

# UNESCO environmental DNA (eDNA) Expeditions in marine World Heritage sites

## Biodiversity survey for Wadden Sea

Interim Results  
Not for public distribution



Credit: Silke Ahlborn/LKN.SH.

## About eDNA Expeditions

UNESCO's eDNA Expeditions is a global, citizen science initiative that is conducted with the intention to measure marine biodiversity and predict the impact climate change on marine community composition across UNESCO World Heritage marine sites.

eDNA is a cost effective and minimally invasive method to measure biodiversity in any given area. Marine species continuously shed DNA into the water around them in the form of waste, mucus, or cells. By extracting this DNA from water samples, and subsequently multiplying and sequencing specific regions within these DNA strands, a wide variety of species can be detected without removing any organisms from their environment. The regions in the DNA targeted for sequencing are selected depending on the scope of the study: while some markers are suitable to obtain a broad overview of biodiversity across many groups of species, other markers are particularly suited to get high resolution insight for a more specific taxonomic group such as fish. The UNESCO eDNA Expeditions initiative combines a number of markers tailored for marine vertebrates (fish, mammals, and turtles). A general marker was added to also allow detection of species from other groups such as invertebrates, which can give a broader insight in the marine species diversity in a given area.

Between September 2022 and May 2023, UNESCO organized eDNA sampling campaigns in 21 marine World Heritage sites across 17 countries around the world. At every World Heritage site, about 20 samples were collected from different habitats. Over 250 young people participated in the local sampling expeditions. They were guided by local experts and park management staff, using protocols and eDNA sampling equipment provided by UNESCO.

Biodiversity inventories generated from the samples are being combined with existing species distribution data from public biodiversity databases such as the Ocean Biodiversity Information System (OBIS) in view of obtaining a comprehensive overview of marine life across marine World Heritage sites. Through the use of climate scenarios and species distribution models, an estimate will be made of the impact of climate change, in particular rising temperatures, on local biodiversity and its potential future distribution patterns.

More information about the initiative and a press kit are available on the UNESCO website: <https://www.unesco.org/en/edna-expeditions>.

## Results

### Sampling and sample processing

eDNA sampling was conducted in Wadden Sea in September 2022 to April 2023. A total of 36 samples were collected at 5 locations in the park covering different habitats: den\_oever, hjerting, neuwerk, schleswig\_holstein, and wilhelmshaven (Figure 1). Up to 1,850 mL of seawater was filtered through filter cartridges containing a filter with a 0.8 µm pore size. After sampling, the filter cartridges were flushed with preservation liquid and shipped to UNESCO. DNA from the samples was extracted and amplified, and subsequently sent to the sequencing facility at KU Leuven in Belgium, a specialized university eDNA lab contracted by UNESCO for this work. PCR amplification was done using five primer pairs selected to capture as much biodiversity as possible in the target groups of the study: fish, mammals, and turtles.



Figure 1: Map of the sampling locations.

### DNA sequencing

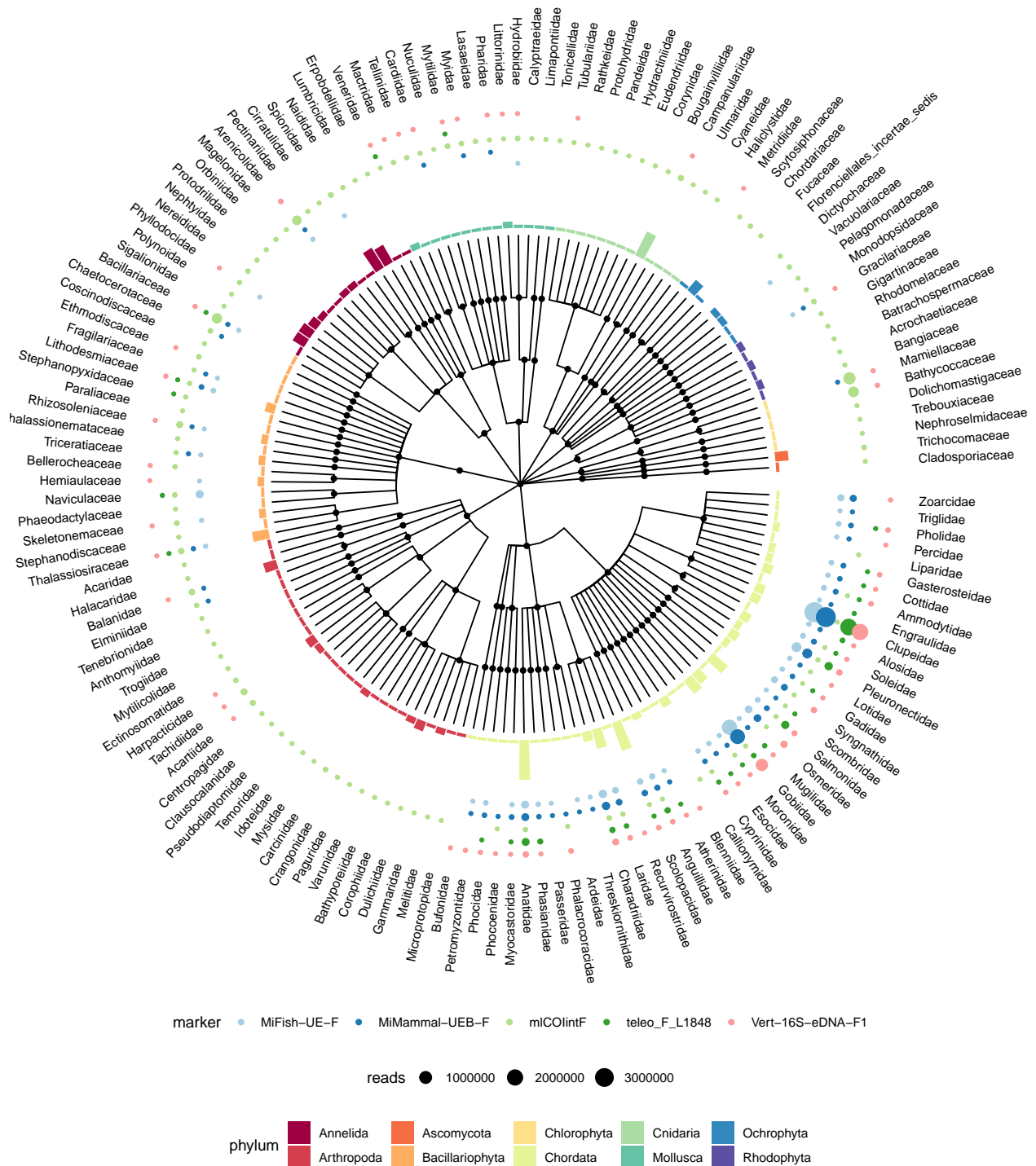
Sequencing of the DNA from 36 samples resulted in over 48 million sequence reads, from which we collected 23,062 unique sequences or ASVs (Tables 1 and 2).

reads	asvs
48802972	23062

Table 1: Reads, ASVs, and species across all samples.

### Species identification

The marker sequences obtained from sequencing were matched with sequence reference databases built using public data available from the National Center for Biotechnology Information (NCBI). This resulted in the identification of 306 species, including 59 fish species, 3 mammalian species, and 0 turtle species (Table 3). Species from other groups, such as algae, worms, cnidarians, crustaceans, and molluscs, were also detected (Figures 2 and 3). This number of species detected represents about 25% of the 3,393 species known from Wadden Sea in the OBIS database. Of the 306 species detected, 78 are not among the species previously reported from Wadden Sea to the UNESCO OBIS database. 2 of the detected species are listed as threatened on the IUCN Red List (Table 4). A full list of species is added at the end of this report.



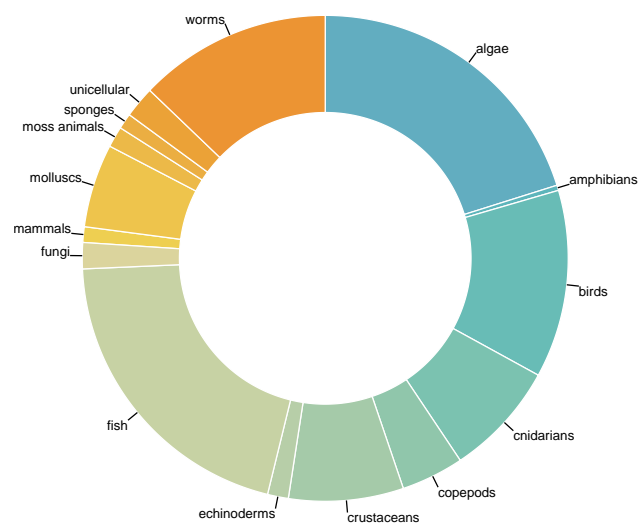


Figure 3: Distribution of detected species across groups.

locality	materialSampleID	sampleSize	reads	asvs	species
Hjerting sejlklub	EE0071	1260	439	22	0
Hjerting sejlklub	EE0091	1800	137965	244	20
Hjerting sejlklub	EE0095	1500	15	12	0
Hjerting sejlklub	EE0096	1200	131	43	4
Tidal creek, river elbe estuary	EE0066	1500	1480031	1538	4
Tidal creek, river elbe estuary	EE0067	1320	1504297	1365	11
Tidal creek, river elbe estuary	EE0074	1260	1708656	1735	13
Tidal creek, river elbe estuary	EE0126	1320	532977	1303	13
Tidal creek, river elbe estuary, Island Neuwerk	EE0195	1200	2188205	8689	119
Tidal creek, river elbe estuary, Island Neuwerk	EE0211	1260	2800249	8134	133
Tidal creek, river elbe estuary, Island Neuwerk	EE0226	1200	204480	4471	88
Wadden Sea	EE0194	960	245101	273	6
Wadden Sea	EE0212	1200	1382135	7234	116
Wadden Sea	EE0222	1500	75241	214	4
Wadden Sea	EE0223	1800	12365	160	1
Wadden Sea	EE0522	1560	4492	195	3
Wadden Sea; NL	EE0081	1500	1125537	3218	98
Wadden Sea; NL	EE0092	1170	3044761	888	5
Wadden Sea; NL	EE0093	1400	553320	1080	10
Wadden Sea; NL	EE0105	1500	1193897	2754	92
Wadden Sea; Schleswig-Holstein	EE0075	1260	1201853	3385	107
Wadden Sea; Schleswig-Holstein	EE0076	900	1263018	2977	101
Wadden Sea; Schleswig-Holstein	EE0077	1500	1071680	555	1
Wadden Sea; Schleswig-Holstein	EE0080	1500	2033932	3132	105
Wilhelmshaven	EE0068	1560	2183528	1495	7
Wilhelmshaven	EE0069	1500	2152695	1167	7
Wilhelmshaven	EE0070	1500	336304	835	7
Wilhelmshaven	EE0085	1500	1280242	3282	89
Wilhelmshaven	EE0210	1400	144144	340	12
Wilhelmshaven	EE0224	1500	1884004	7472	103
Wilhelmshaven	EE0227	840	826823	1450	19
Wilhelmshaven	EE0228	1800	1490690	4456	59
	EE0196	1500	3119306	3432	94
	EE0197	1800	3567944	4148	108
	EE0198	900	4646434	4116	97
	EE0213	1850	3406081	4141	101

Table 2: Reads, ASVs, and species by sample.

group	eDNA species	total species	fraction
fish	59	215	0.27
mammals	3	30	0.10
turtles	0	2	

Table 3: Number of species in the three target groups, from the OBIS database and from eDNA sampling.

category	eDNA species	total species	fraction
CR	1	10	0.10
EN	1	6	0.17
EX	0	1	
VU	0	33	

Table 4: Number of species by IUCN Red List category, from the OBIS database and from eDNA sampling.

phylum	class	species	group	category	new	vernacular
Amoebozoa	Discosea	Neoparamoeba pemaquidensis	unicellular			
Amoebozoa	Discosea	Parvamoeba rugata	unicellular			
Amoebozoa	Discosea	Squamamoeba japonica	unicellular		yes	
Annelida	Clitellata	Amphichaeta sannio	worms			
Annelida	Clitellata	Aporrectodea limicola	worms		yes	
Annelida	Clitellata	Erpobdella octoculata	worms		yes	
Annelida	Clitellata	Nais elinguis	worms			
Annelida	Clitellata	Paranais litoralis	worms			
Annelida	Clitellata	Tubificoides benedii	worms			
Annelida	Clitellata	Tubificoides diazi	worms		yes	
Annelida	Clitellata	Tubificoides mackiei	worms		yes	
Annelida	Polychaeta	Alitta succinea	worms			
Annelida	Polychaeta	Alitta virens	worms			sandworm
Annelida	Polychaeta	Arenicola defodiens	worms			runnydown
Annelida	Polychaeta	Arenicola marina	worms			lugworm, arénicole
Annelida	Polychaeta	Bylgides sarsi	worms			
Annelida	Polychaeta	Dodecaceria concharum	worms		yes	
Annelida	Polychaeta	Eumida mackiei	worms			
Annelida	Polychaeta	Eumida sanguinea	worms			
Annelida	Polychaeta	Harmothoe imbricata	worms			common fifteen-scaled worm
Annelida	Polychaeta	Harmothoe impar	worms			
Annelida	Polychaeta	Hediste diversicolor	worms			ragworm
Annelida	Polychaeta	Hypereteone heteropoda	worms		yes	
Annelida	Polychaeta	Lagis koreni	worms			trumpet worm
Annelida	Polychaeta	Lepidonotus squamatus	worms			twelve-scaled worm
Annelida	Polychaeta	Magelona johnstoni	worms			magélone
Annelida	Polychaeta	Magelona mirabilis	worms			bristleworm
Annelida	Polychaeta	Marenzelleria neglecta	worms		yes	
Annelida	Polychaeta	Marenzelleria viridis	worms			
Annelida	Polychaeta	Meiodrilus adhaerens	worms		yes	
Annelida	Polychaeta	Nephtys cirrosa	worms			white catworm, nephtys
Annelida	Polychaeta	Nephtys hombergii	worms			catworm, nephtys
Annelida	Polychaeta	Phyllodoce mucosa	worms			
Annelida	Polychaeta	Polydora cornuta	worms			
Annelida	Polychaeta	Polydora websteri	worms			
Annelida	Polychaeta	Pygospio elegans	worms			pygospio worm
Annelida	Polychaeta	Scoelepis (Scoelepis) foliosa	worms			
Annelida	Polychaeta	Scoloplos armiger	worms			bristleworm
Annelida	Polychaeta	Sthenelais boa	worms		yes	boa worm, sthénélaïs
Annelida	Polychaeta	Streblospio benedicti	worms			
Arthropoda	Arachnida	Metarhombognathus armatus			yes	
Arthropoda	Arachnida	Tyrophagus putrescentiae			yes	
Arthropoda	Copepoda	Acartia (Acanthacartia) bifilosa	copepods			
Arthropoda	Copepoda	Acartia (Acanthacartia) tonsa	copepods			
Arthropoda	Copepoda	Centropages hamatus	copepods			
Arthropoda	Copepoda	Clausocalanus furcatus	copepods		yes	
Arthropoda	Copepoda	Euterpina acutifrons	copepods			
Arthropoda	Copepoda	Harpacticus flexus	copepods			
Arthropoda	Copepoda	Microarthridion fallax	copepods			
Arthropoda	Copepoda	Mytilicola intestinalis	copepods			mussel intestinal crab, le copépode rouge

Continued on next page



phylum	class	species	group	category	new	vernacular
Arthropoda	Copepoda	Pseudobradia minor	copepods			
Arthropoda	Copepoda	Pseudodiaptomus marinus	copepods		yes	
Arthropoda	Copepoda	Tachidius discipes	copepods		yes	
Arthropoda	Copepoda	Temora longicornis	copepods			
Arthropoda	Hexapoda	Fucellia tergina				
Arthropoda	Hexapoda	Lepinotus patruelis			yes	
Arthropoda	Hexapoda	Tenebrio molitor			yes	
Arthropoda	Malacostraca	Bathyporeia pilosa	crustaceans			
Arthropoda	Malacostraca	Bathyporeia sarsi	crustaceans			
Arthropoda	Malacostraca	Carcinus maenas	crustaceans			green crab, crabe enragé
Arthropoda	Malacostraca	Corophium volutator	crustaceans			mud shrimp
Arthropoda	Malacostraca	Crangon crangon	crustaceans			brown shrimp, crevette grise
Arthropoda	Malacostraca	Dikerogammarus villosus	crustaceans			killer shrimp
Arthropoda	Malacostraca	Dulichia falcata	crustaceans		yes	
Arthropoda	Malacostraca	Gammarus lacustris	crustaceans		yes	
Arthropoda	Malacostraca	Hemigrapsus takanoi	crustaceans			brush-clawed shore crab, crabe japonaise
Arthropoda	Malacostraca	Idotea chelipes	crustaceans			clawfooted marine isopod
Arthropoda	Malacostraca	Melita palmata	crustaceans			
Arthropoda	Malacostraca	Mesopodopsis slabberi	crustaceans			
Arthropoda	Malacostraca	Microprotopus maculatus	crustaceans			
Arthropoda	Malacostraca	Monocorophium acherusicum	crustaceans		yes	
Arthropoda	Malacostraca	Monocorophium insidiosum	crustaceans			
Arthropoda	Malacostraca	Neomysis integer	crustaceans			
Arthropoda	Malacostraca	Pagurus longicarpus	crustaceans			long-clawed hermit crab, bernard-l'ermite à longs bras
Arthropoda	Thecostraca	Amphibalanus improvisus	crustaceans			bay barnacle
Arthropoda	Thecostraca	Austrominius modestus	crustaceans			Australasian barnacle
Arthropoda	Thecostraca	Balanus balanus	crustaceans			rough barnacle, balane côtelée du nord
Arthropoda	Thecostraca	Balanus crenatus	crustaceans			crenate barnacle, balane crénelée
Arthropoda	Thecostraca	Semibalanus balanoides	crustaceans			barnacle, balane
Ascomycota	Dothideomycetes	Cladosporium herbarum	fungi		yes	
Ascomycota	Eurotiomycetes	Aspergillus niger	fungi		yes	
Ascomycota	Eurotiomycetes	Aspergillus versicolor	fungi		yes	
Ascomycota	Eurotiomycetes	Penicillium digitatum	fungi		yes	
Ascomycota	Eurotiomycetes	Penicillium glabrum	fungi		yes	
Bacillariophyta	Bacillariophyceae	Asterionellopsis thurstonii	algae		yes	
Bacillariophyta	Bacillariophyceae	Bellerochea polymorpha	algae			
Bacillariophyta	Bacillariophyceae	Chaetoceros socialis	algae			
Bacillariophyta	Bacillariophyceae	Conticribra weissflogii	algae			
Bacillariophyta	Bacillariophyceae	Coscinodiscus granii	algae			
Bacillariophyta	Bacillariophyceae	Cylindrotheca closterium	algae			
Bacillariophyta	Bacillariophyceae	Ditylum brightwellii	algae			
Bacillariophyta	Bacillariophyceae	Ethmodiscus punctiger	algae			
Bacillariophyta	Bacillariophyceae	Eucampia striata	algae			
Bacillariophyta	Bacillariophyceae	Eucampia zodiacus	algae			
Bacillariophyta	Bacillariophyceae	Lithodesmioides polymorpha	algae		yes	
Bacillariophyta	Bacillariophyceae	Lithodesmium undulatum	algae			
Bacillariophyta	Bacillariophyceae	Microsiphona potamos	algae			
Bacillariophyta	Bacillariophyceae	Navicula cryptocephala	algae			
Bacillariophyta	Bacillariophyceae	Odontella aurita	algae			
Bacillariophyta	Bacillariophyceae	Paralia sulcata	algae			

Continued on next page

phylum	class	species	group	category	new	vernacular
Bacillariophyta	Bacillariophyceae	Phaeodactylum tricornutum	algae		yes	
Bacillariophyta	Bacillariophyceae	Rhizosolenia delicatula	algae			
Bacillariophyta	Bacillariophyceae	Skeletonema costatum	algae			
Bacillariophyta	Bacillariophyceae	Skeletonema dohrnii	algae			
Bacillariophyta	Bacillariophyceae	Stephanodiscus invisitatus	algae		yes	
Bacillariophyta	Bacillariophyceae	Stephanopyxis turris	algae			
Bacillariophyta	Bacillariophyceae	Sundstroemia setigera	algae			
Bacillariophyta	Bacillariophyceae	Thalassionema nitzschioides	algae			
Bacillariophyta	Bacillariophyceae	Thalassiosira nordenskiöldii	algae			
Bacillariophyta	Bacillariophyceae	Thalassiosira profunda	algae		yes	
Bacillariophyta	Bacillariophyceae	Thalassiosira rotula	algae			
Bacillariophyta	Bacillariophyceae	Triceratium intricatum	algae		yes	
Bryozoa	Gymnolaemata	Alcyonidioides mytili	moss animals			
Bryozoa	Gymnolaemata	Alcyonidium verrilli	moss animals		yes	
Bryozoa	Gymnolaemata	Conopeum reticulum	moss animals			an encrusting bryozoan
Bryozoa	Gymnolaemata	Electra pilosa	moss animals			hairy sea-mat, ecorce pileuse
Chlorophyta	Mamiellophyceae	Bathycoccus prasinos	algae		yes	
Chlorophyta	Mamiellophyceae	Dolichomastix tenuilepis	algae			
Chlorophyta	Mamiellophyceae	Micromonas pusilla	algae			
Chlorophyta	Nephroselmidophyceae	Nephroselmis pyriformis	algae			
Chlorophyta	Trebouxiophyceae	Trebouxia aggregata	algae		yes	
Chordata	Amphibia	Bufo bufo	amphibians	LC	yes	
Chordata	Aves	Anas acuta	birds	LC		
Chordata	Aves	Anas crecca	birds	LC		common teal, sarcelle d'hiver
Chordata	Aves	Anas platyrhynchos	birds	LC		mallard, canard colvert
Chordata	Aves	Anas poecilorhyncha	birds	LC	yes	
Chordata	Aves	Anser anser	birds	LC		greylag goose
Chordata	Aves	Anser cygnoides	birds		yes	
Chordata	Aves	Ardea cinerea	birds	LC	yes	
Chordata	Aves	Arenaria interpres	birds	LC		ruddy turnstone, tournepierre à collier
Chordata	Aves	Branta bernicla	birds	LC		Brant goose, bernachle cravant
Chordata	Aves	Calidris alpina	birds	LC		dunlin, bécasseau variable
Chordata	Aves	Calidris canutus	birds	NT		red knot, bécasseau maubèche
Chordata	Aves	Haematopus ostralegus	birds	NT		Eurasian oyster catcher, huîtrier pie
Chordata	Aves	Larus argentatus	birds	LC		herring gull, goéland argenté
Chordata	Aves	Larus canus	birds	LC		mew gull, goéland cendré
Chordata	Aves	Larus fuscus	birds	LC		lesser black-backed gull, goéland de la Balquité
Chordata	Aves	Larus glaucoideus	birds	LC		Iceland gull, goéland à ailes blanches
Chordata	Aves	Larus marinus	birds	LC		great black-backed gull, goéland marin
Chordata	Aves	Larus ridibundus	birds	LC		common black-headed gull, mouette rieuse
Chordata	Aves	Limosa lapponica	birds	NT		bar-tailed godwit, barge rousse
Chordata	Aves	Mareca penelope	birds	LC		
Chordata	Aves	Meleagris gallopavo	birds	LC	yes	
Chordata	Aves	Mergus merganser	birds	LC		common merganser, harle bièvre
Chordata	Aves	Numenius arquata	birds	NT		Eurasian curlew, courlis cendré
Chordata	Aves	Numenius madagascariensis	birds	EN	yes	eastern curlew, courlis de Sibérie
Chordata	Aves	Passer domesticus	birds	LC	yes	
Chordata	Aves	Phalacrocorax carbo	birds	LC		great cormorant, grand cormoran
Chordata	Aves	Platalea leucorodia	birds	LC		Eurasian spoonbill, spatule blanche
Chordata	Aves	Pluvialis dominica	birds	LC		American golden plover, pluvier bronzé

Continued on next page

phylum	class	species	group	category	new	vernacular
Chordata	Aves	Pluvialis squatarola	birds	LC		grey plover, pluvier argenté
Chordata	Aves	Recurvirostra avosetta	birds	LC		avocet, avocette élégante
Chordata	Aves	Somateria mollissima	birds	NT		common eider, eider commun
Chordata	Aves	Spatula clypeata	birds	LC	yes	
Chordata	Aves	Tadorna tadorna	birds	LC		
Chordata	Aves	Tringa erythropus	birds	LC		spotted redshank, chevalier arlequin
Chordata	Aves	Tringa nebularia	birds	LC		common greenshank, chevalier aboyeur
Chordata	Aves	Tringa totanus	birds	LC		redshank, chevalier gambette
Chordata	Mammalia	Myocastor coypus	mammals	LC	yes	
Chordata	Mammalia	Phoca vitulina	mammals	LC		harbour seal, phoque veau marin
Chordata	Mammalia	Phocoena phocoena	mammals	LC		harbor porpoise, pousille
Chordata	Petromyzonti	Lampetra fluviatilis	fish	LC		lampern, lamproie fluviatile
Chordata	Teleostei	Alosa alosa	fish	LC		allis shad, alosa vraie
Chordata	Teleostei	Alosa fallax	fish	LC		twaiter, pucelle
Chordata	Teleostei	Ammodytes marinus	fish			lesser sandeel
Chordata	Teleostei	Ammodytes tobianus	fish	DD		sand-eel, lançon
Chordata	Teleostei	Anguilla anguilla	fish	CR		European eel, anguille d'Europe
Chordata	Teleostei	Aphia minuta	fish			transparent goby, gobie transparent
Chordata	Teleostei	Atherina boyeri	fish	LC		big-scale sand-smelt, joel
Chordata	Teleostei	Atherina presbyter	fish	LC		sand smelt, athérine
Chordata	Teleostei	Boreogadus saida	fish		yes	Arctic cod, morue polaire
Chordata	Teleostei	Callionymus lyra	fish	LC		dragonet, dragonnet lyre
Chordata	Teleostei	Chelidonichthys spinosus	fish		yes	
Chordata	Teleostei	Chelon auratus	fish	LC		
Chordata	Teleostei	Chelon labrosus	fish	LC		thick-lipped grey mullet, muge lippu
Chordata	Teleostei	Chelon ramada	fish	LC		
Chordata	Teleostei	Ciliata mustela	fish	LC		five-bearded rockling, motelle à cinq barbillons
Chordata	Teleostei	Clupea harengus	fish	LC		herring, hareng de l'Atlantique
Chordata	Teleostei	Clupea pallasii	fish	DD	yes	Pacific herring, hareng
Chordata	Teleostei	Dicentrarchus labrax	fish	LC		seabass, bar
Chordata	Teleostei	Engraulis encrasicolus	fish	LC		anchovy, anchois
Chordata	Teleostei	Esox lucius	fish	LC		northern pike, grand brochet
Chordata	Teleostei	Gaidropsarus vulgaris	fish	LC		rockling, motelle à trois barbillons
Chordata	Teleostei	Gasterosteus aculeatus	fish	LC		threespine stickleback, epinoche à trois pointes
Chordata	Teleostei	Gobius niger	fish	LC		black goby, gobie noir
Chordata	Teleostei	Hyperoplus lanceolatus	fish	LC		greater sandeel, lançon
Chordata	Teleostei	Leuciscus leuciscus	fish	LC		dace, vandoise
Chordata	Teleostei	Limanda limanda	fish	LC		common dab, limande
Chordata	Teleostei	Liparis liparis	fish	LC		sea-snail, grande limace de mer
Chordata	Teleostei	Lipophrys pholis	fish	LC		shanny, blennie pholis
Chordata	Teleostei	Merlangius merlangus	fish	LC		whiting, merlan
Chordata	Teleostei	Micromesistius poutassou	fish			poutassou, poutassou
Chordata	Teleostei	Mugil cephalus	fish	LC	yes	grey mullet, muge
Chordata	Teleostei	Myoxocephalus quadricornis	fish	LC	yes	fourhorn sculpin, chaboisseau à quatre cornes
Chordata	Teleostei	Myoxocephalus scorpius	fish			sculpin, chaboisseau
Chordata	Teleostei	Neogobius melanostomus	fish	LC		round goby, gobie à taches noires
Chordata	Teleostei	Oncorhynchus clarkii	fish		yes	cutthroat trout, truite fardée
Chordata	Teleostei	Oncorhynchus mykiss	fish			rainbow trout, truite saumonée
Chordata	Teleostei	Osmerus eperlanus	fish	LC		rainbow smelt, eperlan
Chordata	Teleostei	Perca fluviatilis	fish	LC		perch, perche fluviatile

Continued on next page

phylum	class	species	group	category	new	vernacular
Chordata	Teleostei	Pholis gunnellus	fish			rock gunnel, gonnelle
Chordata	Teleostei	Phoxinus phoxinus	fish	LC		minnow, vairon
Chordata	Teleostei	Platichthys flesus	fish	LC		flounder, flet d'Europe
Chordata	Teleostei	Pleuronectes platessa	fish	LC		European plaice, plie d'Europe
Chordata	Teleostei	Pomatoschistus microps	fish	LC		common goby, gobie buhotte
Chordata	Teleostei	Pomatoschistus minutus	fish	LC		sand goby, gobie buhotte
Chordata	Teleostei	Pungitius pungitius	fish	LC		ninespine stickleback, epinochette
Chordata	Teleostei	Salmo salar	fish	LR/lc		Atlantic salmon, saumon d'Atlantique
Chordata	Teleostei	Salmo trutta	fish	LC		brown trout, truite brune
Chordata	Teleostei	Salvelinus alpinus	fish	LC		Arctic charr, omble chevalier
Chordata	Teleostei	Salvelinus fontinalis	fish			brook trout, saumon de fontaine
Chordata	Teleostei	Sander lucioperca	fish	LC		zander, sandre
Chordata	Teleostei	Sardina pilchardus	fish	LC		European pilchard, sardine commune
Chordata	Teleostei	Scardinius erythrophthalmus	fish	LC		rudd
Chordata	Teleostei	Scomber scombrus	fish	LC		Atlantic mackerel, maquereau bleu
Chordata	Teleostei	Solea solea	fish	DD		Dover sole, sole
Chordata	Teleostei	Sprattus sprattus	fish	LC		European sprat, sprat
Chordata	Teleostei	Syngnathus rostellatus	fish	LC		Nilsson's pipefish, petite aiguille de mer
Chordata	Teleostei	Syngnathus typhle	fish	LC		deep-snouted pipefish, siphonostome
Chordata	Teleostei	Zoarcas viviparus	fish			ocean pout, loquette
Cnidaria	Anthozoa	Metridium senile	cnidarians			clonal plumose anemone, oeillet de mer
Cnidaria	Hydrozoa	Clava multicornis	cnidarians			club hydroid
Cnidaria	Hydrozoa	Clytia hemisphaerica	cnidarians			
Cnidaria	Hydrozoa	Eudendrium capillare	cnidarians		yes	
Cnidaria	Hydrozoa	Gonothyrea loveni	cnidarians			
Cnidaria	Hydrozoa	Hartlaubella gelatinosa	cnidarians			
Cnidaria	Hydrozoa	Laomedea angulata	cnidarians			sea grass sea fir
Cnidaria	Hydrozoa	Laomedea flexuosa	cnidarians			seabells
Cnidaria	Hydrozoa	Leuckartiara octona	cnidarians			
Cnidaria	Hydrozoa	Nemopsis bachei	cnidarians			clinging jellyfish
Cnidaria	Hydrozoa	Obelia bidentata	cnidarians			doubletoothed hydroid
Cnidaria	Hydrozoa	Obelia dichotoma	cnidarians			sea thread hydroid
Cnidaria	Hydrozoa	Obelia longissima	cnidarians			hydroid
Cnidaria	Hydrozoa	Protohydra leuckarti	cnidarians			
Cnidaria	Hydrozoa	Rathkea octopunctata	cnidarians		yes	
Cnidaria	Hydrozoa	Sarsia tubulosa	cnidarians			clapper hydroid
Cnidaria	Hydrozoa	Tubularia indivisa	cnidarians			tall tubularia
Cnidaria	Scyphozoa	Aurelia aurita	cnidarians			common jellyfish, aurélie
Cnidaria	Scyphozoa	Cyanea lamarckii	cnidarians			lion's mane jellyfish, cyanée
Cnidaria	Staurozoa	Halicystus tenuis	cnidarians		yes	
Cryptophyta	Cryptophyta incertae sedis	Leucocryptos marina				
Tentaculata	Tentaculata	Mnemiopsis leidyi	cnidarians		yes	sea walnut, cténophore américain
Ctenophora	Tentaculata	Mnemiopsis leidyi	cnidarians			sea walnut, cténophore américain
Echinodermata	Asteroidea	Asterias rubens	echinoderms			common sea star, étoile de mer
Echinodermata	Echinoidea	Echinocardium cordatum	echinoderms			sea-potato, oursin de sable
Echinodermata	Echinoidea	Psammechinus miliaris	echinoderms			green sea urchin, petit oursin vert
Echinodermata	Ophiuroidea	Ophiura albida	echinoderms			brittlestar, ophiure blanche
Gastrotricha		Neodasys chaetonotoideus				
Gastrotricha		Turbanella hyalina				
Haptophyta	Coccolithophyceae	Emiliania huxleyi	algae		yes	

Continued on next page

phylum	class	species	group	category	new	vernacular
Haptophyta	Coccolithophyceae	Phaeocystis globosa	algae		yes	
Haptophyta	Coccolithophyceae	Phaeocystis pouchetii	algae		yes	
Mollusca	Bivalvia	Cerastoderma edule	molluscs			common cockle, coque
Mollusca	Bivalvia	Ensis directus	molluscs			
Mollusca	Bivalvia	Kurtiella bidentata	molluscs			two-toothed Montagu shell
Mollusca	Bivalvia	Macoma balthica	molluscs			Baltic macoma, telline Baltique
Mollusca	Bivalvia	Mulinia lateralis	molluscs			dwarf surfclam, mactre naine
Mollusca	Bivalvia	Mya arenaria	molluscs			softshell, mye
Mollusca	Bivalvia	Mytilus edulis	molluscs			blue mussel, moule commune
Mollusca	Bivalvia	Nucula nitidosa	molluscs			shiny nut clam
Mollusca	Bivalvia	Petricolaria pholadiformis	molluscs			false angelwing, pétricole pholadiforme
Mollusca	Bivalvia	Ruditapes philippinarum	molluscs			Manilla clam, palourde japonaise
Mollusca	Gastropoda	Crepidula fornicata	molluscs			common Atlantic slippersnail, crépidule pontée
Mollusca	Gastropoda	Limapontia depressa	molluscs			
Mollusca	Gastropoda	Littorina littorea	molluscs			common periwinkle, bigorneau
Mollusca	Gastropoda	Littorina saxatilis	molluscs			black-lined periwinkle, littorine des rochers
Mollusca	Gastropoda	Peringia ulvae	molluscs			common mudflat snail
Mollusca	Polyplacophora	Lepidochitona cinerea	molluscs			cinereous chiton
Myzozoa	Dinophyceae	Heterocapsa rotundata	unicellular			
Myzozoa	Dinophyceae	Noctiluca scintillans	unicellular			
Myzozoa	Dinophyceae	Nusuttodinium poecilochroum	unicellular		yes	
Nematoda	Chromadorea	Daptonema mirabilis			yes	
Ochrophyta	Dictyochophyceae	Octactis speculum	algae			
Ochrophyta	Dictyochophyceae	Pseudochattonella farcimen	algae		yes	
Ochrophyta	Dictyochophyceae	Vicicitus globosus	algae		yes	
Ochrophyta	Eustigmatophyceae	Nannochloropsis granulata	algae		yes	
Ochrophyta	Pelagophyceae	Aureococcus anophagefferens	algae		yes	
Ochrophyta	Phaeophyceae	Fucus spiralis	algae			
Ochrophyta	Phaeophyceae	Hecatonema terminale	algae		yes	
Ochrophyta	Phaeophyceae	Leathesia marina	algae			
Ochrophyta	Phaeophyceae	Myrionema balticum	algae		yes	
Ochrophyta	Phaeophyceae	Myrionema strangulans	algae			
Ochrophyta	Phaeophyceae	Petalonia fascia	algae			
Ochrophyta	Raphidophyceae	Chattonella marina	algae		yes	
Ochrophyta	Raphidophyceae	Fibrocapsa japonica	algae		yes	
Platyhelminthes		Microstomum septentrionale			yes	
Porifera	Demospongiae	Halichondria (Halichondria) bowerbanki	sponges			Bowerbank's halichondria
Porifera	Demospongiae	Halichondria (Halichondria) panicea	sponges			breadcrumb sponge
Porifera	Demospongiae	Haliclona (Haliclona) oculata	sponges			mermaid's glove, chaline
Rhodophyta	Bangiophyceae	Porphyra linearis	algae			
Rhodophyta	Florideophyceae	Acrochaetium humile	algae			
Rhodophyta	Florideophyceae	Acrochaetium luxurians	algae		yes	
Rhodophyta	Florideophyceae	Chondrus crispus	algae			
Rhodophyta	Florideophyceae	Gracilaria vermiculophylla	algae			
Rhodophyta	Florideophyceae	Gracilariopsis longissima	algae			
Rhodophyta	Florideophyceae	Melanothamnus harveyi	algae		yes	
Rhodophyta	Florideophyceae	Torularia atra	algae		yes	
Rhodophyta	Florideophyceae	Vertebrata fucoides	algae			
Rotifera	Eurotatoria	Polyarthra dolichoptera			yes	
Rotifera	Eurotatoria	Synchaeta grimpei			yes	

Continued on next page

phylum	class	species	group	category	new	vernacular
Rotifera	Eurotatoria	Synchaeta hutchingsi			yes	
Rotifera	Eurotatoria	Synchaeta triophthalma			yes	
Rotifera	Eurotatoria	Synchaeta vorax			yes	
Tardigrada	Eutardigrada	Macrobiotus ripperi			yes	
Xenacoelomorpha		Baltalimania macrospiriferum			yes	
Zygomycota	Mucoromycotina incertae sedis	Mucor hiemalis			yes	