Kiel University
Christian-Albrechts-Universität zu Kiel

Federal Agency for Nature Conservation

Seabird Monitoring in the German North Sea and Baltic Sea 2020

Photo: Kai Borkenhagen

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Introduction

Seabirds, as top predators, are an important component of marine ecosystems. They are under increasing pressure from anthropogenic activities such as fishing, the development of offshore wind energy, shipping traffic, marine pollution, etc. Recording species occurrence and improving knowledge of the distribution patterns, population trends and habitat requirements is vital to effectively manage protected areas and associated seabirds. The Birds Directive (BD) and the Marine Strategy Framework Directive (MSFD) of the European Union require their member states to regularly submit reports based on monitoring data. In addition, the data are used to develop indicators to assess the state of the environment within the framework of the regional sea conventions OSPAR and HELCOM.

The marine biodiversity monitoring programme for vertebrates is funded by the German Federal Agency for Nature Conservation (Bundesamt für Naturschutz - BfN) and carried out by the FTZ (Research and Technology Centre, Kiel University) in collaboration with the German Oceanographic Museum Stralsund (Deutsches Meeresmuseum - DMM) and the Institute for Terrestrial and Aquatic Wildlife Research of the Hanover University of Veterinary Medicine Foundation (Institut für Terrestrische und Aquatische Wildtierforschung der Stiftung Tierärztliche Hochschule Hannover - ITAW) with funding from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

The results presented in this report are based on regular large-scale surveys of seabird occurrences in the German North Sea and Baltic Sea. These observations are based on standardised methods and provide data on spatio-temporal patterns of seabirds in the ecosystems of the North Sea and Baltic Sea.

Assessments within the framework of Birds Directive and MSFD and the development of indicators for OSPAR and HELCOM are based on these data. In addition, the data and findings contribute to marine spatial planning and the assessment of anthropogenic activities.

Survey Overview

North Sea

A five-day aerial survey of the entire German North Sea was planned in winter but had to be cancelled due to logistics (weather, aircraft availability). A three-day partial survey of the German Bight was planned for spring. One survey day was planned in the area around Helgoland during breeding season. In addition, 15 days of ship-based surveys on ships of opportunity were to be implemented. From spring onwards, no surveys could be carried out due to the COVID 19 pandemic (Table 1).

Baltic Sea

Only two of three proposed aerial survey days of the entire German Baltic Sea in winter could be implemented, the third day had to be cancelled for logistical reasons (weather, aircraft availability). A seven-day ship-based survey in the Pomeranian Bay in winter was successfully implemented as a charter trip with the "Skoven" in January. A three-day ship-based survey in the western German Baltic Sea was carried out on LLUR ship of opportunity "Haithabu". A seven-day ship-based survey of the Pomeranian Bay in spring, two partial aerial surveys in the Pomeranian Bay in summer and five additional ship-based survey days were cancelled due to the COVID 19 pandemic (Table 1).

Table 1: Survey plan and implementation in 2020. p= plane; sh= ship; EGB = Eastern German Bight; PoBay= Pomeranian Bay; w = winter; sp = spring, s = summer; au = autumn.

	survey		planned				implemented			
			w	sp	s	au	w	sp	s	au
North Sea	entire German North Sea	p	5			5	0			
	partial survey German North Sea spring	p		3				0		
	EEZ off Helgoland summer	p			1				0	
	ship-based survey North Sea (ship of opportunity)	sh		— 15 —				— 0 —		
Baltic Sea	entire German Baltic Sea	p	3				2			
	SPA Pomeranian Bay	sh	7	7			7	0		
	partial survey SPA PoBay summer	p			2				0	
	ship-based survey Baltic Sea (ship of opportunity)	sh		— 8 —				— 3 —		

Survey Results

The course of the transect, key findings, and special observations from each survey are presented below. Densities of all species observed within the transect are shown in the tables, disregarding distance correction. As the surveys sometimes differ substantially in the spatial distribution of survey effort, any numbers and density values are comparable to a limited extent only. All distribution maps are based on distance-corrected bird numbers.

Baltic Sea

Aerial seabird survey of the German Baltic Sea in winter

Two aerial seabird surveys took place in the Baltic Sea on 28th December 2019 and 14th February 2020 (Figure 1). An additional planned flight day had to be cancelled for logistical reasons. Seaducks dominated in terms of numbers, but herring gulls, auks and divers were also recorded in considerable numbers (Table 2). Divers were concentrated in the southern part of the Pomeranian Bay, with, unlike the year before, a focus on the Odra Bank (Figure 2). Common eiders were particularly frequent in the Darß and Fischland area (Figure 3). Hardly any eiders were sighted east of Rügen. Common scoters were concentrated in the eastern part of the study area, especially off Usedom, on the Odra Bank and on the Adler Ground, but they also occurred in large numbers west of Hiddensee (Figure 4). The main distribution of mallards was off Darß, Zingst and Fischland, but there were also local concentrations off Usedom and on the Odra Bank (Figure 5). Velvet scoters were mainly restricted to the Pomeranian Bay, where the Odra Bank was the main distribution area (Figure 6). Herring gulls occurred throughout the study area. High densities were found off Usedom, north of the Darß, between Odra Bank and Adler Ground, and north of Rügen (Figure 7). Common guillemots and razorbills were especially frequent in deep-water areas, particularly in the area between Odra Bank and Adler Ground (Figure 8).

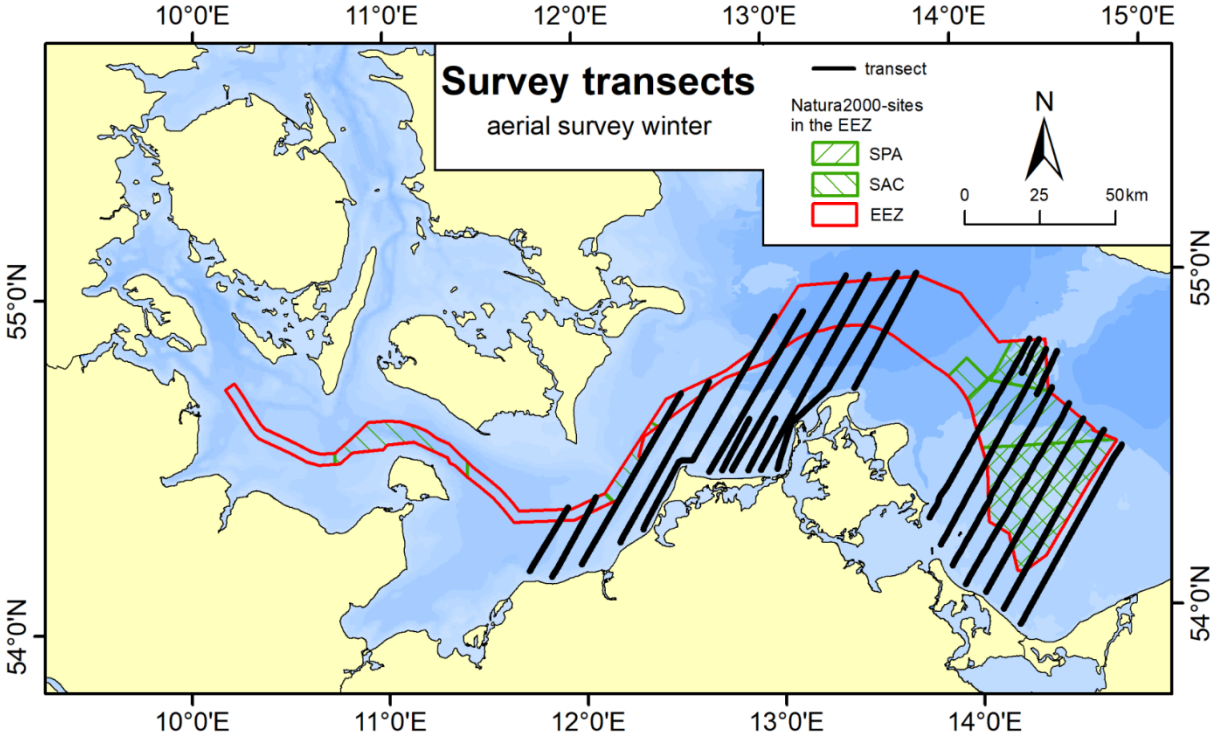

Figure 1: Transect course of the aerial seabird survey in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

Table 2: Abundance and average density of species recorded in the transect during the aerial surveys in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

species	scientific name	count	density [ind./km²]
red-throated diver	*Gavia stellata*	63	0.075
black-throated diver	*Gavia arctica*	8	0.010
unidentified diver	*Gavia spec.*	42	0.050
great crested grebe	*Podiceps cristatus*	13	0.016
red-necked grebe	*Podiceps grisegena*	8	0.010
Slavonian grebe	*Podiceps auritus*	3	0.004
unidentified grebe	Podicipedidae	5	0.006
northern gannet	*Morus bassanus*	1	0.001
cormorant	*Phalacrocorax carbo*	124	0.148
grey heron	*Ardea cinerea*	1	0.001
mute swan	*Cygnus olor*	2	0.002
common eider	*Somateria mollissima*	2,088	2.493
long-tailed duck	*Clangula hyemalis*	10,009	11.949
common scoter	*Melanitta nigra*	14,011	16.727
common scoter / velvet scoter	*Melanitta nigra / Melanitta fusca*	955	1.140
velvet scoter	*Melanitta fusca*	2,007	2.396
common golden-eye	*Bucephala clangula*	27	0.032
red-breasted merganser	*Mergus serrator*	4	0.005
goosander	*Mergus merganser*	2	0.002
white-tailed eagle	*Haliaeetus albicilla*	1	0.001
little gull	*Hydrocoloeus minutus*	11	0.013
black-headed gull	*Chroicocephalus ridibundus*	3	0.004
common gull	*Larus canus*	12	0.014
unidentified small gull		4	0.005
herring gull	*Larus argentatus*	170	0.203
great black-backed gull	*Larus marinus*	28	0.033
common gull / herring gull	*Larus canus / Larus argentatus*	4	0.005
unidentified gull		2	0.002
common guillemot	*Uria aalge*	56	0.067
common guillemot / razorbill	*Uria aalge / Alca torda*	82	0.098
razorbill	*Alca torda*	16	0.019
black guillemot	*Cepphus grylle*	1	0.001
unidentified bird		14	0.017
grey seal	*Halichoerus grypus*	2	0.002

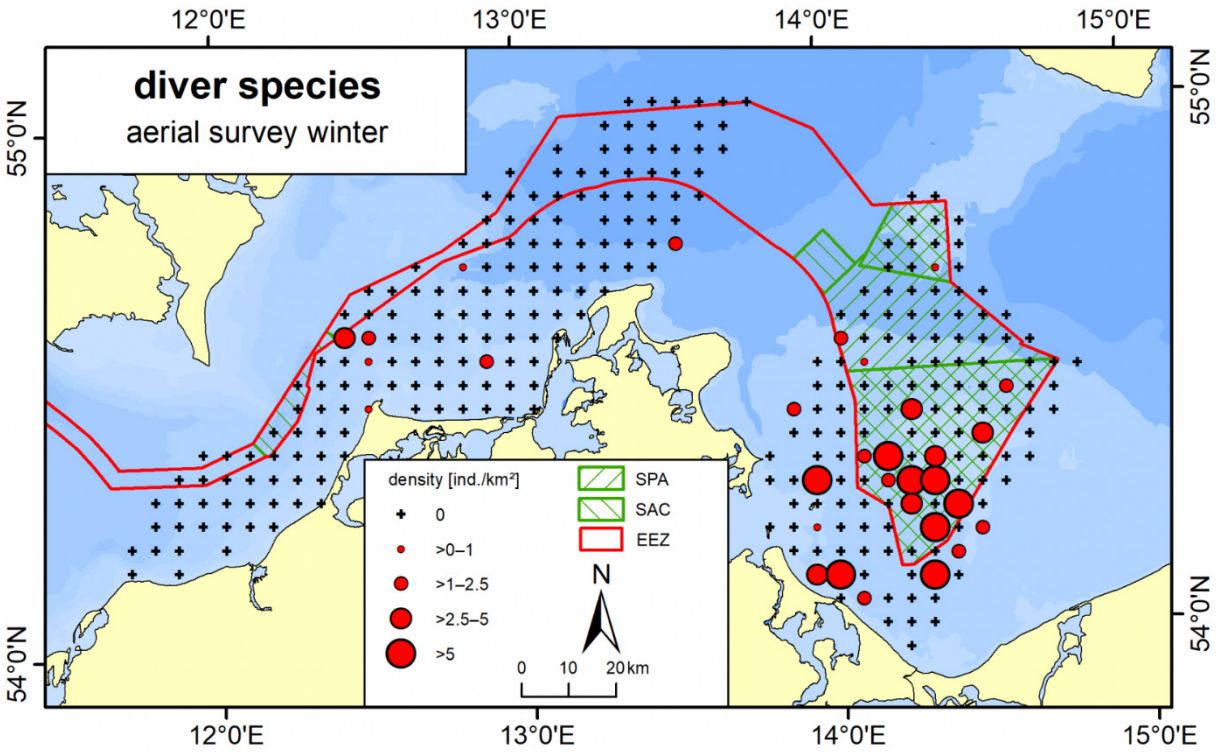

Figure 2: Distribution of divers (*Gavia spec.*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

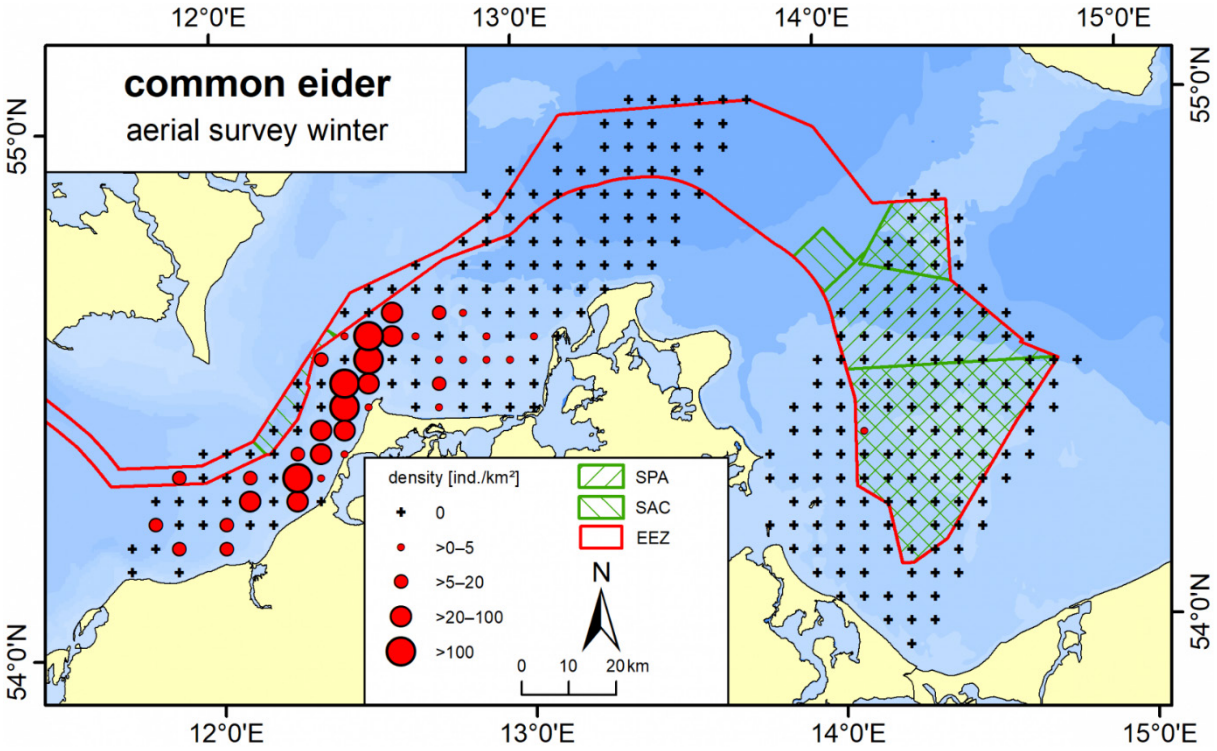

Figure 3: Distribution of common eiders (*Somateria mollissima*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

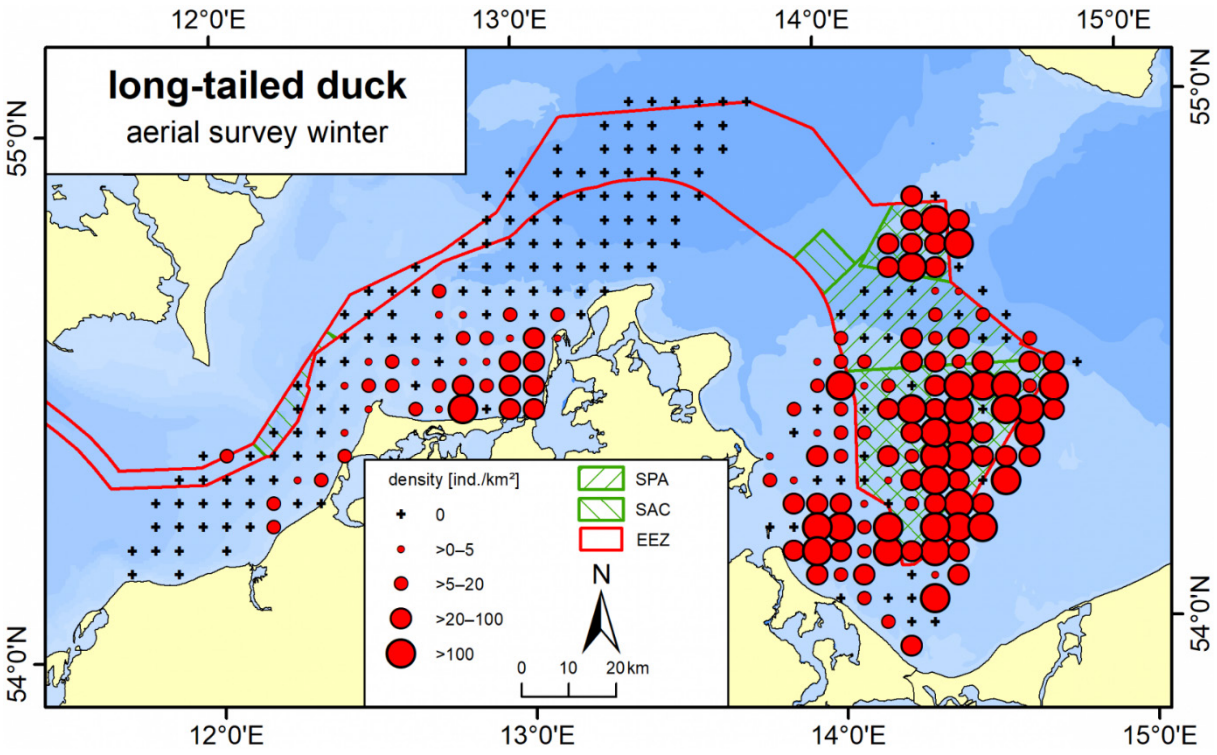

Figure 4: Distribution of long-tailed ducks (*Clangula hyemalis*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

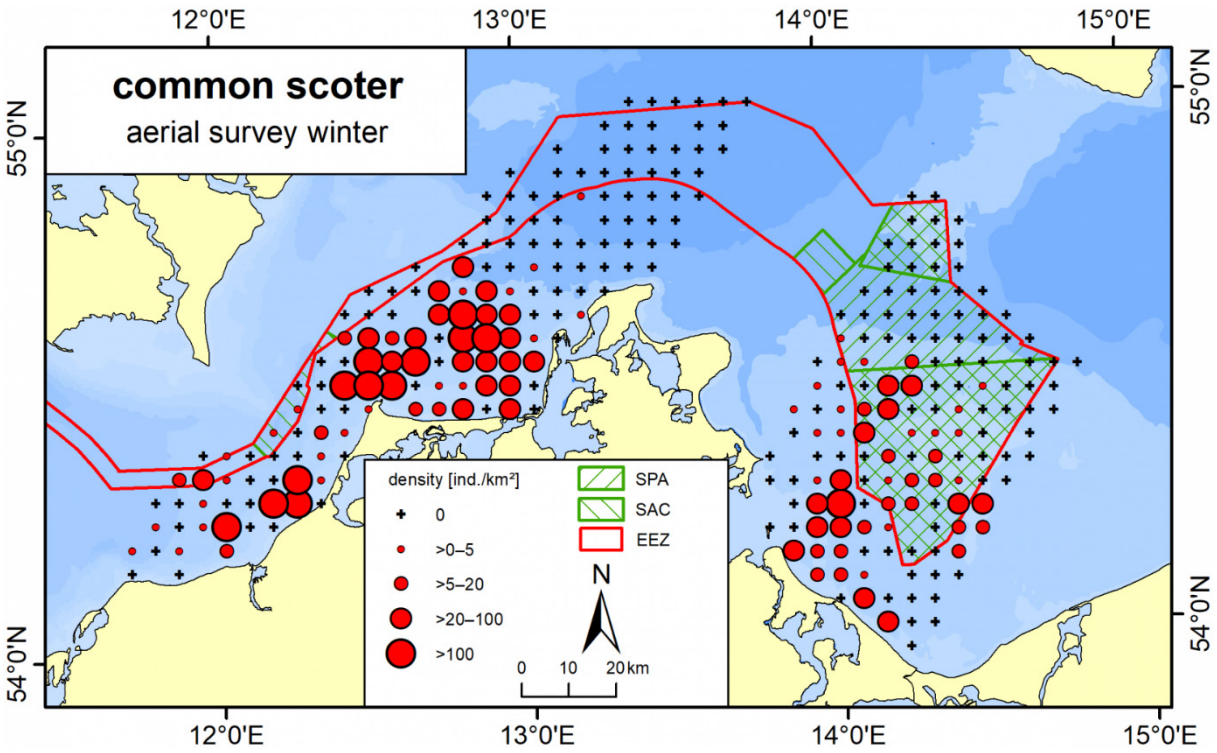

Figure 5: Distribution of common scoters (*Melanitta nigra*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

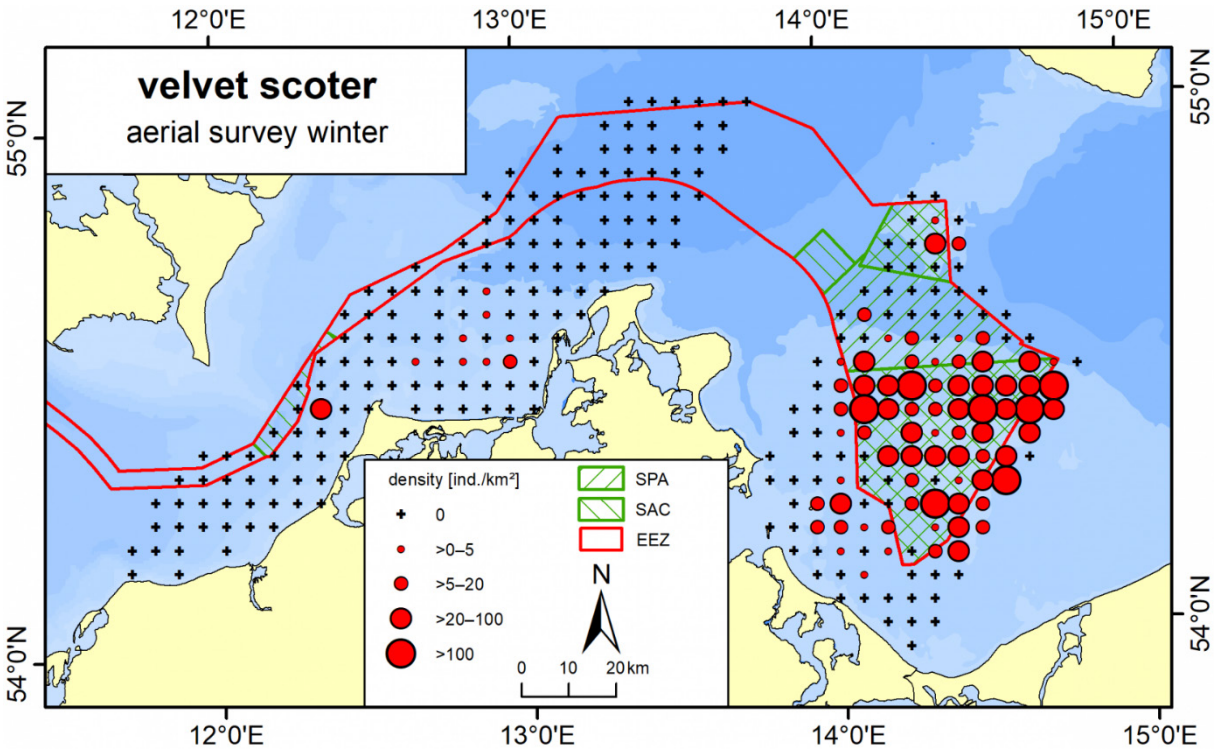

Figure 6: Distribution of velvet scoters (*Melanitta fusca*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

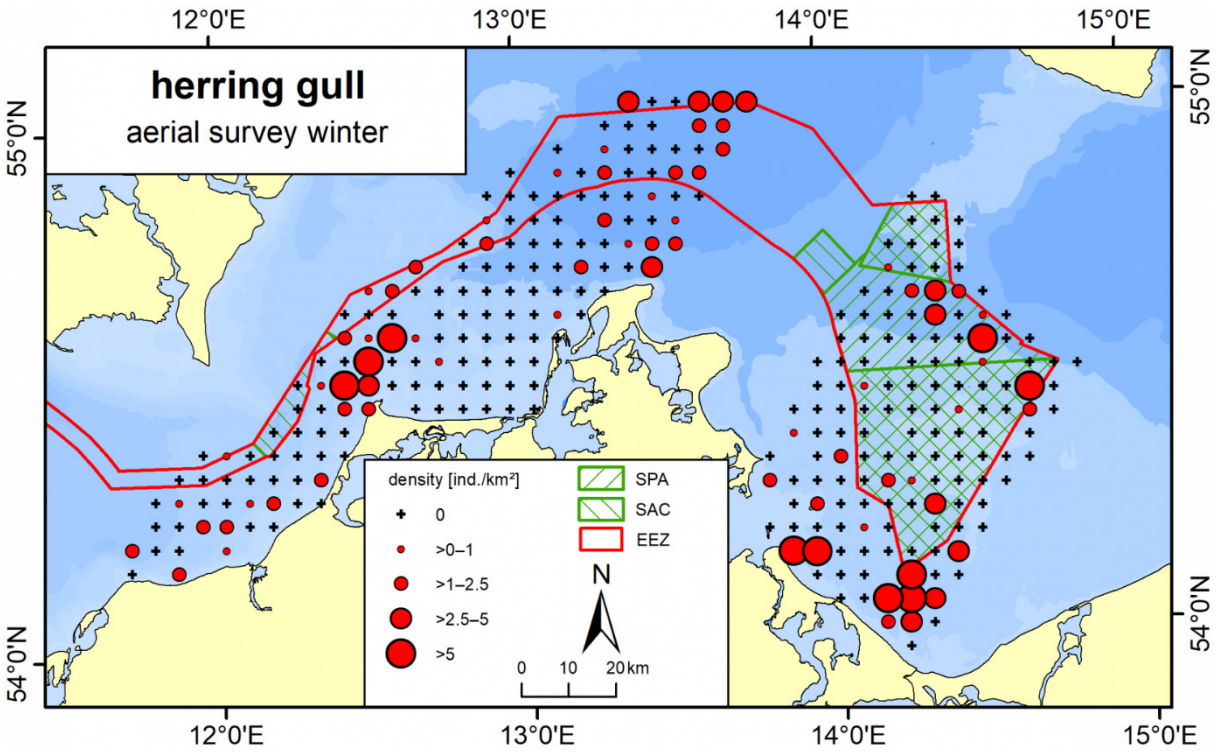

Figure 7: Distribution of herring gulls (*Larus argentatus*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

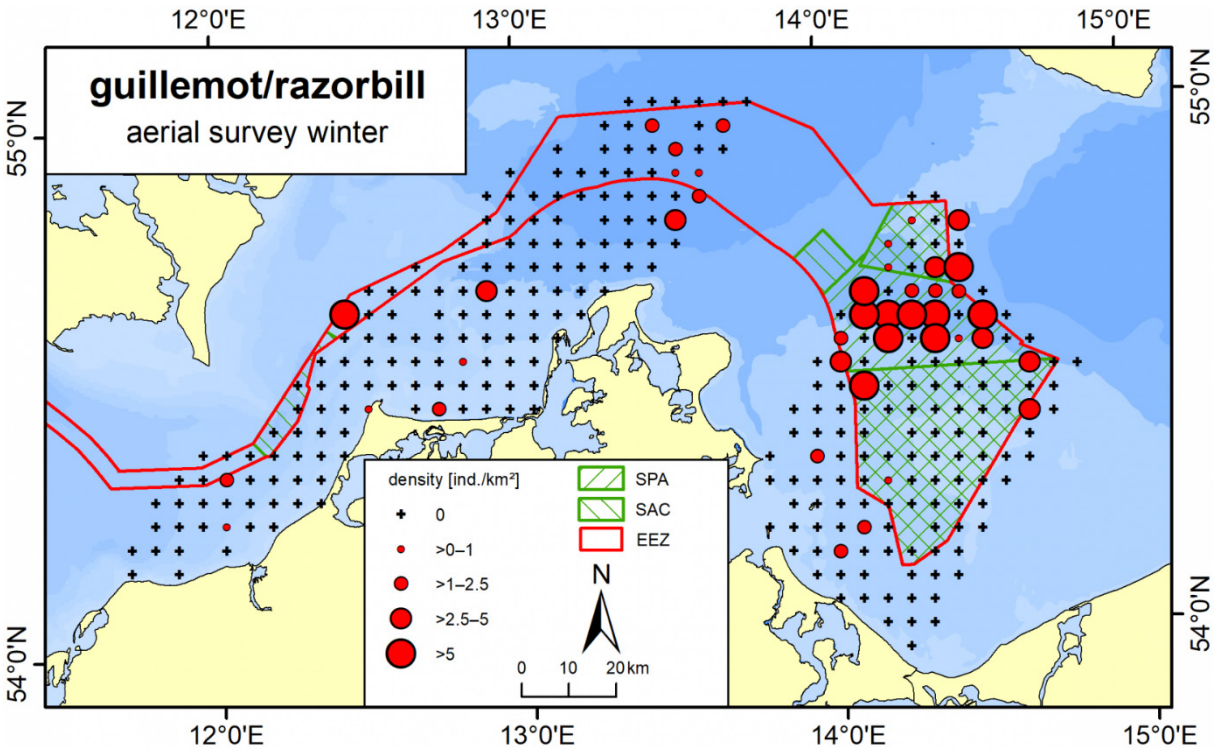

Figure 8: Distribution of common guillemots (*Uria aalge*) and razorbills (*Alca torda*) in the German Baltic Sea in winter (28th December 2019 and 14th February 2020).

Ship-based seabird survey in the Pomeranian Bay and in the Bay of Greifswald in winter

A ship-based seabird survey was carried out in the Pomeranian Bay and the Bay of Greifswald as a charter survey with the "Skoven" from 15th to 21st January (Figure 9). Seaducks, red-breasted mergansers, great crested grebes, and cormorants made up the majority of observed birds (Table 3). Divers occurred throughout the study area with highest densities north-west and south-west of the Odra Bank as well as off Usedom and in Tromper Wiek (Figure 10). Among the divers identified to species level, red-throated divers were slightly more common than black-throated divers (Table 3). Great crested grebes were restricted to the nearshore area (Figure 11). Cormorants were concentrated along the coasts of Rügen and Usedom (Figure 12). Cormorants were also observed at Adler Ground where they use the foundations of the nearby wind farms as a resting area. Long-tailed ducks were comparatively numerous at ~56 ind./km² during this survey (Table 3) (with a similar survey design in January 2015: 29 ind./km²; January 2016: 31 ind./km²; January 2017: 33 ind./km²; January 2018: 62 ind. /km²; January 2019: 43 Ind./km²), and almost reached the record level of 2018. The species occurred almost everywhere in the surveyed area, with low densities only in areas with greater water depth (Figure 13). Common scoters were concentrated north-west of the Odra Bank but also occurred in notable numbers off Usedom, on the east coast of Rügen and on the Adler Ground (Figure 14). The distribution of velvet scoters was also concentrated north-west of the Odra Bank and, in contrast to previous surveys, their distribution pattern was similar to that of common scoters (Figure 15). Red-breasted mergansers predominantly used coastal areas, with high densities throughout, especially in the eastern part of the Bay of Greifswald to the Greifswalder Oie (Figure 16). Red-breasted mergansers were also observed on the Adler Ground. Slavonian grebes were almost exclusively restricted to the SPA Odra Bank and only sporadically occurred outside this area (Figure 17).

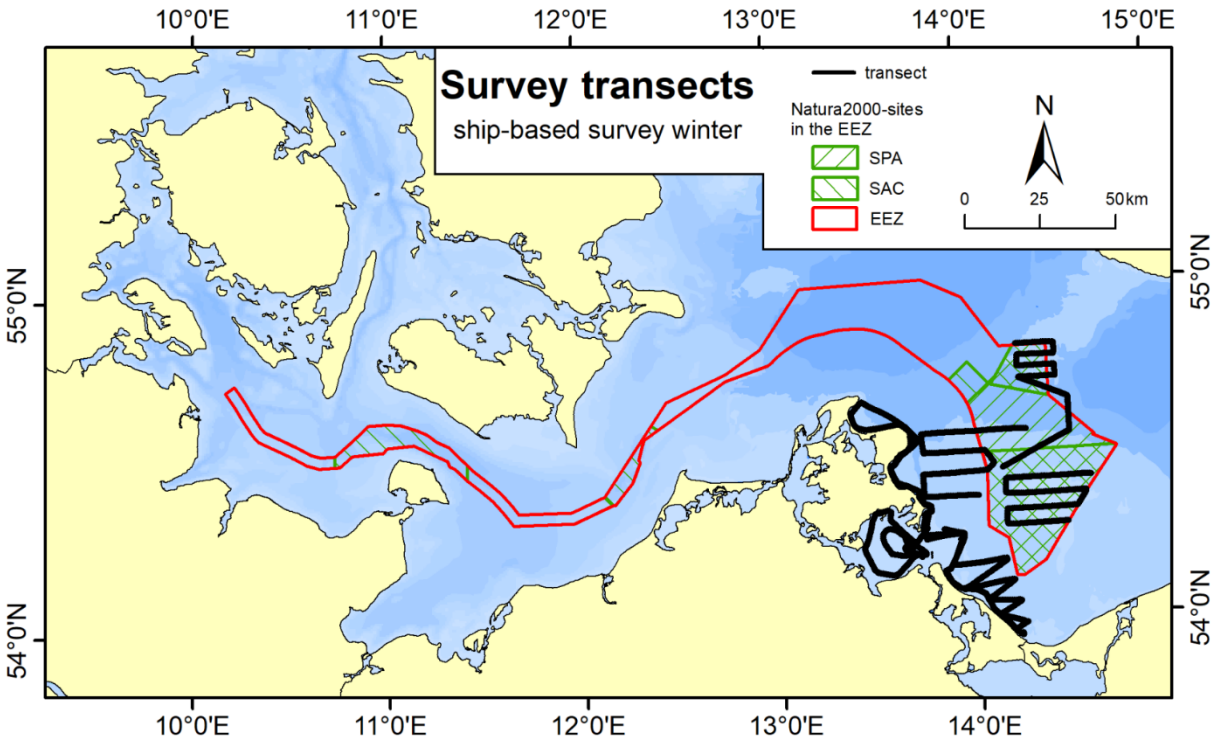

Figure 9: Transect course of the ship-based seabird survey in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

Table 3: Abundance and average density of species recorded in the transect during the ship-based surveys in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2010).

species	scientific name	count	density [ind. /km²]
red-throated diver	*Gavia stellata*	10	0.028
black-throated diver	*Gavia arctica*	7	0.020
unidentified diver	*Gavia spec.*	35	0.099
great crested grebe	*Podiceps cristatus*	374	1.062
red-necked grebe	*Podiceps grisegena*	7	0.020
Slavonian grebe	*Podiceps auritus*	42	0.119
unidentified grebe	Podicipedidae	7	0.020
northern gannet	*Morus bassanus*	2	0.006
cormorant	*Phalacrocorax carbo*	318	0.903
mute swan	*Cygnus olor*	19	0.054
Eurasian wigeon	*Anas penelope*	65	0.185
tufted duck	*Aythya fuligula*	70	0.199
common eider	*Somateria mollissima*	5	0.014
long-tailed duck	*Clangula hyemalis*	19,826	56.290
common scoter	*Melanitta nigra*	4,364	12.390
common scoter / velvet scoter	*Melanitta nigra / Melanitta fusca*	6	0.017
velvet scoter	*Melanitta fusca*	2,370	6.729
common golden-eye	*Bucephala clangula*	59	0.168
red-breasted merganser	*Mergus serrator*	515	1.462
goosander	*Mergus merganser*	41	0.116
common gull	*Larus canus*	9	0.026
herring gull	*Larus argentatus*	58	0.165
great black-backed gull	*Larus marinus*	26	0.074
common guillemot	*Uria aalge*	10	0.028
common guillemot / razorbill	*Uria aalge / Alca torda*	14	0.040
razorbill	*Alca torda*	6	0.017
black guillemot	*Cepphus grylle*	17	0.048
grey seal	*Halichoerus grypus*	4	0.011

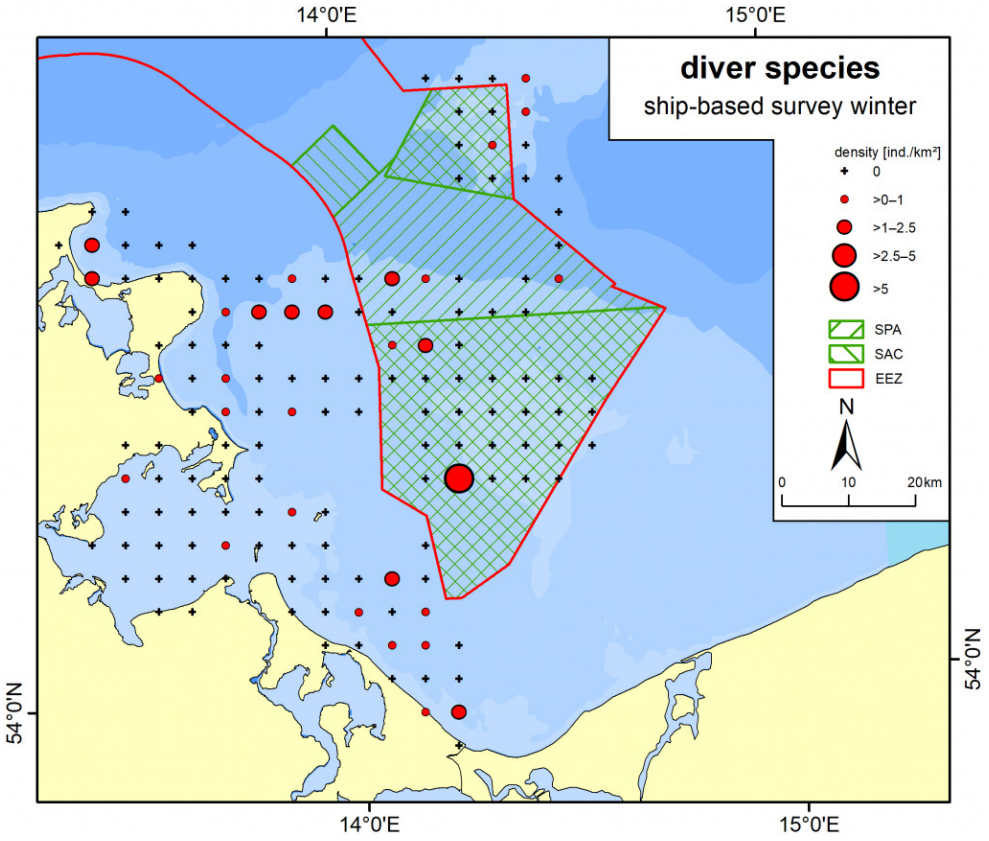

Figure 10: Distribution of divers (*Gavia spec.*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

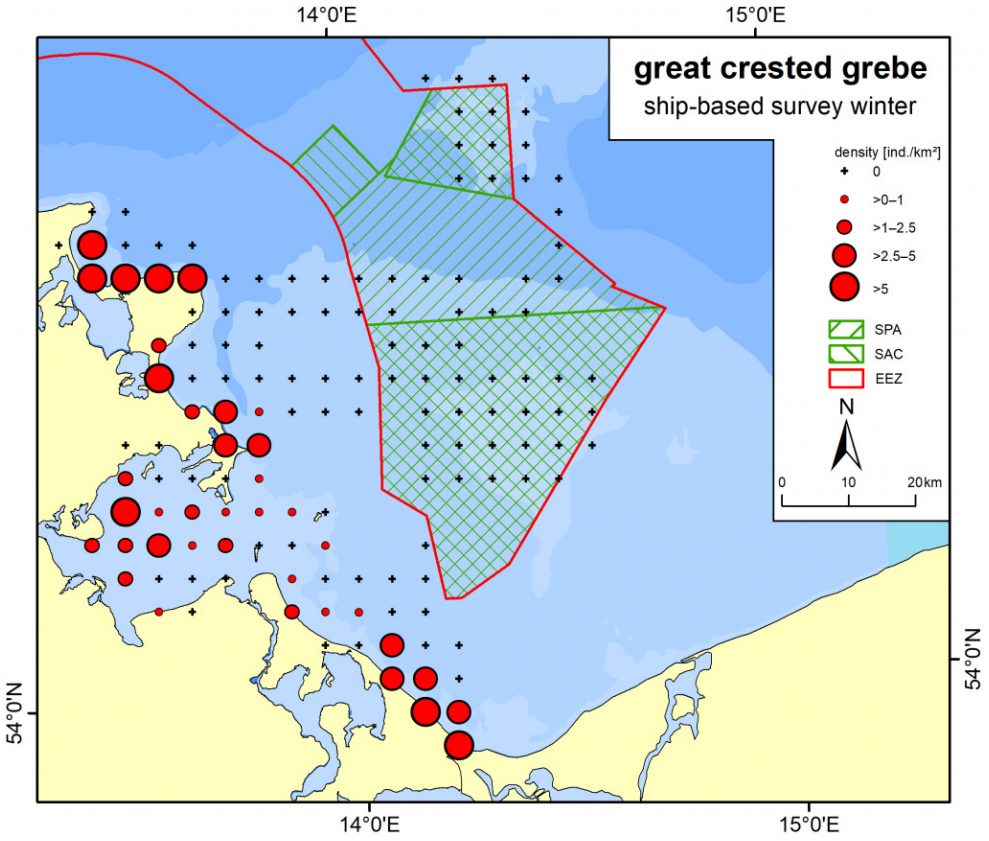

Figure 11: Distribution of great crested grebes (*Podiceps cristatus*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

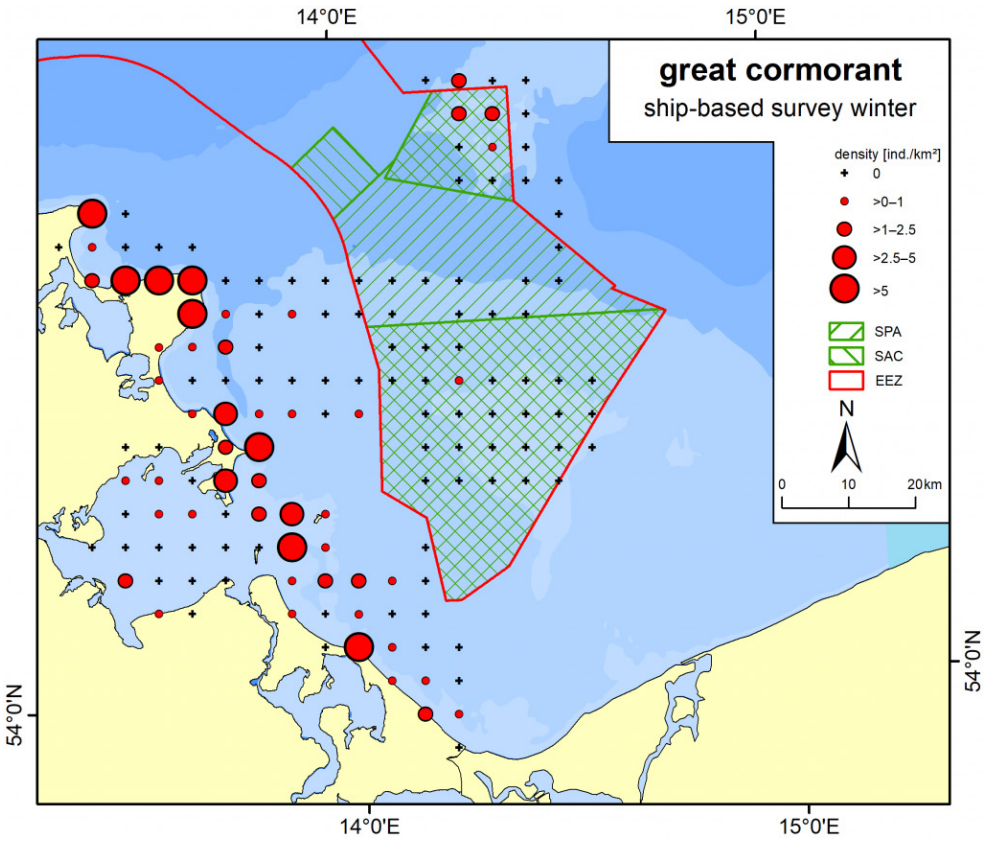

Figure 12: Distribution of cormorants (*Phalacrocorax carbo*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

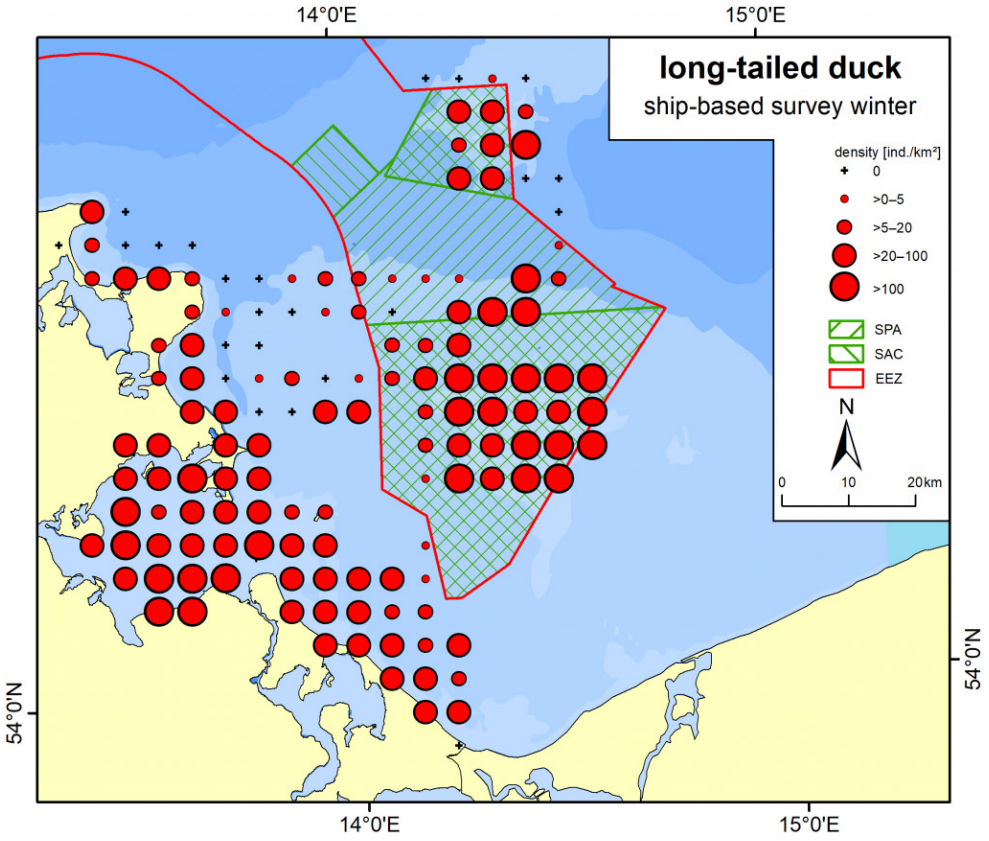

Figure 13: Distribution of long-tailed ducks (*Clangula hyemalis*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

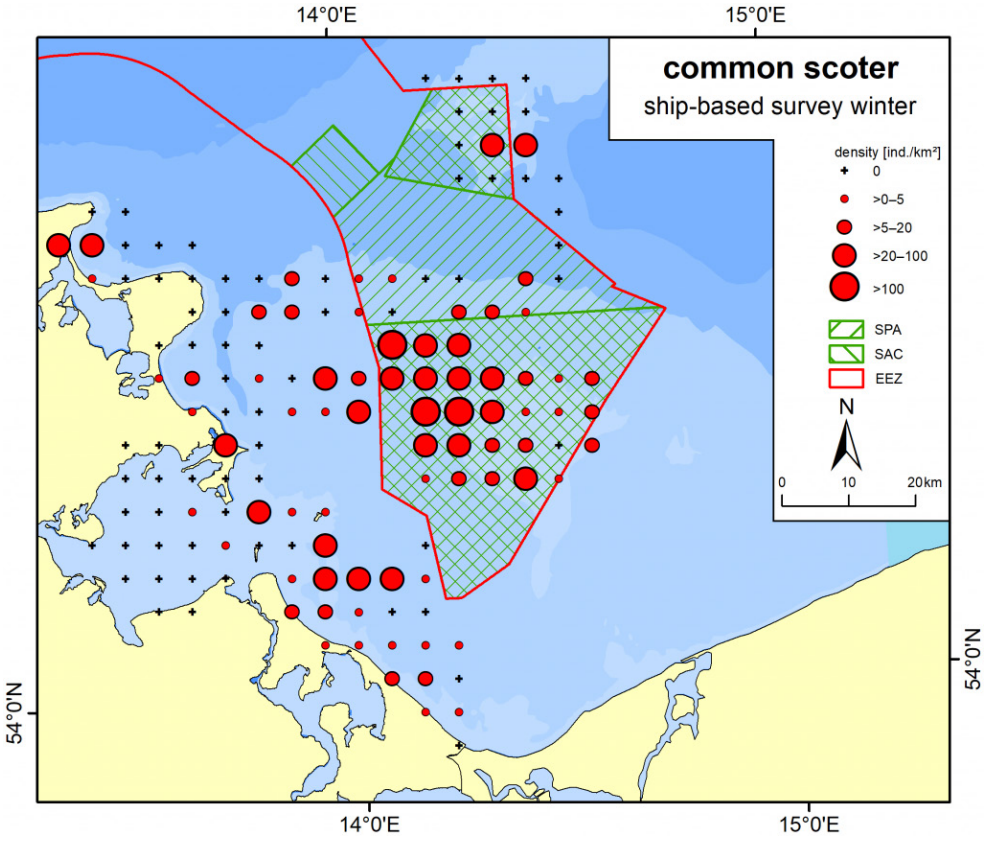

Figure 14: Distribution of common scoters (*Melanitta nigra*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

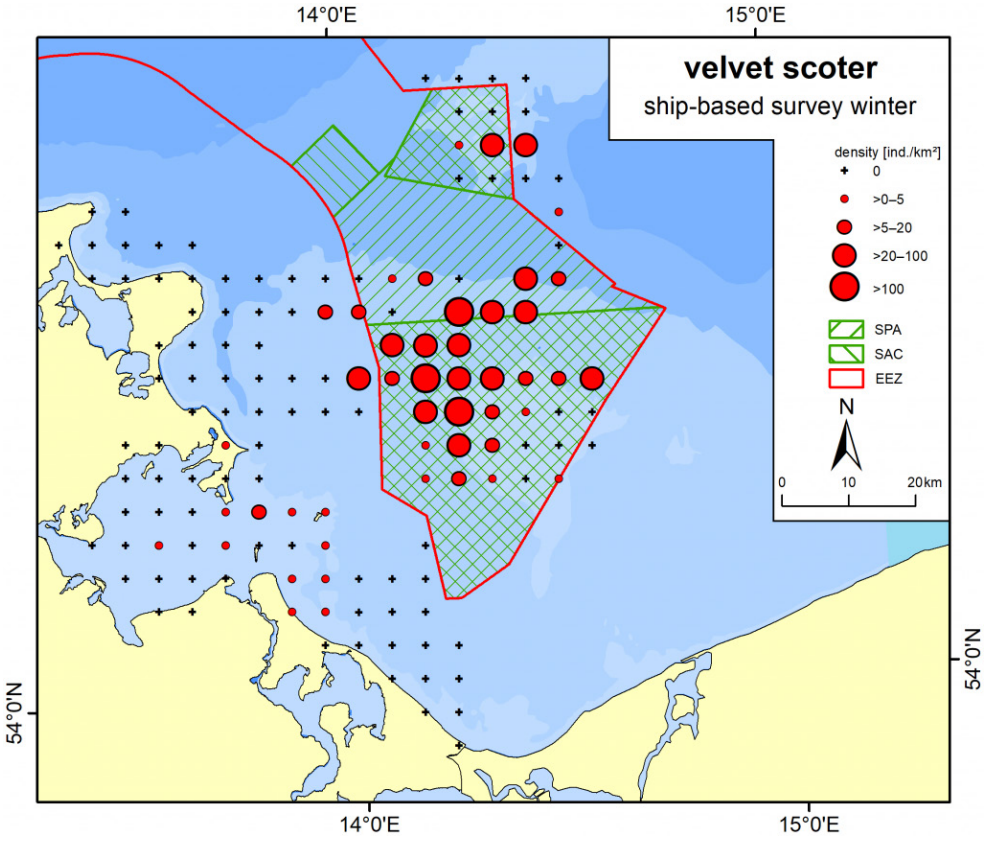

Figure 15: Distribution of velvet scoters (*Melanitta fusca*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

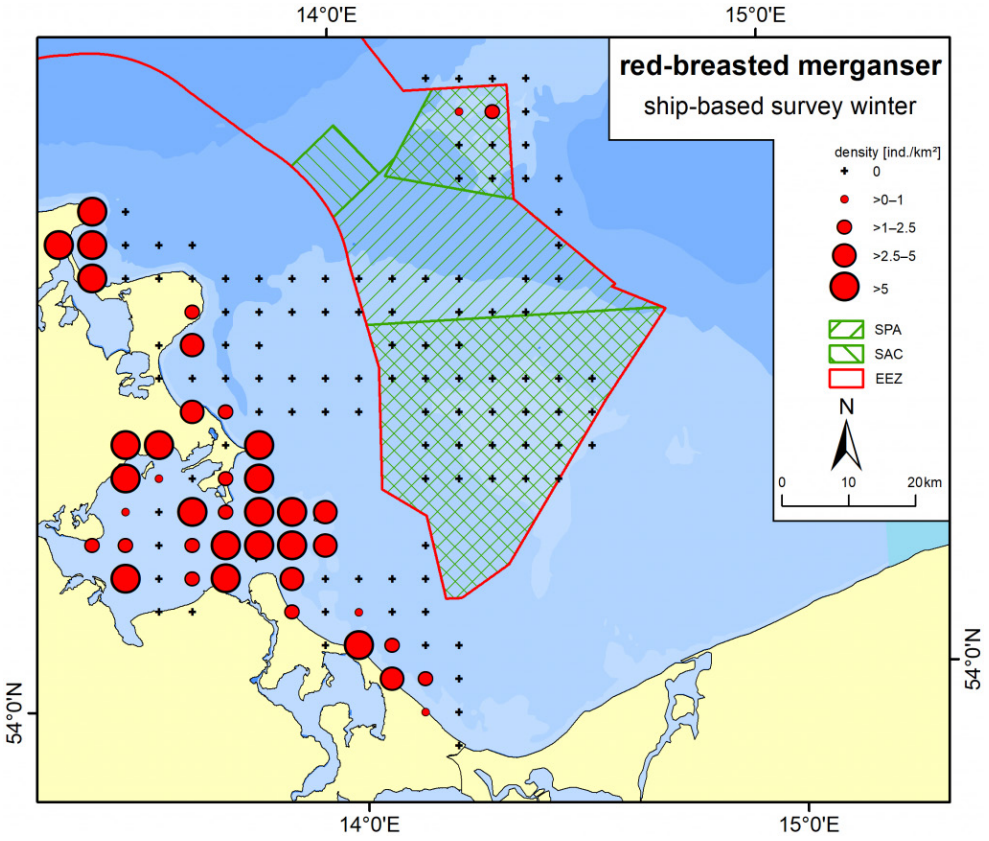

Figure 16: Distribution of red-breasted mergansers (*Mergus serrator*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

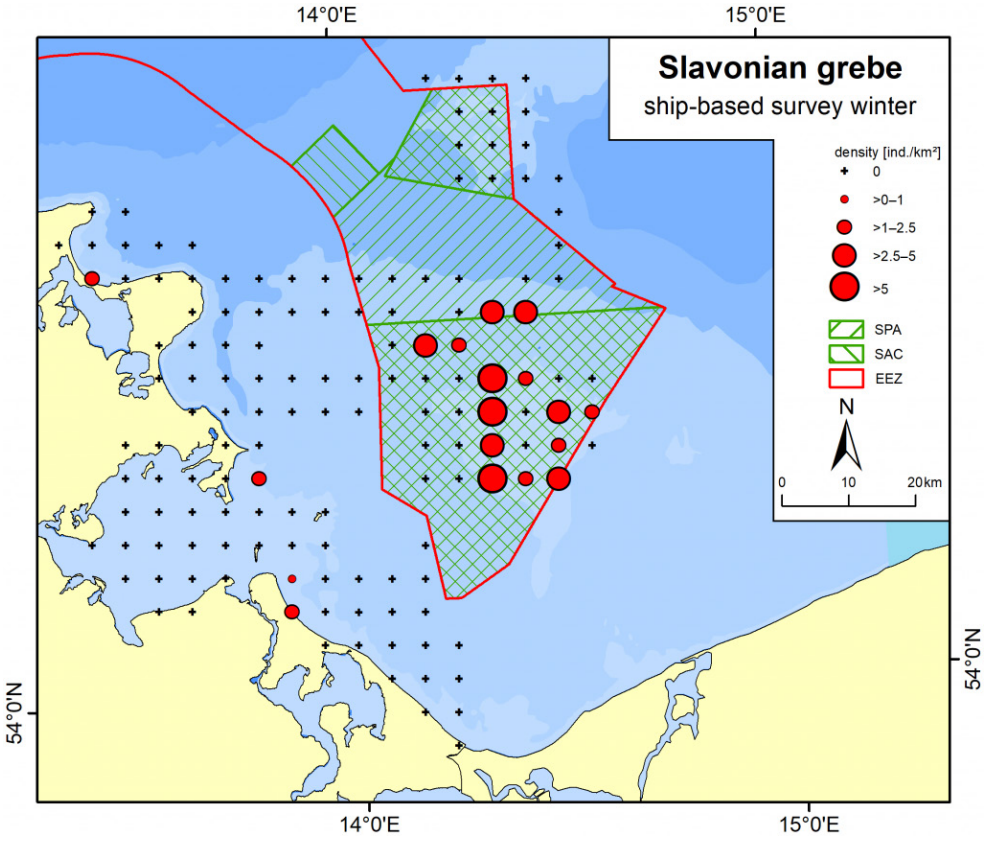

Figure 17: Distribution of Slavonian grebes (*Podiceps auritus*) in the Pomeranian Bay and the Bay of Greifswald in winter (15th to 21st January 2020).

Ship-based seabird survey in the western German Baltic Sea in winter

A ship-based seabird survey took place in the western German Baltic Sea with multi-purpose vessel "Haithabu" between 18th and 20th February (Figure 18), joining a research team from the State Office for Agriculture, Environment and Rural Areas Schleswig-Holstein (LLUR) conducting the Federal/State North Sea and Baltic Sea Monitoring Programme (BLMP). In terms of numbers, seaducks and great crested grebes dominated the scene (Table 4). Great crested grebes were observed almost throughout the study area and were concentrated in areas with shallow water depths (Figure 19). Common eiders were found in high densities almost throughout the area, with somewhat lower densities only in the north-east of Eckernförde Bay (Figure 20). Long-tailed ducks preferred areas with shallow water depths (Figure 21). Common scoters tended to be more common in areas far from shore rather than near shore, but some individuals were observed in the Flensburg Fjord and the Danish Wahld (Figure 22). Velvet scoters were particularly abundant at the mouth of the Flensburg Fjord far from shore east of the mouth of the Schlei River (Figure 23). Large numbers of seaducks of all species were found offshore in the northern part of the Bay of Kiel. This area was identified as an important area for seabirds in the FABENA project and subsequently recommended for consideration in marine spatial planning (SCHIELE *et al*. 2018). Red-breasted mergansers occurred close to the shore throughout the study area, but avoided the inner areas of the fjords (Figure 24). Common gulls were remarkably frequent in the Eckernförde Fjord (Figure 25). Auks were concentrated in the offshore area east of Angeln and Schwansen (Figure 26). Of the auks identified down to species level, razorbills were noticeably more abundant than common guillemots (Table 4).

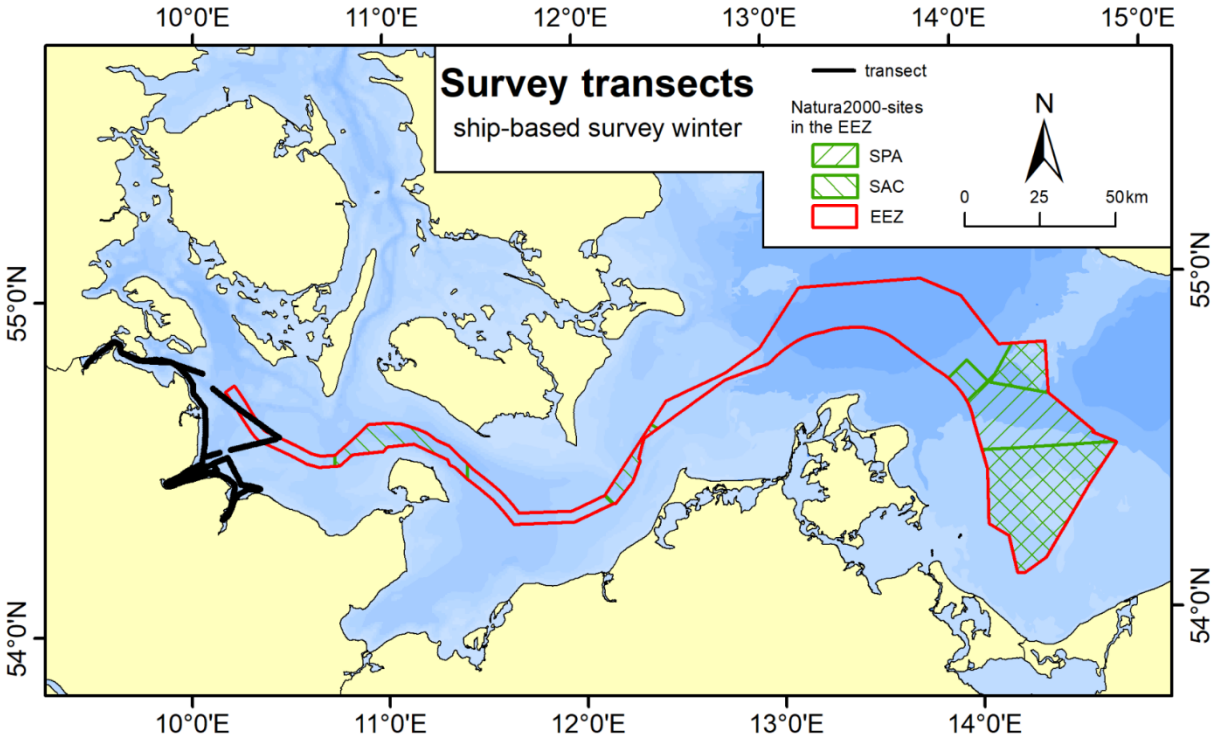

Figure 18. Transect course of the ship-based seabird survey in the western German Baltic Sea in winter (18th to 20th February 2020). This survey was carried out on ship of opportunity "Haithabu", joining an LLUR monitoring campaign.

Table 4: Abundance and average density of species recorded in the transect during the ship-based surveys in the western German Baltic Sea in winter (18th to 20th February 2020).

species	scientific name	count	density [ind. /km²]
red-throated diver	*Gavia stellata*	4	0.045
black-throated diver	*Gavia arctica*	5	0.056
great crested grebe	*Podiceps cristatus*	360	4.064
red-necked grebe	*Podiceps grisegena*	2	0.023
Slavonian grebe	*Podiceps auritus*	3	0.034
unidentified grebe	Podicipedidae	1	0.011
cormorant	*Phalacrocorax carbo*	34	0.384
grey heron	*Ardea cinerea*	1	0.011
mute swan	*Cygnus olor*	2	0.023
common eider	*Somateria mollissima*	2,326	26.256
long-tailed duck	*Clangula hyemalis*	338	3.815
common scoter	*Melanitta nigra*	561	6.333
velvet scoter	*Melanitta fusca*	98	1.106
common golden-eye	*Bucephala clangula*	9	0.102
red-breasted merganser	*Mergus serrator*	100	1.129
goosander	*Mergus merganser*	3	0.034
little gull	*Hydrocoloeus minutus*	2	0.023
black-headed gull	*Chroicocephalus ridibundus*	20	0.226
common gull	*Larus canus*	174	1.964
herring gull	*Larus argentatus*	55	0.621
great black-backed gull	*Larus marinus*	18	0.203
common guillemot	*Uria aalge*	13	0.147
common guillemot / razorbill	*Uria aalge / Alca torda*	27	0.305
razorbill	*Alca torda*	58	0.655
black guillemot	*Cepphus grylle*	1	0.011
skylark	*Alauda arvensis*	6	0.068
rook	*Corvus frugilegus*	2	0.023
harbour porpoise	*Phocoena phocoena*	1	0.011

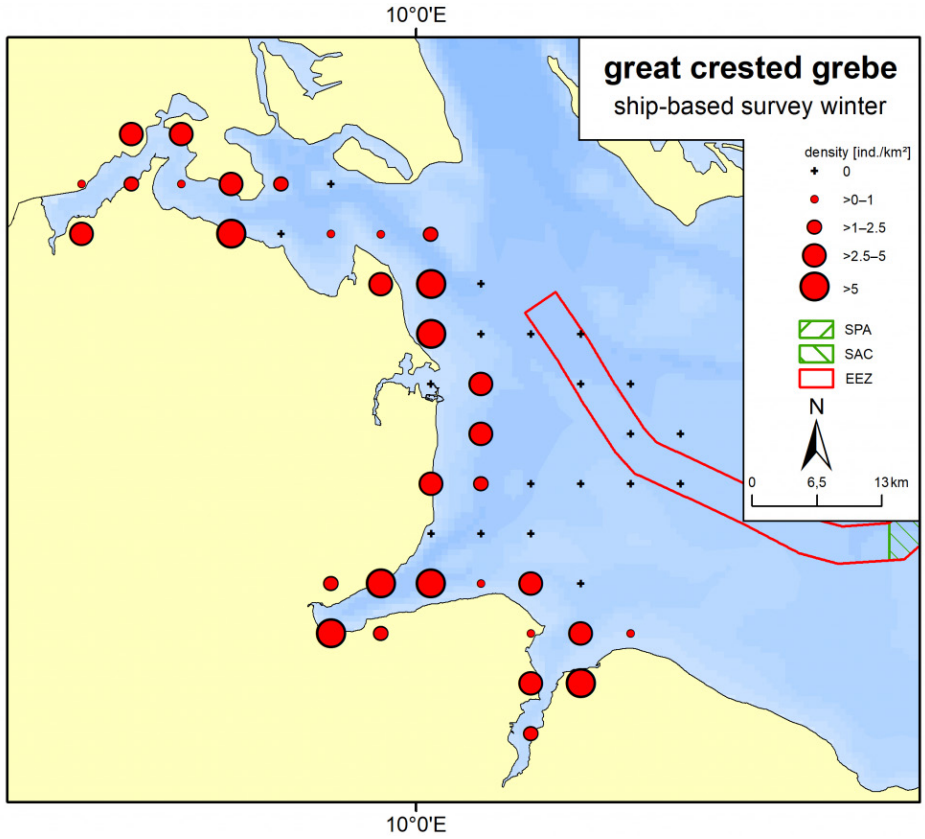

Figure 19: Distribution of great crested grebes (*Podiceps cristatus*) in the western German Baltic Sea in winter (18th to 20th February 2020).

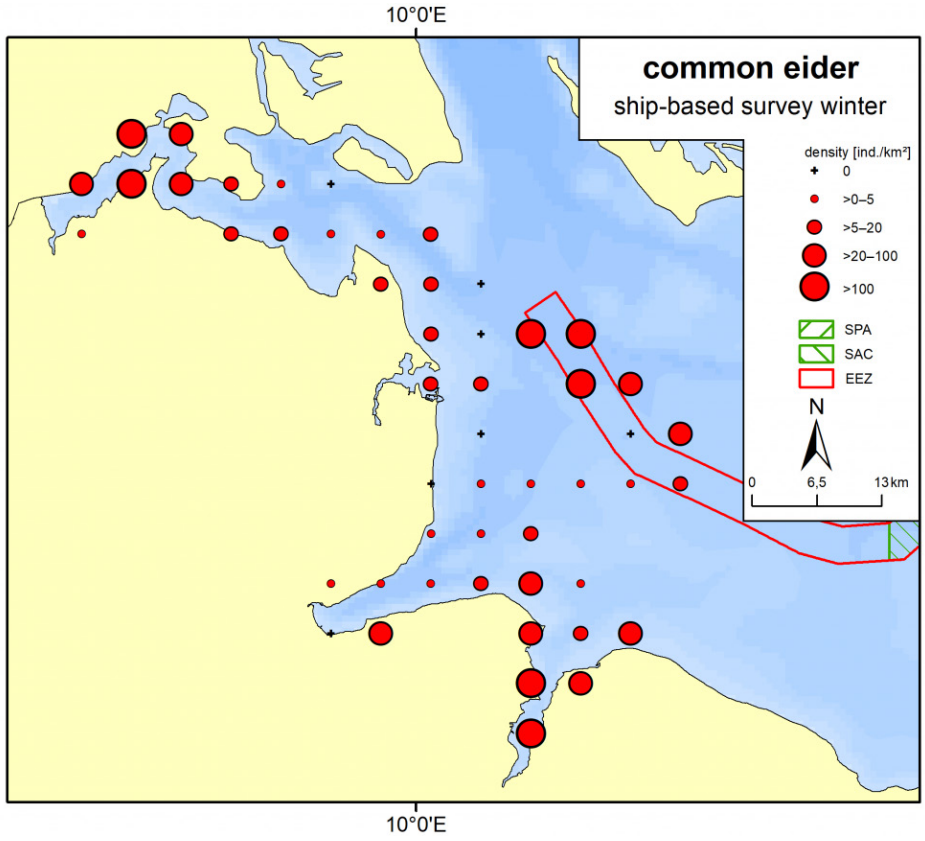

Figure 20: Distribution of common eiders (*Somateria mollissima*) in the western German Baltic Sea in winter (18th to 20th February 2020).

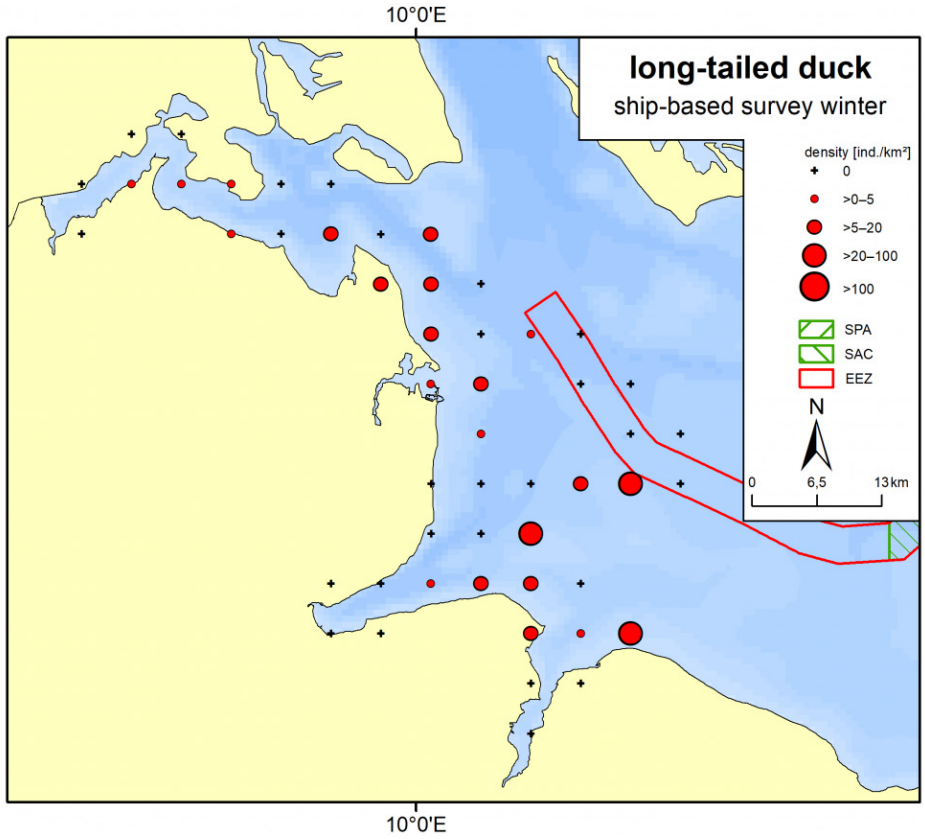

Figure 21: Distribution of long-tailed ducks (*Clangula hyemalis*) in the western German Baltic Sea in winter (18th to 20th February 2020).

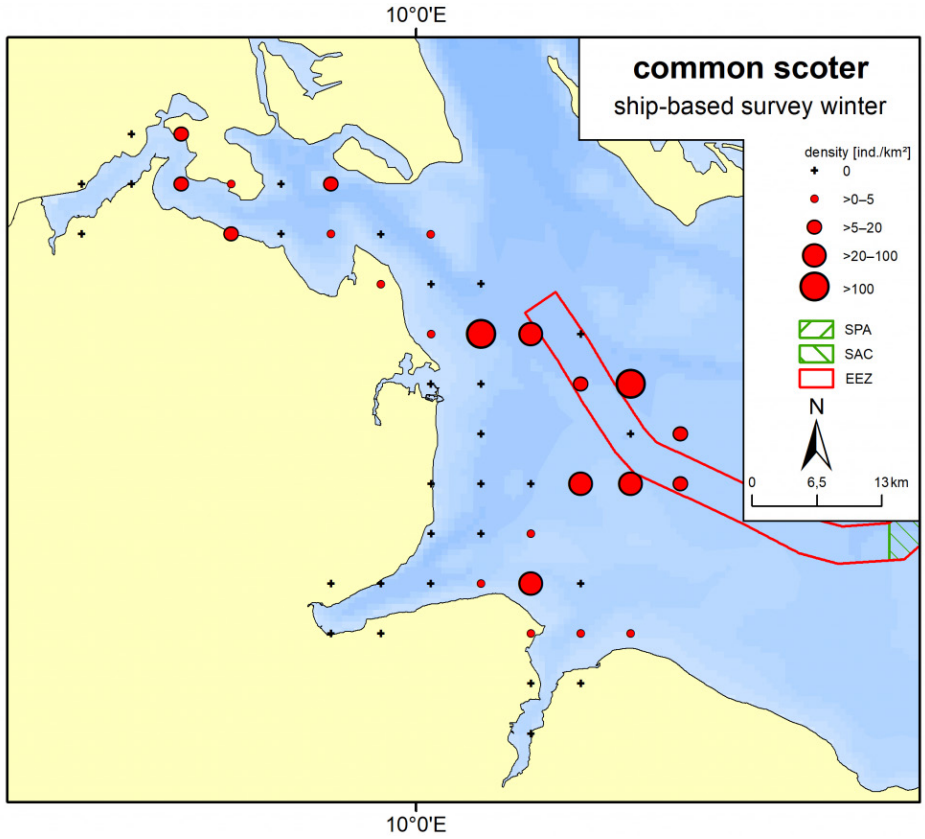

Figure 22: Distribution of common scoters (*Melanitta nigra*) in the western German Baltic Sea in winter (18th to 20th February 2020).

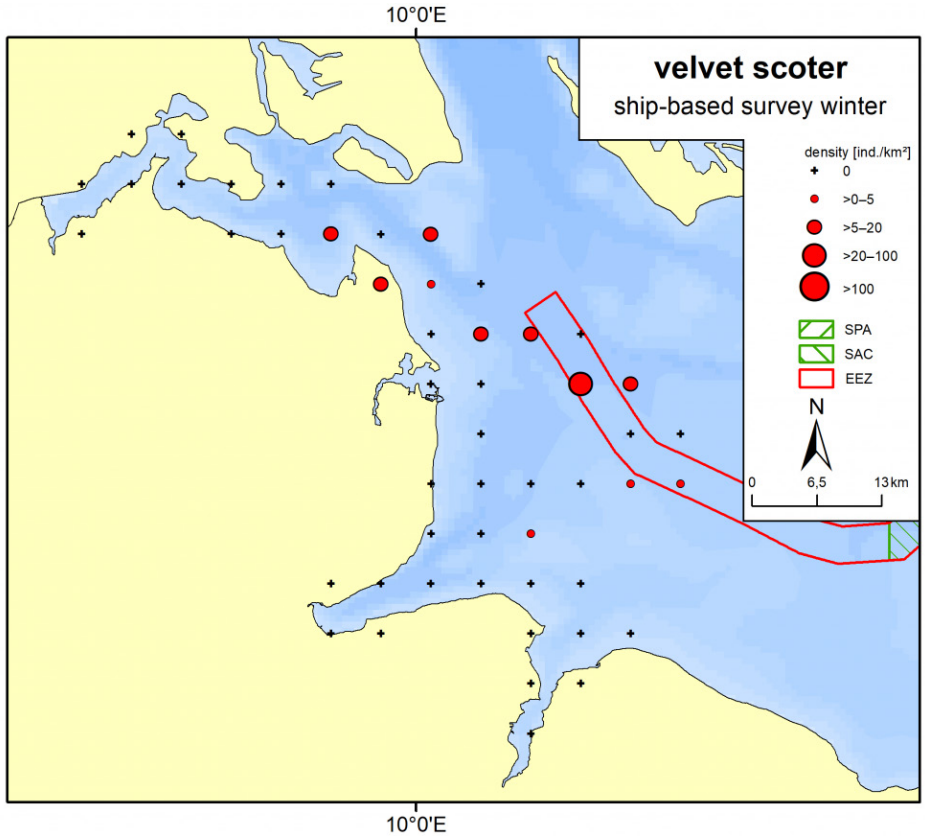

Figure 23: Distribution of velvet scoters (*Melanitta fusca*) in the western German Baltic Sea in winter (18th to 20th February 2020).

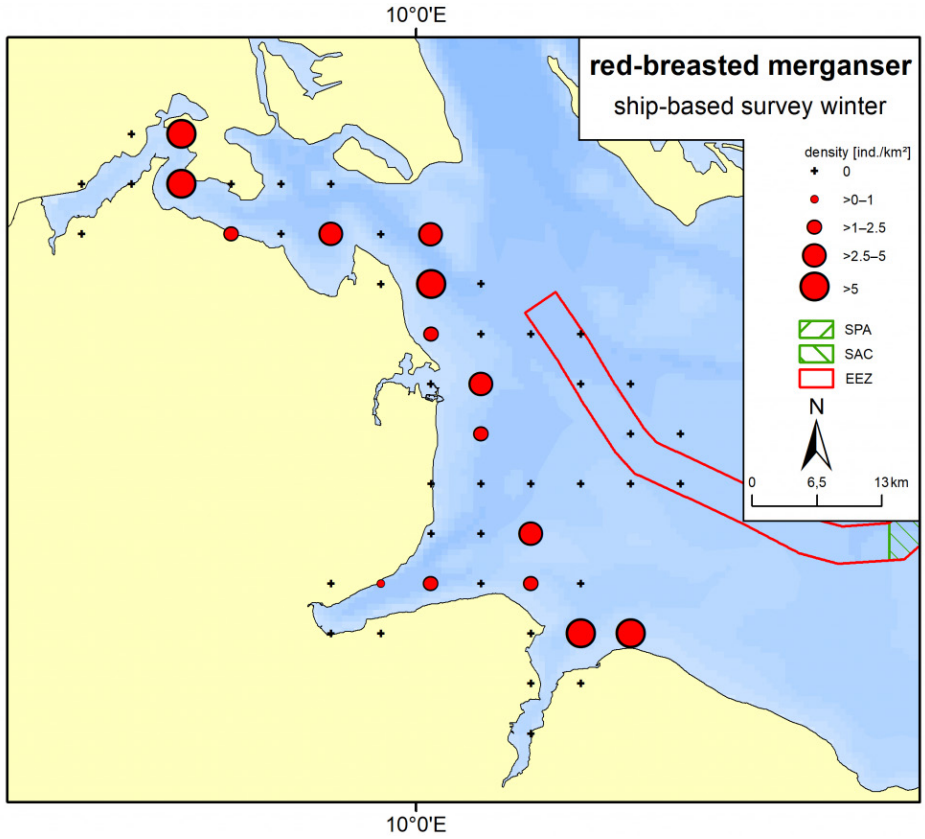

Figure 24: Distribution of red-breasted mergansers (*Mergus serrator*) in the western German Baltic Sea in winter (18th to 20th February 2020).

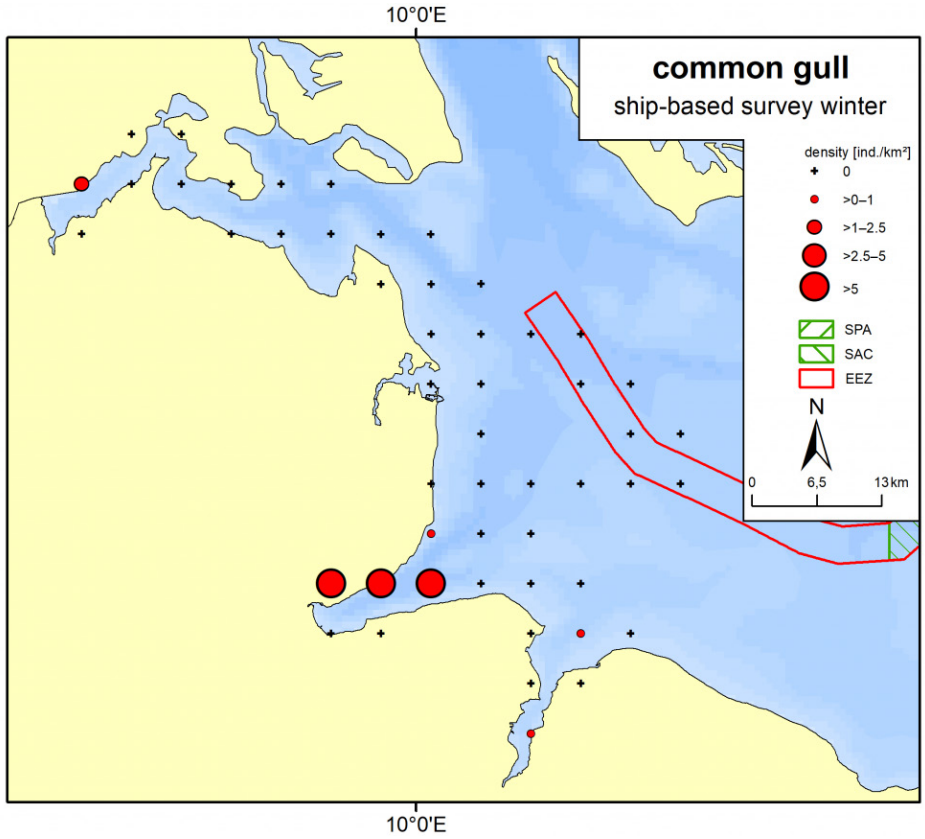

Figure 25: Distribution of common gulls (*Larus canus*) in the western German Baltic Sea in winter (18th to 20th February 2020).

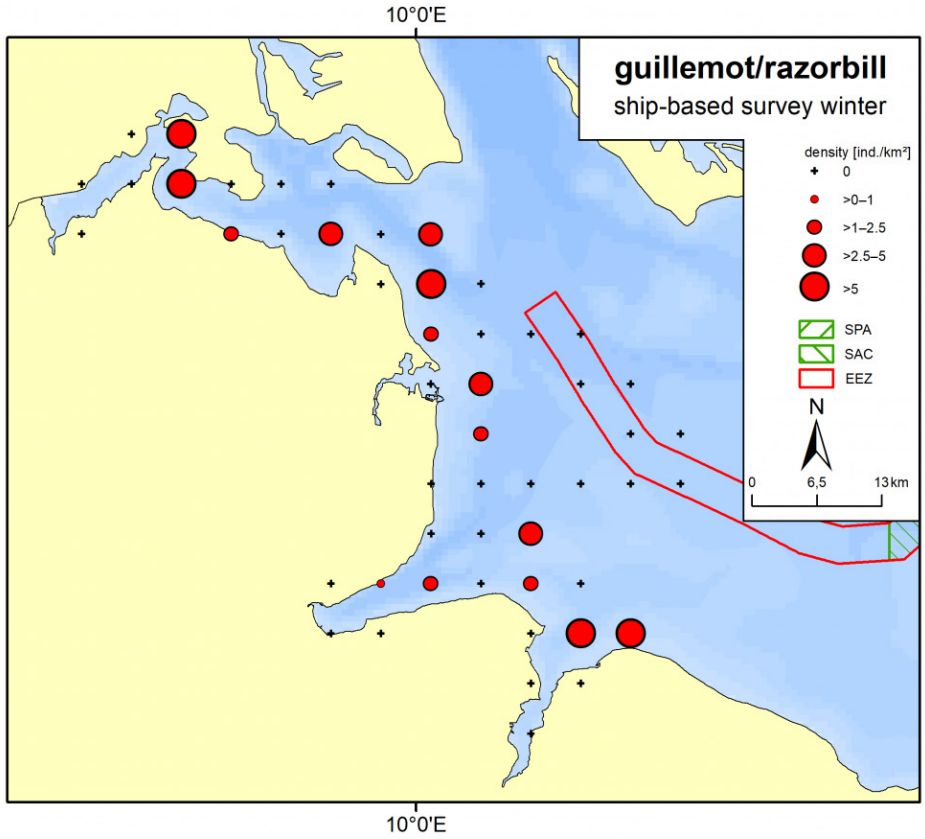

Figure 26: Distribution of razorbills/common guillemots (*Uria aalge / Alca torda*) in the western German Baltic Sea in winter (18th to 20th February 2020).

Further Results

The impact of offshore wind farms on kittiwakes and common guillemots in spring and during breeding season was quantified using seabirds at sea data (PESCHKO *et al.* 2020). All previous sightings of moonfish during observer-based surveys as part of seabird monitoring were compiled (BORKENHAGEN & MARKONES 2020).

Current results of the monitoring are presented on the website of BfN. Sighting maps as well as density maps aggregated over 3 years are available for all common seabird species.

https://www.bfn.de/themen/meeresnaturschutz/marines-monitoring.html

Monitoring reports are available for free download from BfN, in German and English.

https://www.bfn.de/themen/meeresnaturschutz/downloads/berichte-zum-monitoring/berichte-zum-seevogelmonitoring.html

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