HELCOM LIST OF NON-INDIGENOUS AND CRYPTOGENIC SPECIES IN THE BALTIC SEA (VERSION 2)

This is an updated version (approved by HELCOM HABITAT 12/2010) of the *HELCOM List of non-indigenous and cryptogenic species in the Baltic Sea* (Version 0) and the *HELCOM Target species list* (Version 0), both approved by HELCOM HOD 27/2008. Mammals, birds and terrestrial species have been excluded. Freshwater species that might occur in Baltic Sea states, but do not occur in the Baltic Sea, have also been excluded. The species already on the HELCOM list of non-indigenous and cryptogenic species have been excluded from the draft HELCOM Target species list.

Part I of the *HELCOM list of non-indigenous and cryptogenic species in the Baltic Sea* contains species whose current occurrence in the Baltic Sea has been confirmed and the **Part II** contains species whose current occurrence in the Baltic Sea is possible but there is no firm indication of their distribution. As a new feature potential areas of secondary dispersal have been marked with prefix *2°* in the column "Area of origin". Unless otherwise indicated at the bottom of the table, the source of information is the Baltic Sea Alien Species Database (http://www.corpi.ku.lt/nemo/mainnemo.html, referred to 28.8.2009).

BP = Baltic Proper, CL = Curonian Lagoon, GoB = Gulf of Bothnia, GoF = Gulf of Finland, GoR = Gulf of Riga, K = Kattegat and Belt Sea, OL = Odra Lagoon, VL = Vistula lagoon, LF = Limfjord and KF = Kattegat N coast of Sjælland, Isefjord, Roskilde Fjord.

Salinity range: N = in native habitat, B = in Baltic Sea, Lab= laboratory experiment. Salinity ranges are not exact since the intervals of the Venice system[1] have been used (< 0,5, 0,5-3, 3-5, 5-10, 10-18, 18-30, 30-40, > 40 psu).

Part I

No.	Species	Taxon	Area of origin	Distribution in the BS	First observed	Status	Characteristics	Vector	Impact
1	***Acartia tonsa***	**Crustacea**	**Indo-Pacific, North America**	**GoB, GoF, GoR, K, OL, BP[11], VL[11]**	**1924**	**Established**	**Zooplankton suspension feeder. Salinity range: N: 18-30 psu, B: 0.5-30 psu**	**Shipping**	**Competition**
2	***Aglaothamnion halliae[6]***	**Rhodo-phycea**	**North America**	**K[11]**	**2003**	**Established**		**Shipping**	**Unknown**
3	***Alexandrium tamarense***	**Dinophycea**	**Unknown**	**K**	**1968[9]**	**Established**	**Phytoplankton, autotroph. Salinity range: ?**	**Shipping**	**Toxicity, aquaculture**
4	***Alexandrium minimum[10]***	**Dinophycea**	**Unknown**	**K, LF[11], KF[11]**	**2000's**	**Established**	**Phytoplankton. Salinity range:?**	**?**	**Toxicity**
5	***Alkmaria romijni*** **(tentacled lagoon worm)[2]**	**Polychaeta**	**Unknown**	**BP[3, 4], OL[11], K[11]**	**?**	**Established**	**Benthic suspension feeder. Salinity range 5-48 psu**	**Shipping**	**Unknown**
6	***Ameira divagans***	**Crustacea**	**North America**	**K**	**1970's**	**Established**	**Zooplankton suspension feeder. Salinity range:?**	**Shipping**	**Unknown**
7	***Anguillicola crassus***	**Nematoda**	**Indo-Pacific**	**BP, CL, K, OL, VL, LF[11], KF[11]**	**1980's**	**Established**	**Invertebrate parasite. Salinity range: N: 0-30 psu, B: 0-10 psu**	**Associated**	**Parasitism, aquaculture**

8	*Balanus improvisus* (barnacle)	Crustacea	North America	BP, CL, GoB, GoF, GoR, K, OL, VL, LF[11], KF[11]	1844	Established	Benthic suspension feeder. Salinity range: N: 18-40 psu, B: 0.5-30 psu	Shipping	Shipping, constructions, competition, water abstractions
9	*Boccardia (syn. Polydora) redeki*	Polychaeta	North Sea	BP, GoB, GoF[11]	1960	Established (Not considered alien in Denmark) [9]	Benthic suspension feeder. Salinity range: B: 3-10 psu	Shipping	Unknown
10	*Boccardiella ligerica*[2]	Polychaeta	?	K	?	Established	Benthic suspension feeder.	Unknown	Unknown
11	*Bonnemaisonia hamifera* (pink cotton wool)	Rhodo-phycea	China Seas	K, VL[11], LF[11], KF[11]	1902	Established	Macrophyte. Salinity range: B: 5-30 psu	Associated, shipping	Competition
12	*Bougainvillia rugosa*	Hydrozoa	North America	K	1960's[9]	Established	Benthic suspension feeder. Salinity range: N: 18-30 psu, B: 5-30 psu	Shipping	Unknown
13	*Branchiura sowerbyi*	Oligochaeta	Indo-Pacific	OL	1976	Established	Benthic deposit feeder. Salinity range: N: < 0.5 psu, B: < 0.5	Shipping	Habitat change, competition
14	*Carassius gibelio* (gibel carp)	Pisces	Asia, Siberia (inland waters)	BP, CL, GoF, GoR, VL, OL[11]	1889	Established (not in GoF)	Fish, bentophagous. Salinity range: B: 0-5 psu	Stocking	Competition, hybridization, fisheries
15	*Cercopagis pengoi* (fish-hook water flea)	Crustacea	Ponto-Caspian	BP, CL, GoB, GoF, GoR, K, VL	1992	Established	Zooplankton, predator. Salinity range: N: < 0.5 psu, B: 0.5–10 psu	Shipping	Food-web, competition, fisheries
16	*Chaetogammarus ischnus*	Crustacea	Ponto-Caspian	CL, GoF, OL, VL, BP[11]	1928[11]	Established	Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0–5 psu	Stocking	Competition, fisheries
17	*Chaetogammarus warpachowskyi*	Crustacea	Ponto-Caspian	CL, GoF[12], BP[11]	1962[11]	Established	Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0–10 psu	Stocking	Competition, fisheries
18	*Chara connivens* (convergent stonewort)	Characea	West Europe (inland waters)	BP, GoB, K, OL, GoF[11], GoR[11]	1858	Established	Macrophytes. Salinity range N: < 0.5 psu, B: 0–10 psu	Shipping	Competition

19	***Chelicorophium (syn. Corophium) curvispinum***	**Crustacea**	**Ponto-Caspian**	**CL, K, OL, VL, GoF[11], BP[11]**	**1900's**	**Established**	**Benthic deposit feeder. Salinity range B: 0–10 psu**	**Shipping**	**Competition, food-web, water abstractions**
20	***Chelon (syn. Mugil) labrosus*** **(mullet)**	**Pisces**	**Indo-Pacific**	**KF[11], K[11]**	**1998**	**Established**	**Fish, bentophagous. Salinity range: N: 0-30 psu, B: 3-10 psu**	**Unknown**	**Unknown**
21	***Codium fragile*** **(dead man's fingers)**	**Chloro-phycea**	**Indo-Pacific**	**K, LF[11]**	**1919[9]**	**Established**	**Macrophyte. Salinity range N: 18-40 psu, B: 18-30 psu**	**Associated, shipping**	**Competition, habitat change, fisheries human health, tourism**
22	***Colpomenia peregrina*** **(oyster thief)**	**Phaeo-phyceae**	**Pacific**	**K, LF[11]**	**1930**	**Established**	**Macrophyte. Salinity range:?**	**Associated**	**Aquaculture**
23	***Cordylophora caspia*** **(Brackish water hydroid)**	**Hydrozoa**	**Ponto-Caspian**	**CL, GoB, GoF, GoR, K, OL, VL, BP[11]**	**1800's**	**Established**	**Benthic suspension feeder. Salinity range N: 0-40 psu, B: 0–18 psu**	**Shipping**	**Competition, habitat change, water abstractions**
24	***Cornigerius maeoticus maeoticus***	**Crustacea**	**Ponto-Caspian**	**GoF**	**2003**	**Unknown**	**Zooplankton predator. Salinity range N: 0-13 psu[8], B: 3–5 psu**	**Shipping**	**Unknown**
25	***Coscinodiscus wailesii***	**Bacillario-phyceae**	**Indo-Pacific, North America**	**K**	**1977[2]**	**Established**	**Phytoplankton, autotroph. Salinity range N: 18-40 psu, B: 5-30 psu**	**Associated, Shipping**	**Competition, habitat change, aquaculture, fisheries, water quality**
26	***Crassostrea gigas*** **(Pacific oyster)**	**Mollusca**	**Japan Sea**	**K, LF[11], KF[11]**	**1985**	**Established[2]**	**Benthic suspension feeder. Salinity range N: 18-40 psu, B: 5-10 psu**	**Stocking**	**competition, habitat change, hybridization, transfer of parasites and diseases, aquaculture, fisheries, tourism**
27	***Crepidula fornicata*** **(slipper limpet)**	**Mollusca**	**North America**	**K, LF[11]**	**1934[9]**	**Established**	**Benthic suspension feeder. Salinity range: N: 18-30 psu, B: 5-30 psu**	**Associated**	**competition, habitat change, transfer of parasites and diseases, aquaculture, fisheries, tourism, water abstractions, water quality**
28	***Cyprinus carpio*** **(carp)**	**Pisces**	**Ponto-Caspian**	**CL, GoF, GoR, VL, BP[11], OL[11]**	**1400's**	**Established (Not in FI)**	**Fish, bentophagous. Salinity range N: < 0.5 psu, B: 0–5 psu**	**Stocking**	**Competition, habitat change, water quality, fisheries**
29	***Dasya baillouviana***	**Rhodo-phycea**	**Pacific**	**K, LF[11], KF[11]**	**1950's**	**Established**	**Macrophytes. Salinity range B: 18-30 psu**	**Shipping**	**Unknown**
30	***Dictyota dichotoma[9]***	**Phaeophyta**	**Atlantic Mediterranean**	**LF[11]**	**?**	**Established (limited range)**	**Macrophyte**	**Unknown**	**Unknown**

31	***Dikerogammarus haemobaphes***	**Crustacea**	**Ponto-Caspian**	**VL, OL[11]**	**1997**	**Established**	**Nekto-benthic invertebrate. Salinity range B: 0-3 psu**	**Stocking**	**Competition**
32	***Dikerogammarus villosus* (Killer shrimp)[16]**	**Crustacea**	**Ponto-Caspian 2°Central European rivers**	**OL**	**1999**	**Established**	**Nekto-benthic invertebrate. Salinity range: 0-20 psu. Salinity range B: 0-3 psu**	**Stocking, Shipping**	**Competition, predation, host for parasite**
33	***Dreissena bugensis* (quagga mussel)[14]**	**Mollusca**	**Ponto-Caspian**	**GoF**	**2004**	**Unknown**	**Benthic suspension feeder. Salinity range N: < 0.5 psu, B: 0-3 psu**	**Shipping**	**Competition, habitat change, fisheries, human health, tourism, water quality**
34	***Dreissena polymorpha* (zebra mussel)**	**Mollusca**	**Ponto-Caspian**	**CL, GoF, GoR, OL, VL, BP[11], K[11]**	**1800's**	**Established**	**Benthic suspension feeder. Salinity range N: < 0.5 psu, B: 0-3 psu**	**Shipping**	**Competition, habitat change, transfer of parasites and diseases, aquatic transport, fisheries, human health, water abstractions, water quality**
35	***Elodea canadensis* (American waterweed)**	**Plantae**	**North America**	**GoB, GoF[11]**	**1870's**	**Established**	**Macrophyte. Salinity range N: < 0.5 psu, B: 0-3 psu**	**Ornamental**	**Competition, habitat change, aquatic transport, fisheries, water abstractions**
36	***Ensis americanus (syn. E. directus,* American jack knife clam)**	**Mollusca**	**North America**	**K, LF[11], KF[11]**	**1981**	**Established**	**Benthic deposit feeder. Salinity range: N: 18-40 psu, B: 10-30 psu**	**Shipping**	**Competition, habitat change, fisheries, human health**
37	***Eriocheir sinensis* (Chinese mitten crab)**	**Crustacea**	**China Seas**	**BP, CL, GoB, GoF, GoR, K, OL, VL, LF[11], KF[11]**	**1926**	**Not established (migrating to the Baltic from Atlantic rivers)**	**Benthic omnivore. Salinity range: N: 0-30 psu, B: 0-30 psu**	**Shipping**	**Competition, habitat change, transfer of parasites and diseases, aquaculture, fisheries, tourism, water abstractions**
38	***Evadne anonyx***	**Crustacea**	**Ponto-Caspian**	**GoF, BP[11], GoR[11], GoB[11]**	**1999**	**Established**	**Zooplankton predator. Salinity range N: 9-13.5 psu[8], B: 0.5-3 psu**	**Shipping**	**Competition**
39	***Ficopomatus enigmaticus* (Australian tubeworm)[14]**	**Polychaeta**	**Cryptogenic Indo-Pacific 2°Black Sea**	**K**	**1953**	**Established**	**Benthic suspension feeder. Salinity range: N: 18-40 psu, B: 5-30 psu. T > 1°C**	**Shipping Fisheries (oyster vector)**	**Habitat change, aquatic transport, water abstractions, water quality**

40	***Fucus evanescens***	**Phaeo-phyceae**	**North America**	**K, BP[11], KF[11]**	**1924**	**Established**	**Macrophyte. Salinity range: N: 18-40 psu, B: 5-30 psu**	**Shipping**	**Competition, habitat change, hybridization**
41	***Gammarus tigrinus***	**Crustacea**	**North America**	**CL, GoF, GoR, K, OL, VL, GoB[11]**	**1975**	**Established**	**Nekto-benthic invertebrate. Salinity range: N: 0-30 psu, B: 0-30 psu**	**Shipping**	**Competition, transfer of parasites and diseases, fisheries**
42	***Garveia franciscana***	**Hydrozoa**	**North America**	**K[11]**	**1950**	**Unknown**	**Benthic suspension feeder. Salinity range: ?**	**Shipping**	**Competition, habitat change, water abstractions**
43	***Gmelinoides fasciatus***	**Crustacea**	**Asia, Siberia (inland waters)**	**GoF[12]**	**1972**	**Established**	**Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0.5-3 psu**	**Stocking**	**Competition, water abstractions**
44	***Gonionemus vertens*** **(clinging jellyfish)**	**Hydrozoa**	**Pacific**	**K**	**1960**	**Not established**	**Nekto-benthic invertebrates. Salinity range: ?**	**Associated**	**Unknown**
45	***Gracilaria vermicullophylla***	**Rhodo-phycea**	**Japan Sea**	**K, LF[11]**	**2003[9]**	**Established[9]**	**Phytobenthic red alga. Salinity range: N: 18-40 psu, B: 10-18 psu. (or survival 2-50 psu and reprod. at 5-> psu). Temp minimum at 5 C or lower.**	**Shipping**	**Competition**
46	***Hemimysis anomala*** **(bloody red shrimp)**	**Crustacea**	**Ponto-Caspian**	**BP, CL, GoB, GoF, OL, VL**	**1962**	**Established**	**Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0-10 psu**	**Stocking**	**Competition**
47	***Heterosiphonia japonica*[5]**	**Rhodophyta**	**Asia[11]**	**K, LF[11]**	**2004[9]**	**Established**		**Aquaculture[11] Shipping[11]**	**Competition, habitat modification[11]**
48	***Ictalurus melas*** **(catfish)**	**Pisces**	**North America**	**?**	**1980's**	**Established**	**Fish, predator. Salinity range N: < 0.5 psu**	**Stocking**	**Competition, aquaculture, fisheries**
49	***Jaera sarsi***	**Crustacea**	**Ponto-Caspian**	**GoF[12]**	**2004**	**Unknown**	**Benthic omnivor. Salinity range: ?**	**Unknown**	**Grazing**
50	***Karenia (syn. Gymnodinium) mikimotoi***	**Dinophycea**	**Unknown**	**K, LF[11]**	**1968[9]**	**Established**	**Phytoplankton, autotroph. Salinity range: ?**	**Shipping**	**Competition, fisheries, toxicity**
51	***Lepomis gibbosus*** **(pumpkinseed)**	**Pisces**	**North America**	**OL**	**1975**	**Established**	**Fish, bentophagou. Salinity range N: < 0.5 psu, B: 0-5 psu**	**Ornamental**	**Competition, fisheries**

52	*Limnomysis benedeni*	Crustacea	Ponto-Caspian	CL, BP[11], GoF[11]	1962	Established	Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0-5 psu	Stocking	Unknown
53	*Limulus polyphemus* (horseshoe crab)	Crustacea	North America	K	1968	Not established	Benthic omnivor. Salinity range: ?	Shipping	Fisheries
54	*Lithoglyphus naticoides* (gravel snail)	Mollusca	Ponto-Caspian	CL, VL, OL[11], BP[11]	1800's	Established	Benthic deposit feeder. Salinity range N: < 0.5 psu, B: 0-5 psu	Shipping	Transfer of parasites and diseases
55	*Maeotias marginata* (Black Sea jellyfish)[14]	Hydrozoa	Ponto-Caspian 2°North Sea & North America	GoF[6]	1999	Not established[6]	Zooplankton predator. Salinity range B: 5-10 psu	Shipping	Competition, predation[6]
56	*Marenzelleria arctica*	Polychaeta	Arctic waters	BP, GoB	2005	Unknown	Salinity range N: 0-30 psu	Shipping	Competition
57	*Marenzelleria neglecta*	Polychaeta	North America	BP, CL, GoB, GoF, GoR, K, OL, VL	1985	Established	Benthic deposit feeder, Benthic suspension feeder. Salinity range: N: 18-40 psu, B: 0.5-30 psu	Shipping	Competition, habitat change, fisheries
58	*Marenzelleria viridis*	Polychaeta	North America	GoB, K, BP[11], OL[11], KF[11], VL[11]	2005	Established	Benthic deposit feeder. Salinity range: ?	Shipping	Unknown
59	*Mastocarpus stellatus*[2]	Rhodo-phycea	?	K, LF[11]	1969	Established[9]	Macrophyte. Salinity range:?	Shipping	
60	*Mertensia ovum*	Hydrozoa	Arctic Seas	BP[11], GoF[11], GoB[11]	?	Established	?	?	?
61	*Micropterus dolomieu* (smallmouth bass)	Pisces	North America	K	1890	Unknown	Fish, predator. Salinity range N: < 0.5 psu	Unknown	Competition, aquaculture, fisheries
62	*Mnemiopsis leidyi* (American comb jelly)	Ctenophora	North America	BP, GoB[5], GoF[5], K, OL, LF[11], KF[11]	2006	Unknown[11]	Zooplankton predator. Salinity range: N: 2-40 psu, B: 4.5-28 psu[5]	Shipping	Competition, predation, fisheries
63	*Molgula manhattensis*[11]	Tunicata	?	K, BP[11], KF[11], LF[11]		Established	Benthic suspension feeder		

64	*Mya arenaria* (soft-shell clam)	Mollusca	North America	BP, CL, GoB, GoF, GoR, K, OL, VL, LF[11], KF[11]	1200's	Established	Benthic suspension feeder. Salinity range: N: 18-40 psu, B: 3-10 psu	Shipping	Competition, habitat change, fisheries, tourism, water quality
65	*Mytilicola intestinalis*[11]	Crustacea	Mediterranean[8]	LF[11]		Established	Parasite on bivalves	Aquaculture, shipping[8]	
66	*Mytilopsis (syn. Congeria) leucophaeata* (Conrad's false mussel)[16]	Mollusca	Africa, NW coast 2°Atlantic Coast	GoF, GoB[11], K[11]	1930's	Established	Benthic suspension feeder. Salinity range: N: 0-30 psu, B: 0-10 psu	Shipping	Competition, aquatic transport, water abstractions
67	*Neogobius (syn. Apollonia) melanostomus* (round goby)	Pisces	Ponto-Caspian	BP, CL, GoF, GoR, K, VL, GoB[11], OL[11]	1990	Established	Fish, predator. Salinity range N: < 0.5 psu, B: 0-10 psu	Shipping	Competition, habitat change, fisheries
68	*Neogobius fluviatilis fluviatilis* (Monkey goby[11, 15])	Pisces	Ponto-Caspian 2°Volga River	VL[11], BP[11] (only in Gulf of Gdansk)	2007	Unknown	Fish. Salinity range: ?		
69	*Obesogammarus crassus*	Crustacea	Ponto-Caspian	CL, VL	1962	Established	Nekto-benthic invertebrate. Salinity range N: < 0.5 psu, B: 0-5 psu	Stocking	Competition
70	*Odontella sinensis*	Bacillario-phyceae	Indo-Pacific	K, LF[11]	1903	Established	Phytoplankton autotroph. Salinity range B: 5-30 psu	Shipping	Competition
71	*Oncorhynchus mykiss* (Rainbow trout)	Pisces	Pacific	CL, GoB, GoF, K, VL, BP[11], GoR[11], OL[11], LF[11], KF[11]	1890	Established	Fish, predator. Salinity range: N: 0-40 psu, B: 0-5 psu	Stocking	Competition, habitat change, hybridization, transfer of parasites and disease, aquaculture
72	*Orchestia cavimana*	Crustacea	Ponto-Caspian	BP, OL, K[11], VL[11]	1970's	Established	Nekto-benthic invertebrate. Salinity range: ?	Shipping	Unknown
73	*Orconectes limosus* (spiny-cheek crayfish)	Crustacea	North America	CL, OL, BP[11]	1890	Established	Benthic omnivor Salinity range: B: 0-10 psu	Stocking	Competition, aquaculture
74	*Orconectes virilis* (northern crayfish)	Crustacea	North America	K	1960	Established	Benthic omnivor. Salinity range: survival upto 10psu	Stocking	Unknown

75	***Pachycordyle navis (syn. Clavopsella navis, Cordylophora dispar)***	**Hydrozoa**	**Africa, S coast**	**K, BP[11], KF[11]**	**1960**	**Not established**	**Benthic suspension feeder. Salinity range N: 18-30 psu, B: 10–30 psu**	**Shipping**	**Unknown**
76	***Pacifastacus leniusculus*** **(signal crayfish)**	**Crustacea**	**North America**	**GoB**	**1960's**	**Established**	**Benthic omnivor. Salinity range: B: 3-5 psu**	**Stocking**	**Competition, habitat change, transfer of parasites and disease, aquaculture**
77	***Palaemon elegans***	**Crustacea**	**North Sea**	**BP, GoF, K, VL, CL[11], OL[11], LF[11], KF[11]**	**1920's**	**Unknown (Not considered alien in Denmark)**	**Benthic omnivor. Salinity range: B: 0.5-5 psu**	**Shipping**	**Competition**
78	***Palaemon longirostris***	**Crustacea**	**West Europe**	**BP**	**1999**	**Unknown**	**Salinity range: ?**	**Unknown**	**Unknown**
79	***Paramysis lacustris***	**Crustacea**	**Ponto-Caspian**	**CL, GoF, BP[11]**	**1962**	**Established**	**Nekto-benthic invertebrate. Salinity range: N: < 0.5 psu, B: 0-10psu**	**Stocking**	**Unknown**
80	***Paramysis intermedia***	**Crustacea**	**Ponto-Caspian**	**GoF, GoR**	**2009**	**Established**	**Nekto-benthic invertebrate. Salinity range: N: < 0.5 psu, B: ?**	**?**	**Food-prey**
81	***Paranais frici***	**Oligochaeta**	**Ponto-Caspian**	**GoF**	**1970's**	**Established**	**Benthic deposit feeder. Salinity range: N: < 0.5 psu, B: 0-10 psu**	**Shipping**	**Competition**
82	***Penilia avirostris***	**Cladocera**	**?**	**K, LF[11]**	**2001[9]**	**Established**	**Salinity range: 0-49 psu. Limited to warm temperate waters.**	**?**	**?**
83	***Percottus glehni*** **(Amur sleeper)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoF, VL**	**1916**	**Established**	**Fish, predator. Salinity range: N: < 0.5 psu, B: 0-5 psu**	**Ornamental**	**Competition**
84	***Petricola pholadiformis*** **(American piddock)**	**Mollusca**	**North America**	**K, LF[11]**	**1926**	**Established**	**Benthic suspension feeder. Salinity range: B: 10-30 psu**	**Associated**	**Competition, habitat change**
85	***Platorchestia platensis[9]***	**Crustacea**		**K, BP[11]**		**Established**			
86	***Pleurosira leavis f. polymorpha***	**Bacillario-phyceae**	**Unknown**	**BP[13]**	**1900's**	**Established**	**Phytoplankton autotroph. Salinity range: ?**	**Associated**	**Unknown**

87	***Polysiphonia* (former *Neosiphonia) harveyi***	**Rhodo-phycea**	**Western Pacific, Japan Sea**	**K**	**1964[9]**	**Established**	**Macrophyte. Salinity range: ?**	**Shipping**	**Competition, hybridization, water abstraction, Epiphytic on macroalgae and seagrasses**
88	***Pontogammarus robustoides***	**Crustacea**	**Ponto-Caspian**	**CL, GoF, OL, VL**	**1962**	**Established**	**Nekto-benthic invertebrate. Salinity range: N: < 0.5 psu, B: 0-5 psu**	**Stocking**	**Competition, hybridization, transfer of parasites and disease**
89	***Potamopyrgus antipodarum***	**Mollusca**	**Pacific**	**BP[3], CL, GoB, GoF, GoR, K, OL, VL, LF[11], KF[11]**	**1887**	**Established**	**Benthic deposit feeder. Salinity range: N: 0-30 psu, B: 0-18 psu**	**Shipping**	**Competition, transfer of parasites and disease, water abstraction**
90	***Potamothrix bavaricus*[2]**	**Oligochaeta**	**Ponto-Caspian**	**K[11], BP[11]**	**?**	**Established**	**Salinity range: ?**	**Shipping[6]**	**Decomposition, Resource allocation, Abiotic changes**
91	***Potamothrix bedoti***	**Oligochaeta**	**Ponto-Caspian**	**BP[11], GoF[11]**	**1980's**	**Established**	**Salinity range: 0-0.1 psu. Temp range 0-34C**	**Unknown**	**Unknown**
92	***Potamothrix heuscheri***	**Oligochaeta**	**Ponto-Caspian**	**?**	**1910's**	**Established**	**Benthic deposit feeder. Salinity range: B: < 0.5 psu**	**Shipping[6]**	**Decomposition, Resource allocation, Abiotic changes**
93	***Potamothrix moldaviensis***	**Oligochaeta**	**Ponto-Caspian**	**K[11]**	**1980's**	**Established**	**Freshwater and can tolerate brief salinity increase. Reproduces at 10 degrees C.**	**Shipping[6]**	**Decomposition, Resource allocation, Abiotic changes**
94	***Potamothrix vejdovskyi***	**Oligochaeta**	**Ponto-Caspian**	**GoF**	**1900's**	**Established**	**Benthic deposit feeder. Salinity range: B: < 0.5 psu**	**Shipping**	**Competition**
95	***Prorocentrum minimum***	**Dinophycea**	**Unknown**	**BP, CL, GoF[11], K[11], GoR[11], LF[11], KF[11]**	**1970's**	**Established**	**Phytoplankton autotroph. Salinity range: N: 18-40 psu, B: 0.5-30 psu**	**Shipping**	**Toxicity, aquaculture, human health**
96	***Protomonostroma undulatum*[2]**	**Chloro-phyceae**	**Unknown**	**K**	**?**	**Unknown**	**Macrophyte. Salinity range:?**	**Unknown**	**Unknown**
97	***Pseudodactylogyrus anguillae***	**Mono-genoidea**	**Pacific**	**K, VL**	**1980's**	**Established**	**Invertebrate parasite. Salinity range: B: 0-5 psu**	**Associated**	**Parasitism, fisheries**
98	***Pseudodactylogyrus bini***	**Mono-genoidea**	**Pacific**	**?**	**1980's**	**Established**	**Invertebrate parasite. Salinity range: ?**	**Associated**	**Parasitism, fisheries**
99	***Rhithropanopeus harrisii* (Harris mud crab)**	**Crustacea**	**North America**	**BP, K, OL, VL**	**1948**	**Established**	**Benthic omnivor. Salinity range: N: 18-30 psu B: 0.5-18 psu**	**Shipping**	**Competition**

100	*Sargassum muticum* (japweed)	Phaeo-phyceae	Japan Sea	K, LF[11]	1984	Established	Macrophyte. Salinity range: N: 18-40 psu B: 5-30 psu	Associated	Competition, habitat change, aquatic transport, fisheries, tourism, water abstraction
101	*Spartina anglica*[9]	Plantae	Hybrid developed in Britain. North Sea, North America[10], South Africa[10], New Zeeland[10], Asia[10]	K[11], LF[11]	1948[9]	Established[9]	Macrophyte, brackish waters[10]	Planting, floating, birds[10]	Habitat change, competition[10]
102	*Stenocuma graciloides*	Crustacea	Ponto-Caspian	GoF	2004	Unknown	Benthic deposit feeder. Salinity range: N: < 0.5 psu B: 3-5 psu	Shipping	Unknown
103	*Styela clava* (stalked sea squirt)[16]	Tunicata	Pacific [2°]North Sea	K, LF[11]	1980's	Established	Benthic suspension feeder. Salinity range: N: 18-40 psu B: 18-30 psu	Shipping Aquaculture	Competition, aquaculture, aquatic transport
104	*Teredo navalis* (shipworm)	Mollusca	China Seas	K, LF[11], KF[11]	1853	Established	Wood-borer. Salinity range: N: 18-40 psu B: 10-30 psu	Shipping	Habitat change, aquatic transport, water abstraction
105	*Thalassiosira punctigera*	Bacillario-phyceae	Unknown	K	1979	Established	Phytoplankton autotroph. Salinity range: B: 10-30 psu	Associated Shipping	Unknown
106	*Tharyx killariensis*[5] (*syn. Caulleriella killariensis)*	Polychaeta	?	K		Unknown	Unknown	Unknown	Unknown
107	*Tubificoides pseudogaster*	Oligochaeta	North Sea	GoF, BP[11], K[11]	2000's	Established	Benthic deposit feeder. Salinity range: ?	Unknown	Competition
108	*Verrucophora farcimen*[2]	Dictyocho-phyceae	Japan	K	1998	Unknown	Phytoplankton, autotroph. Salinity range: Lab: 10-35 psu	Shipping	Toxicity, aquaculture
109	*Victorella pavida* (trembling sea mat)[16]	Bryozoa	Indian Ocean	GoB, K[11], BP[11], GoF[11]	1960's	Established[6]	Benthic suspension feeder. Salinity range: 1-27 psu[3]	Shipping	Competition, habitat change

Part II

No.	Species	Taxon	Area of origin	Distribution in the BS	First observed	Status	Characteristics	Vector	Impact
111	***Acipenser baeri*** **(Siberian sturgeon)**	**Pisces**	**Asia, Siberia (inland waters)**	**CL, GoF, GoR, VL**	**1962**	**Not established**	**Fish, predator. Salinity range: N: < 0.5 psu, B: 0-3 psu**	**Stocking**	**Hybridization**
112	***Acipenser gueldenstaedti*** **(Russian sturgeon)**	**Pisces**	**Ponto-Caspian**	**CL, GoF, GoR, VL**	**1962**	**Not established**	**Fish, predator. Salinity range: N: 0-30 psu, B: 0-10 psu**	**Stocking**	**Hybridization**
113	***Acipenser ruthenus*** **(starlet)**	**Pisces**	**Ponto-Caspian**	**CL, GoB, GoF, GoR, VL**	**1948**	**Not established**	**Fish, predator. Salinity range: N: < 0.5 psu, B: 0-3 psu**	**Stocking**	**Hybridization**
114	***Acipenser stellatus*** **(starry sturgeon)**	**Pisces**	**Ponto-Caspian**	**GoB**	**1999**	**Unknown**	**Fish, predator. Salinity range: N: 0-30 psu**	**Stocking**	**Transfer of parasites and diseases**
115	***Acipenserobdella volgensis*** **[2]**	**Annelida**	**Unknown**	**?**	**?**	**Unknown**	**Invertebrate parasite. Salinity range:?**	**Unknown**	**Unknown**
116	***Aristichthys nobilis*** ***(*****bighead carp*****)***	**Pisces**	**Asia, Siberia (inland waters)**	**GoR**	**1960's**	**Unknown**	**Fish, planktivorous. Salinity range: N: < 0.5 psu, B: 3-10 psu**	**Stocking**	**Competition**
117	***Astacus leptodactylus*** **(Danube crayfish)[2]**	**Crustacea**	**Ponto-Caspian**	**Denmark, possibly only in freshwaters**	**?**	**Established**	**Benthic omnivore. Salinity range:?**	**Unknown**	**Unknown**
118	***Aeromonas salmonicidae*** **[6]**	**Bacteria**	**North America**	**In Sweden and Finland, possibly only in freshwaters**	**?**	**Established**	**Bacterial parasite. Salinity range:?**	**Aquaculture**	**Unknown**
119	***Callinectes sapidus*** **(blue crab)[14]**	**Crustacea**	**North America**	**K**	**1951**	**Not established**	**Benthic predator. Salinity range: N: 18-40 psu, B: 5-10 psu**	**Shipping**	**Predation, fisheries**
120	***Catostomus catostomus rostratus*** **(longnose sucker)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoF**	**1980's**	**Unknown**	**Fish, bentophagous. Salinity range: N: < 0.5 psu, B: 3-5 psu**	**Stocking**	**Hybridization**
121	***Corbicula fluminea*** **[2, 7, 18, 20]**	**Mollusca**	**Asia**	**Poland & Germany possibly only in freshwaters.**	**2003**	**Estalished**	**Benthic suspension feeder. Salinity range: < 5 psu.**	**Stocking Shipping**	**Unknown, clogging of pipes**

122	***Coregonus autumnalis migratorius* (Baikal omul)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoF**	**1957**	**Unknown**	**Fish, planktivorous. Salinity range N: < 0.5 psu, B: 3–5 psu**	**Stocking**	**Fisheries**
123	***Coregonus muksun* (muksun)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoF**	**1970**	**Unknown**	**Fish, planktivorous. Salinity range N: < 0.5 psu, B: 3–5 psu**	**Stocking**	**Fisheries**
124	***Coregonus nasus* (broad whitefish)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoF**	**1960**	**Unknown**	**Fish, planktivorous. Salinity range N: < 0.5 psu**	**Stocking**	**Transfer of parasites and diseases, fisheries**
125	***Coregonus peled* (peled)**	**Pisces**	**Asia, Siberia (inland waters)**	**CL, GoB, GoF, VL**	**1965**	**Unknown**	**Fish, planktivorous. Salinity range N: < 0.5 psu**	**Stocking**	**Hybridization, aquaculture, fisheries**
126	***Crassostrea virginica* (American oyster)[18]**	**Mollusca**	**North America 2°NW Atlantic**	**K**	**1880**	**Not established**	**Benthic suspension feeder. Salinity range N: 18-40 psu, B: 5-30 psu**	**Stocking Aquaculture[21]**	**habitat change, hybridization, aquaculture, aquatic transport, water quality**
127	***Ctenopharyngodon idella* (grass carp)**	**Pisces**	**Asia, Siberia (inland waters)**	**K**	**1970**	**Not established**	**Fish, phytophagous. Salinity range N: < 0.5 psu, B: 10-30 psu**	**Stocking**	**Competition, change of habitat, transfer of parasites and diseases, aquaculture, fisheries, water quality**
128	***Elminius modestus*[5]**	**Crustacea**	**Pacific**	**K**	**2007[9]**	**Not established**		**Shipping[5, 9]**	
129	***Gymnodinium catenatum*[10]** (The species has been re-identified by Danish as native Gymnodinium nolleri. Ellegaard & Moestrup, 1999).	**Dinophycea**	**Unknown**	**K**	**1993**	**Established**	**Phytoplankton, autotroph. Salinity range N: < 0.5 psu, B: 10-18 psu**	**Shipping**	**Competition, toxicity, aquaculture, fisheries, human health**
130	***Homarus americanus*[9] (American lobster)**	**Crustacea**	**North America**	**K**	**2007**	**Not established**			
131	***Hypophthalmichthys molitrix* (silver carp)**	**Pisces**	**Asia, Siberia (inland waters)**	**GoR, VL**	**1960**	**Unknown**	**Fish, planktivorous. Salinity range N: < 0.5 psu, B: 0.5-5 psu**	**Stocking**	**Competition, aquaculture, fisheries, human health, water quality**

132	*Huso huso* (Beluga sturgeon)	Pisces	Ponto-Caspian	GoR	1962	Unknown	Fish, predator. Salinity range: N: 0-30 psu, B: 3-5 psu	Stocking	Hybridization
133	*Ictalurus* punctatus (channel catfish)[6]	Pisces	North America	Estonia and Lithuania, possibly only in freshwaters.	1975	Not established	Fish, predator. Salinity range:?	Stocking	Competition
134	*Morone* saxatilis (striped bass)[6]	Pisces	North America	Latvia and Lithuania, possibly only in freshwaters.	1964	Not esteblished	Fish, predator. Salinity range:?	Unknown	Unknown
135	*Neanthes succinea*[9] *(syn. Nereis succinea)*	Poly-chaeta		K		Established (Cryptogenic in DK)			
136	*Neogobius kessleri*[2]	Pisces	Ponto-Caspian	K (single record in Germany).	?	Not established	Fish, predator. Salinity range:?	Unknown	Unknown
137	*Oncorhynchus clarki* (cuttroath trout)	Pisces	Pacific	K	1960's	Not established	Fish, predator. Salinity range: N: 0-40 psu, B: 5-30 psu	Stocking	Habitat change, hybridization, aquaculture
138	*Oncorhynchus gorbusha* (pink salmon)[16]	Pisces	North Pacific	GoR	1973	Not established	Fish, predator. Salinity range B: 3-5 psu	Stocking	Competition, hybridization, transfer of parasites and disease, fisheries
139	*Oncorhynchus keta* (chum salmon)	Pisces	Pacific	GoR	1971	Not established	Fish, predator. Salinity range: N: 0-40 psu, B: 3-5 psu	Stocking	Competition, aquaculture, fisheries
140	*Oncorhynchus kisutch* (coho salmon)	Pisces	Pacific	BP[3]	1975	Not established	Fish, predator. Salinity range: N: 0-40 psu	Stocking	Competition, transfer of parasites and disease, aquaculture, fisheries
141	*Oncorhynchus nerka* (sockeye salmon)	Pisces	Pacific	K	1959	Not established	Fish, predator. Salinity range: N: 0-40 psu, B: 5-30 psu	Stocking	Competition, fisheries
142	*Oncorhynchus tshawytcha* (chinook salmon)	Pisces	Pacific	GoB	1933	Not established	Fish, predator. Salinity range: N: 0-40 psu, B: 0,5-5psu	Stocking	Fisheries
143	*Paphia philippinarum*	Mollusca	China Seas	Skagerrak?	1980's	Unknown	Benthic suspension feeder. Salinity range: N: 18-40 psu, B: 18-30 psu	Associated	Unknown
144	*Paranais botniensis*[2]	Oligo-chaeta	?	?	?	?	Benthic deposit feeder. Salinity range: ?	?	?

145	***Pleurosigma simonsenii***	**Bacillario-phyceae**	**Indian Ocean**	**?**	**1980's**	**Unknown**	**Phytoplankton autotroph. Salinity range: ?**	**Shipping**	**Competition**
146	***Pomatocypris humilis***	**Crustacea**	**NW Africa**	**?**	**1948**	**Unknown**	**Benthic deposit feeder. Salinity range: ?**	**Shipping**	**Unknown**
147	***Porphyra cf. insolita*[2] *(syn. P. umbilicalis)***	**Rhodo-phycea**	**North Sea**	**K**	**?**	**Unknown (Not considered alien in Denmark)**	**Macrophyte. Salinity range: ?**	**Shipping**	**Unknown**
148	***Psammoryctides moravicus*[6]**	**Oligo-chaeta**	**Ponto-Caspian**	**Estonia, possibly only in freshwaters**	**?**	**Established**	**Benthic deposit feeder. Salinity range:?**	**Shipping**	**Competition, habitat change**
149	***Salvelinus fontinalis* (brook trout)**	**Pisces**	**North America**	**K**	**1872**	**Not established**	**Fish, predator. Salinity range: N: 0-30 psu B: 3-30 psu**	**Stocking**	**Competition, hybridization, aquaculture**
150	***Salvelinus namaycush* (lake trout)**	**Pisces**	**North America**	**GoB**	**1959**	**Not established**	**Fish, predator. Salinity range: N: < 0,5 psu B: 0.5-3 psu**	**Stocking**	**Hybridization, aquaculture**
151	***Tubifex newaensis*[6]**	**Oligo-chaeta**	**Ponto-Caspian**	**Estonia, possibly only in freshwaters**	**?**	**Established**	**Benthic deposit feeder. Salinity range:?**	**Shipping**	**Competition, habitat change**
152	***Undaria pinnafitida* (Japanese kelp)[2, 16]**	**Phaeo-phyceae**	**Northwestern Pacific [2°] Atlantic ,UK, Mediter-ranean**	**Sweden (absent or extinct).**	**?**	**Not established**	**Macroalgae. Salinity range:?**	**Shipping, aquaculture**	**Competition, aquaculture, fouling**
153	***Valipora campylancristrota*[6]**	**Cestoda**	**Asia, Europe**	**Estonia, possibly only freshwaters.**	**1992**	**Established**	**Noninvertebrate parasite. Salinity range:?**	**Aquaculture**	**Transfer of parasites and disease**

[1]Venice system (1959). The final resolution of the symposium on the classification of brackish waters. Archo Oceanogr. Limnol., 11 (suppl): 243–248.

[2]DAISIE, Delivering Alien Invasive Species Inventories for Europe. (http://www.europe-aliens.org/index.jsp, referred to 16.4.2008)

[3] Alien Species in Swedish Seas. http://www.frammandearter.se, referred to 18.06.2008.

[4]Elena Ezhova, Ludwik Zmudzinski and Krystyna Maciejewska (2005), Long-term trends in the marcrozoobenthos of the Vistula Lagoon, southeastern Baltic Sea. Species composition and biomass distribution. Bulletin of the Sea Fisheries Institute 1 (164) 2005.

[5]Maiju Lehtiniemi, Jari-Pekka Pääkkönen, Juha Flinkman, Tarja Katajisto, Elena, Gorokhova, Miina Karjalainen, Satu Viitasalo and Heidi Björk (2007), Distribution and abundance of the American comb jelly (*Mnemiopsis leidyi*) –A rapid invasion to the northern Baltic Sea during 2007. Aquatic Invasions 2 (4): 445-449.

[6]NOBANIS, North European and Baltic Network on Invasive Alien Species. http://www.nobanis.org/default.asp, referred to 18.4.2008)

[7]http://www.iop.krakow.pl/gatunkiobce/default.asp?nazwa=opis&id=23&je=pl

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[9]Kathe Rose Jensen, Natural History Museum of Denmark, personal communication.

[10] IGLOO report - http://www.blst.dk/NR/rdonlyres/BCBDE528-D5E3-435B-8C23-0771D0E510F7/0/IGLOOdecember2008.pdf

[11] a draft HOLAS Alien species indicator. Information on the indicator can be founding HELCOM MONAS 12/2009 document 7/4, Chapter 4.

[12] Orlova M., Telesh, I., Berezina, N., Anstulevixh, A., Maximov, A. & Litvinchuk, L. 2006. Effects of nonindigenous species on diversity and community functioning in the eastern Gulf of Finland (Baltic Sea). Helgol. Mar. Res. 60: 98-105 pp.

[13] Jansson K. 1994. Alien Species in the Marine Environment. Introductions to the Baltic sea and the Swedish West Coast. Solna, Swedish Environmental Protection Agency: 68pp.

[14] Leppäkoski E., Gollasch S. 2006. Risk Assessment of Ballast Water Mediated Species Introductions – a Baltic Sea Approach. Report to HELCOM, 112 pp. www.helcom.fi/shipping/ballast/en_GB/ballast/

[15] Panov, V., Dgebuadze, Y, Shiganova, T., Filippov, A., Minchin, D. 2007. A risk assessment of biological invasions in the inland waterways of Europe: the Northern Invasion Corridor case study. In. Gherardi, F. (ed.). Biological invaders in inland waters: profiles, distribution and threats, 639-656. 2007, Springer.

[16] Alien Species in Swedish Seas. http://www.frammandearter.se, referred to 18.06.2008.

[18] Appendix 11: List of non-indigenous species, species known to cause harm and Species of Concern in the OSPAR area. Devised from the paper entitled ”Alien Species in the Northeast Atlantic – Status and National Activities in the OSPAR Convention Area”, compiled for OSPAR by the Swedish Environmental Protection Agency in 1998, enhanced with information provided by the IMO, The Netherlands and Sweden.

[20] *Corbicula fluminea* is included in the draft target species list because it occurs in Polish freshwaters, and tolerates salinities up to 5 psu, as according to DAISIE, Delivering Alien Invasive Species Inventories for Europe. (http://www.europe-aliens.org/index.jsp, referred to 16.4.2008)).

[21] NOBANIS, North European and Baltic Network on Invasive Alien Species. (http://www.nobanis.org/default.asp, referred to 18.6.2008)

DRAFT HELCOM TARGET SPECIES LIST (VERSION 2)

The draft *HELCOM Target species list* contains species which may be introduced to the Baltic Sea and may potentially impair or damage the environment, human health, property or resources. The list is based on information from Leppäkoski & Gollasch 2006[1], Panov et al. 2007[2], www.frammandearter.se[3], Great Lakes databases[12], the Black Sea Commission's list on exotic species[4] and the list of non-indigenous species in the OSPAR area[5], if not otherwise indicated. The species already on the *HELCOM list of non-indigenous and cryptogenic species* have been excluded from the *draft HELCOM Target species list*.

The list has been compiled using the assumption that species which have invaded the Black Sea, the North Sea, the Great Lakes and western Atlantic estuaries of North America might also invade the Baltic Sea. This is due to similar climate and salinity ranges, documented invasions between the areas in the past and frequent ship traffic between the areas. The environmental requirements of the species (e.g. salinity and temperature tolerance) have not been taken into account at this stage, except for non-indigenous species in the Great Lakes and western Atlantic estuaries of North America. The next step is to assess the environmental requirements also for the Black Sea and North Sea non-indigenous species, thereby narrowing the list down to species with a high potential to spread to and survive in the Baltic Sea.

No.	Species	Taxon	Area of origin	Invaded areas	Characteristics	Vector	Impact
1	***Achirus fasciatus* (American sole)** [18]	**Pisces**		**Norh Sea**	**Fish**		
2	***Acrochaetium codicolum***[17*]	**Rhodophyta**	**Atlantic**	**Black Sea**	**Macrophyte**	**Shipping**[17*]	
3	***Acervochalina loosanoffi***[18]	**Porifera**		**North Sea**			
4	***Acipenser transmontanus***[18]	**Pisces**	**North America**	**North Sea**	**Fish**		
5	***Alexandrium acantenella***[17]	**Dinophycea**	**Pacific**	**Ponto-Caspian**	**Phytoplankton**	**Shipping**[19]	
6	***Alexandrium affine***[17]	**Dinophycea**	**South-East Asia**	**Ponto-Caspian**	**Phytoplankton**	**Shipping**[19]	
7	***Alexandrium monilatum***[17]	**Dinophycea**		**Ponto-Caspian**	**Phytoplankton**		
8	***Alexandrium pseudogonyaulax***[17]	**Dinophycea**	**East Atlantic, Mediterranean**	**Ponto-Caspian**	**Phytoplankton**		
9	***Amphilochus sp.*** [18, 25]	**Crustacea**	**Unknown**	**Western Atlantic, North Sea**	**Free-living epibenthic, broods offspring. Euryhaline. Established as north as to Gulf St-Lawrence.**	**Unknown**	**Unknown**
10	***Anadara inaequivalvis***[14]	**Mollusca**	**Indo-Pacific**	**Ponto-Caspian, Mediterranean**	**Benthic suspension feeder. Salinity range: brackish-marine**	**Shipping**	**Unknown**
11	***Anodonta woodiana* (Eastern Asiatic freshwater clam)** [17]	**Mollusca**	**East Asia**	**Ponto-Caspian**	**Benthic suspension feeder**		

12	*Antithamnion densum*[18]	Rhodophyceae		North Sea, Atlantic[22]		Shipping[22]	
13	*Apedinella spinifera*[17]	Flagellate	Atlantic, Mediterranean, Pacific[19]	Ponto-Caspian		Shipping[19]	
14	*Asparagopsis armata*[17*]	Rhodophyta	Australia, New Zealand	Black Sea	Macrophyte	Shipping[17*]	
15	*Asterionella japonica*[17]	Bacillariophyceae		Ponto-Caspian	Phytoplankton		
16	*Asterias amurensis* (Northern Pacific sea star) [14]	Echinodermata	Eastern Asia	Australia, cryprogenic in Alaska	Benthic predator, pelagic larvae. Salinity range: marine	Shipping	Predation, aquaculture
17	*Atherina boyeri*[18]	Pisces	Ponto-Caspian	North Sea	Fish		
18	*Azolla caroliniana* (Carolina mosquito fern) [17]	Plantae	North-South America	Ponto-Caspian	Macrophyte	Ornamental[19]	
19	*Azolla filiculoides* (water fern) [17]	Plantae	North-South America	Ponto-Caspian	Macrophyte	Ornamental[19]	
20	*Bacteriastrum hyalinum*[17]	Bacillariophyceae	Atlantic[19]	Ponto-Caspian	Phytoplankton	Shipping[19]	
21	*Balanus amphitrite*[17, 18]	Crustacea	Pacific	Ponto-Caspian, North Sea	Benthic suspension feeder	Shipping[18, 19]	Fouling, habitat modification[19]
22	*Balanus eburneus* (ivory barnacle) [14]	Crustacea	Western Atlantic	North Sea, Ponto-Caspian, India, West Africa	Benthic suspension feeder, planctonic larvae. Salinity range: marine	Unknown	Fouling, habitat modification[19]
23	*Bangia atropurpurea*[25]	Rhodophyta: Bangiaceae	Many areas	Great Lakes	Filamentous red alga, Salinity 2.6 _->	Shipping (hull / ballast)	Fouling, habitat modification
24	*Beroe ovata* [17]	Ctenophora	North America	Ponto-Caspian, Mediterranean	Zooplankton predator	Shipping[19]	Predation[19]
25	*Blackfordia virginica*[14]	Hydrozoa	Ponto-Caspian	North America, South America	Benthic suspension feeder/medusa. Salinity range: brackish	Shipping	Unknown
26	*Bougainvillia megas*[14]	Hydrozoa	North West Atlantic	Ponto-Caspian, Western North America	Benthic suspension feeder. Salinity range: brackish-marine	Unknown	Unknown

27	*Bougainvillia macloviana*[18]	Hydrozoa		North Sea, Atlantic[22]	Benthic suspension feeder	Shipping[22]	
28	*Branchiomma bombyx*[18]	Polychaeta		North Sea			
30	*Calyptraea chinensis* (chinaman's hat)[18]	Mollusca		North Sea			
31	*Cancer pagurus* (edible crab)[18]	Crustacea		North Sea	Benthic predator		
32	*Capitellethus dispar*[17]	Polychaeta	New Zeeland	Ponto-Caspian			
33	*Chaetoceros muelleri subsalsum*[25]	Chaetocerotaceae	Unclear	Great Lakes	Tolerates brackish water	Shipping (ballast)	Unknown
34	*Chondrophycus papillosus*[17*]	Rhodophyta	Red Sea	Black Sea	Macrophyte	Canals(?)[17*]	
35	*Chroodactylon ramosum*[25]	Porphyridiaceae		Great Lakes	A red alga		
36	*Chroomonas acuta*[15]	Cryprophyceae	Ponto-Caspian	Volga River reservoirs	Phytoplankton		
37	*Cirrenalia basiminuta*[17]	Fungi	Indo-Pacific	Ponto-Caspian			
38	*Clupeonella cultiventris*[15]	Pisces	Ponto-Caspian (Caspian Sea)	Azov Sea, Volga River reservoirs	Fish		
39	*Cochlodinium polykrikoides*[17]	Dinophycea	North America, Indo Pacific[6]	Ponto-Caspian	Phytoplankton	Shipping[6]	
41	*Corophium sextonae*[16, 18]	Crustacea	New Zealand	Skagerrak, west coast of UK; Mediterranean		Shipping	
43	*Cryptonemia hibernica*[18]	Rhodophyceae		North Sea			
44	*Desmarestia viridis*[17]	Phaeophyceae	Atlantic	Ponto-Caspian		Shipping[6]	
45	*Diadumene cincta*[18]	Antozoa	North Pacific[21]	North Sea		Shipping[22]	
46	*Diadumene lineata*[25]	Anthozoa	Northwest Atlantic	Pacific	Salinity 12psu->, Temp. survives in low temp…	Unknown	Unknown
48	*Distephanus octonarius*[17]	Silicoflagellata		Ponto-Caspian			
49	*Doridella obscura*[17]	Mollusca	North America	Ponto-Caspian			
51	*Ercolania viridis (ex. funereal)*[17]	Mollusca	Atlantic	Ponto-Caspian		Shipping[6]	Predation[6]
52	*Eudendrium vaginatum (annulatum)*[17]	Hydrozoa	Atlantic	Ponto-Caspian		Shipping[6]	
53	*Eudendrium capillare*[17]	Hydrozoa	Atlantic	Ponto-Caspian		Shipping[6]	
54	*Eusarsiella zostericola*[18]	Ostracoda	North Atlantic	North Sea		Unknown	
56	*Ganonema farinosum*[17*]	Rhodophyta		Black Sea	Macrophyte	Canals (?)[17*]	
57	*Goniadella gracilis*[18]	Polychaeta	North America	North Sea		Shipping[18]	
58	*Gracilaria multipartita*[18]	Rhodophyceae		North Sea			

59	*Gymnodinium uberrinum*[17]	Dinophycea	Europe	Ponto-Caspian	Phytoplankton autotroph	Shipping[6]	
60	*Gyrodinium cf. (aureloum)*[17]	Dinophycea		Ponto-Caspian	Phytoplankton autotroph		
61	*Halothrix lumbricalis*[17*]	Phaeophyta		Black Sea	Macrophyte	Shipping[17*]	
62	*Hemigrapsus penicillatus* (Asian crab)[14,18]	Crustacea	Asia	North Sea	Benthic predator. Salinity range: brackish	Unknown	Unknown
63	*Hemigrapsis sanguineus* (Asian crab)[14]	Crustacea	Asia	North Sea	Benthic predator. Salinity range: brackish	Unknown	Unknown
64	*Heteropsyllus nr. nunni*[25]	Custacea (Copepoda)	North America		Brackish water		
65	*Hillea fusiformis*[17]	Chlorophyta	Mediterranean[6]	Ponto-Caspian	Phytoplankton	Shipping[6]	
66	*Hydroides elegans*[18]	Polychaeta	North America	North Sea, Mediterranean[22]		Shipping[18]	
67	*Hydroides dianthus*[18]	Polychaeta	Pacific[21]	North Sea, Atlantic[22], Mediterranean[22]		Shipping[22]	
68	*Hydroides ezoensis*[18]	Polychaeta	Asia	North Sea		Shipping[18]	
69	*Hypania invalida*[15]	Annelida	Ponto-Caspian	Volga River reservoirs			
70	*Ichthyocotylurus pileatus*[25]	Trematoda	Black Sea	Great Lakes	Digenean Fluke, parasitic to round goby (*Neogobius melanostomus*) and Eurasian ruffe (*Gymnocephalus cernuus*).	Shipping	Unknown
71	*Ischadium recurvum*[25]	Bivalvia	Western Atlantic	Western Atlantic	A mollusk. Min. salinity (for reprod.) 8psu, Min temp for reprod. 11.6C.	Shipping	Fouling
72	*Jasus lalandii* (cape rock lobster)[18]	Crustacea	Southern Africa	North Sea	Benthic predator		
73	*Laurencia intermedia (or L. okemurae?)*[17*]	Rhodophyta	Asia	Black Sea	Macrophyte	Shipping[17*]	
74	*Laurencia brongniartii*[18]	Rhodophyta	Asia	North Sea	Phytoplankton		
75	*Leander longirostris*[18]	Crustacea		North Sea			
76	*Lepas anatifera*[18]	Crustacea		North Sea	Benthic suspension feeder	Shipping[21]	

77	*Lomentaria hakodatensis*[18]	Rhodophyta	Pacific	North Sea, Mediterranean[22]			
78	*Macrocystis pyrifera*[18]	Bacillariophyceae		North Sea	Phytoplankton	Aquaculture[22]	
80	*Maia spinado* (spinous spider crab)[18]	Crustacea		North Sea			
81	*Mantoniella squamata*[17]	Chlorophyta	Baltic Sea?	Ponto-Caspian	Phytoplankton		
82	*Mesothamnion caribaeum*[18]	Rhodophyta	Indian Ocean	North Sea, Atlantic[22], Mediterranean[22]		Shipping[22]	
83	*Micromesistius poutassou* (blue whiting)[17]	Pisces	Atlantic, Mediterranean	Ponto-Caspian	Fish predator	Shipping[19]	
84	*Moerisia lyonsi*[25]	Hydrozoa	Ponto-Caspian?	Western Atlantic	Min salinity for reprod. is 2.3psu and min temp for reprod is 10C. Feed on zooplankton.	Shipping (ballast + fouling)	Potential predator of copepods but not as efficient as M. leidyi.
85	*Mugil soiuy (Far eastern mullet)*[17]	Pisces	West Pacific	Ponto-Caspian	Fish	Aquaculture[19]	
86	*Mytilicola orientalis*[18]	Crustacea	Asia	North Sea, Mediterranean[22]	Parasite on bivalves	Aquaculture[22]	
88	*Nemopsis bachei*[18]	Hydrozoa	North Atlantic[21]	North Sea			
90	*Neogobius iljini*[15]	Pisces	Ponto-Caspian	Volga River reservoirs			
91	*Nephthys ciliate*[17]	Polychaeta		Ponto-Caspian		Shipping[19]	
93	*Oxyphysis oxytoxoides*[17]	Dinophyceae		Ponto-Caspian	Phytoplankton		
94	*Pfisteria piscicida*[14]	Dinophyceae	North America		Phytoplankton predator. Salinity range: brackish	Shipping	Fisheries, human health
95	*Paralithodes camtschatica* (red king crab)[18]	Crustacea	North Pacific	North Sea	Benthic predator	Stocking[21]	Predation[21]
96	*Pilumnus spinifer* (red hairy crab)[18]	Crustacea		North Sea	Benthic predator	Shipping[22]	
97	*Platysiphonia caribaea*[18]	Rhodophyceae		North Sea			
98	*Podonevadne trigonia*[15]	Crustacea	Ponto-Caspian	Volga River reservoirs			
99	*Polydora hoplura*[18]	Polychaeta		North Sea		Aquaculture[22], Shipping[22]	
100	*Polydora limicola*[17]	Polychaeta		Ponto-Caspian			
101	*Polysiphonia paniculata*[17*]	Rhodophyta	Atlantic	Black Sea	Macrophyte	Shipping[17*]	
102	*Poropila dubia*[17]	Clorophyta	Mediterranean[19]	Ponto-Caspian	Phytoplankton	Shipping[19]	

103	*Porphyra miniata*[18]	Rhodophyceae	North Atlantic, including Baltic Sea? [23]	North Sea			
104	*Porphyra yezoensis*[18]	Rhodophyceae		North Sea			
105	*Portumnus latipes* (Pennant's swimming crab)[18]	Crustacea		North Sea			
106	*Predaea huismanii*[18]	Rhodophyceae		North Sea			
107	*Procambarus clarckii*[18]	Crustacea	North America[22]	Central and western Europe[22]	Freshwater species, tolerates saline water[22]	Aquaculture[22]	Competition, habitat change[22]
108	*Pronoctiluca pelagica*[17]	Dinophyceae	Atlantic, Mediterranean[19]	Ponto-Caspian		Shipping[19]	
109	*Proterorhinus marmoratus*[15]	Pisces	Ponto-Caspian	Volga River reservoirs		Canals	
110	*Pseudobacciger harengulae*[18]	Digenea	Unknown	North Sea	Parasite on fish	Shipping[21]	
111	*Pseudorasbora parva*[17]	Pisces	South East Asia[19]	Ponto-Caspian			Competition[18]
112	*Pseudosolenia calcar-avis*[15]	Bacillario-phyceae		Ponto-Caspian	Phytoplankton	Shipping[19]	
113	*Pseudo-nitszchia seriata*[15]	Bacillario-phyceae	Azov Sea	Caspian Sea	Phytoplankton		
114	*Pterosperma cristatum*[17]	Chlorophyta		Ponto-Caspian	Phytoplankton	Shipping[19]	
115	*Pterosperma jorgensenii*[17]	Chlorophyta	Mediterranean[19]	Ponto-Caspian	Phytoplankton	Shipping[19]	
116	*Pyramimonas longicauda*[17]	Chlorophyta	Pacific[19]	Ponto-Caspian	Phytoplankton	Shipping[19]	
117	*Rangia cuneata*[25]	Bivalvia	Western Altlantic	Western Altlantic	Salinity range for reproduction 2.5-14. Min. Temp. for reproduction 18C.	Shipping	Important prey. No adverse effects known.
118	*Rapana venosa* (Asian rapa whelk) [14]	Mollusca	Asia	Ponto-Caspian, North Sea	Benthic predator, pelagic larvae. Salinity range: marine	Shipping	Unknown
119	*Rathkea octopunctata*[25]	Hydrozoa	Atlantic	Ponto-Caspian	Zooplankton		
120	*Savoryella lignicola*[25]	Fungi		Ponto-Caspian		Shipping[19]	
121	*Schizopera borutzkyi*[25]	Crustacea (Copepoda)	Great Lakes	Black Sea	Benthic harpacticoid, salinity of 0.04–6ppt.	Shipping	Competition
122	*Skeletonema subsalsum*[15]	Bacillariophyceae	Ponto-Caspian	Volga River reservoirs			

123	***Sigambra tentaculata (Ancistrosyllis tentaculata)*** [17]	**Polychaeta**	**North-West Atlantic**	**Ponto-Caspian**			
124	***Sirpus zariquieyi***[17]	**Crustacea**	**Mediterranean**	**Ponto-Caspian**			
125	***Solidobalanus fallax***[18]	**Crustacea**	**African West coast**	**North Sea**	**Benthic suspension feeder**		
126	***Spartina townsendii***[18]	**Plantae**	**Hybrid**	**North Sea**	**Macrophyte**		
127	***Spatulodinium pseudonoctiluca*** [17]	**Dinophyceae**		**Ponto-Caspian**		**Shipping**[19]	
128	***Sphyraena obtusata*** **(Obtuse barracuda)** [17]	**Pisces**	**Pacific**	**Ponto-Caspian**		**Shipping**[19]	
129	***Streptocyllis varians***[17]			**Ponto-Caspian**			
131	***Synechocystis salina***[17]	**Cyanobacteria**		**Ponto-Caspian**	**Phytoplankton autotroph**		
132	***Tapes philippinarum***[18]	**Mollusca**	**Asia**[21]	**North Sea**	**Bentcic suspension feeder**	**Aquaculture**[21, 22]	
133	***Telmatogeton japonicus***[15]	**Insecta**	**Asia**	**North Sea**	**Unknown**	**Shipping**	**Unknown**
134	***Tiaropsis multicirrata***[17]	**Hydrozoa**	**North Atlantic**	**Ponto-Caspian**		**Shipping**[19]	
135	***Thalassiosira incerta***[15]	**Bacillario-phyceae**	**Ponto-Caspian**	**Volga River reservoirs**			
136	***Thalassiosira nordenskjoldi*** [17]	**Bacillariaphyceae**	**Northern Atlantic**	**Ponto-Caspian**	**Phytoplankton**	**Shipping**[19]	
137	***Thalassiotrix mediterraneae*** [17]	**Bacillariophyceae**	**East Atlantic, Mediterranean**	**Ponto-Caspian**	**Phytoplankton**		
138	***Ulva fasciata***[17*]	**Chlorophyta**	**Red Sea(?)**[17*]	**Black Sea**	**Macrophyte**	**Canals(?)**[17*]	
140	***Urnatella gracilis***[17]	**Entoprocta**	**North America**	**Ponto-Caspian, Germany**[21]	**Benthic suspension feeder**	**Shipping**[19]	

[14] Leppäkoski E., Gollasch S. 2006. Risk Assessment of Ballast Water Mediated Species Introductions – a Baltic Sea Approach. Report to HELCOM, 112 pp. www.helcom.fi/shipping/ballast/en_GB/ballast/

[15] Panov, V., Dgebuadze, Y, Shiganova, T., Filippov, A., Minchin, D. 2007. A risk assessment of biological invasions in the inland waterways of Europe: the Northern Invasion Corridor case study. In. Gherardi, F. (ed.). Biological invaders in inland waters: profiles, distribution and threats, 639-656. 2007, Springer.

[16] Alien Species in Swedish Seas. http://www.frammandearter.se, referred to 18.06.2008.

[17] Black Sea Commission CBD Annex 1 (waiting for information on the correct reference)

[17*] Çınar, M., Bilecenoğlu, M., Öztürk, B., Katağan, T. and Aysel, V. 2005. Alien species on the coasts of Turkey. Mediterranean Marine Science, 62: 119-146.

[18] Appendix 11: List of non-indigenous species, species known to cause harm and Species of Concern in the OSPAR area. Devised from the paper entitled ”Alien Species in the Northeast Atlantic – Status and National Activities in the OSPAR Convention Area”, compiled for OSPAR by the Swedish Environmental Protection Agency in 1998, enhanced with information provided by the IMO, The Netherlands and Sweden.

[19] Alexandrov, B., Boltachev, A., Kharchenko, T., Lyashenko, A., Son, M., Tsarenko, P. and Zhukinsky, V. 2007. Trends of aquatic alien species invasions in Ukraine. Aquatic Invasions 2 (4): 215-242.

[20] *Corbicula fluminea* is included in the draft target species list because it occurs in Polish freshwaters, and tolerates salinities up to 5 psu, as according to DAISIE, Delivering Alien Invasive Species Inventories for Europe. (http://www.europe-aliens.org/index.jsp, referred to 16.4.2008)).

[21] NOBANIS, North European and Baltic Network on Invasive Alien Species. (http://www.nobanis.org/default.asp, referred to 18.6.2008)

[22] DAISIE, Delivering Alien Invasive Species Inventories for Europe. (http://www.europe-aliens.org/index.jsp, referred to 26.10.2008)

[23] Nielsen, R., Kristiansen, A., Mathiesen, L. & Mathiesen, H. (1995). Distributional index of the benthic marine macroalgae of the Baltic Sea area. *Acta Botanica Fennica* 155: 1-70.

[24] Alien Species in Swedish Seas. http://www.frammandearter.se, referred to 18.06.2008.

[25] Great Lakes Nonindigenous Species List. (http://www.glerl.noaa.gov/res/Programs/ncrais/docs/search_tips.xls, referred to 26.10.2008) and Nonindigenous Aquatic Species, USGS (http://nas.er.usgs.gov/queries/factsheetlist.asp, referred to 17.10.2008)