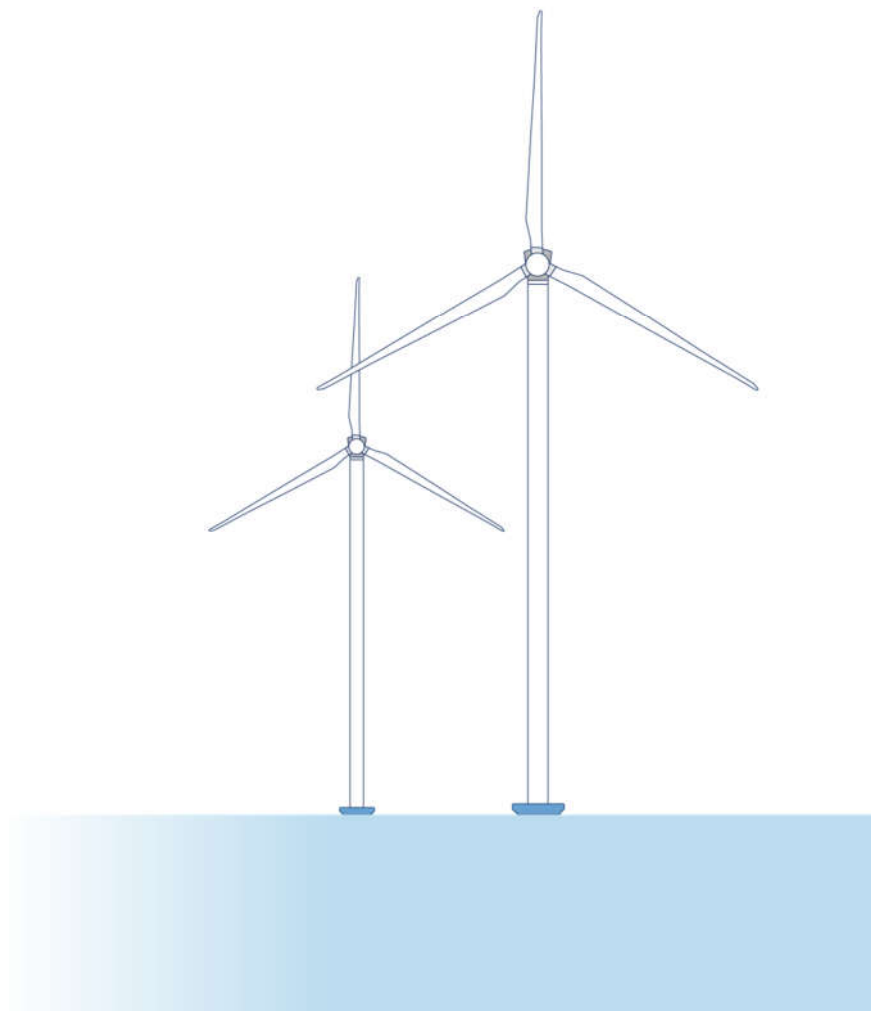


Annex 6

Reports of ornithological research in 2022–2025:

- 2023 m. May – 2025 m. January
(211 p.);
- 2022 m. November - 2023 m.
October (120 p.)



Survey Report Lithuania

Resting Birds

Report November 2022 - October 2023



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V3.0

Husum, November 2023

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1 INTRODUCTION

On behalf of PI Coastal Research and Planning Institute (CORPI), BioConsult SH conducted digital aerial surveys and vessel-based surveys between November 2022 and October 2023 on resting/local birds, using data collection and analysis methods comparable to Germany. The goal was to determine the abundance and spatial distribution of resting seabirds in an area within the exclusive economic zone (EEZ) of Lithuania, where the development of a wind farm (OWF) is planned. This report presents the results of the second year of surveys, which includes 5 digital aerial surveys and 6 ship-based surveys.

1.1 Description of the project area

The planned wind farm area is located around 29 km west of the coast of Lithuania (Figure 1.1). It is bordering the Special Protection Area (SPA) “Klaipėdos–Ventspilio plynaukštė”, which extends to the east of the planned OWF area. Relevant bird species in this SPA are Red-throated Diver, Long-tailed Duck, Velvet Scoter, Common Guillemot and Razorbill.

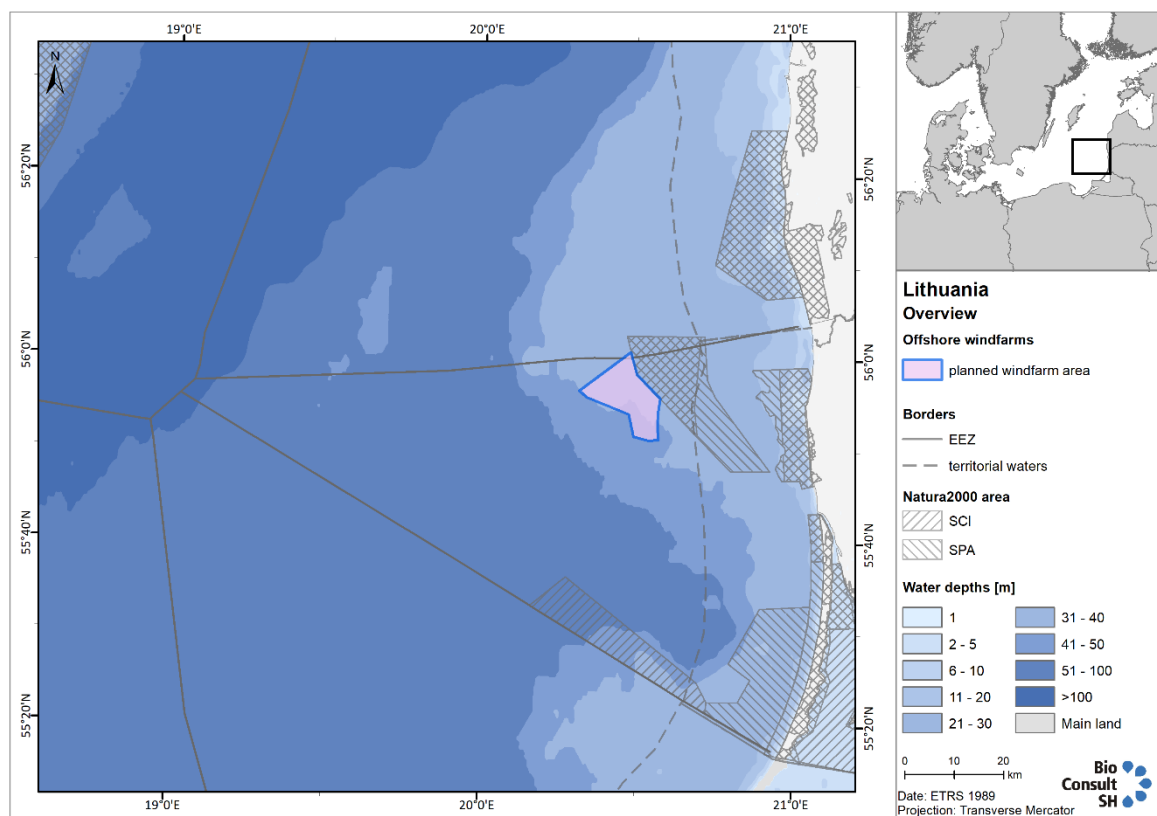


Figure 1.1 Overview of the study area in Lithuania.

2 METHODS

2.1 Aerial surveys using digital videos

2.1.1 Description of the survey transects

This report uses seabird abundances and distributions obtained from a total of 5 airplane-based digital surveys conducted between November 2022 and April 2023. The survey area is referred to as the study site and corresponds to the area covered by the transects (e.g., Figure 2.1).

Two transect designs have been used. The first transect design was used for the first two flights (November 2022 and January 2023) whereas the second transect design was used for the last three flights (Feb-Apr 2023). The first transect design includes 13 transects with transect lengths of 39 km and 4 shorter transects in between, to cover the planned wind farm area, with a transect lengths of 19.07 km. In total, a transect length of 583.28 km is reached. The long transects run parallel to each other and are separated by 4 km, the shorter transects are located in between at a distance of 2 km. The area covered by the transect design is 2,340 km² (Table 2.1, Table 2.3, Figure 2.1).

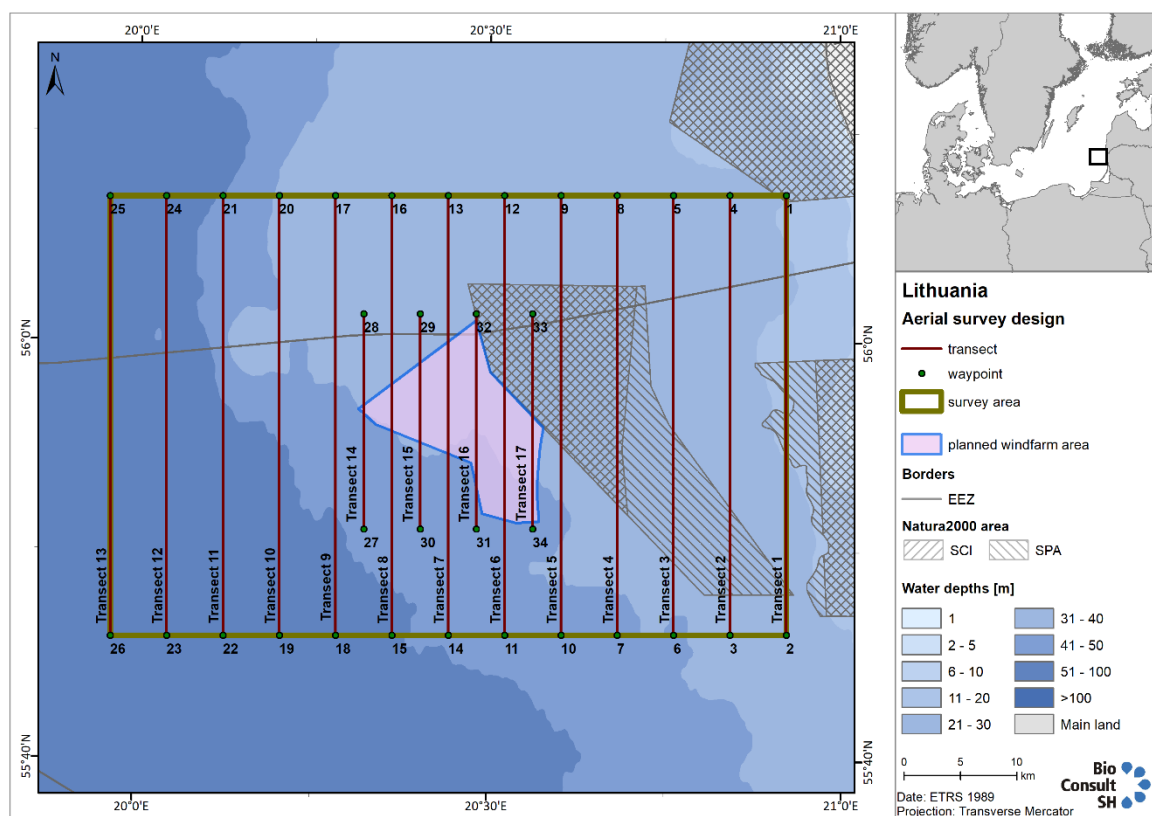


Figure 2.1 Aerial survey transect design for the survey area used for the first two flights. The figure includes the planned wind farm area (filled in light pink). The total study area covers 2,340 km².

Table 2.1 *Geographical coordinates and length of aerial survey transects in the study area during the first two flights.*

Transect	Waypoint	Latitude	Longitude
1	1	56° 7.099' N	20° 55.360' E
1	2	55° 46.074' N	20° 55.401' E
2	3	55° 46.069' N	20° 50.620' E
2	4	56° 7.094' N	20° 50.535' E
3	5	56° 7.086' N	20° 45.710' E
3	6	55° 46.061' N	20° 45.838' E
4	7	55° 46.051' N	20° 41.057' E
4	8	56° 7.075' N	20° 40.885' E
5	9	56° 7.061' N	20° 36.060' E
5	10	55° 46.037' N	20° 36.275' E
6	11	55° 46.020' N	20° 31.494' E
6	12	56° 7.044' N	20° 31.236' E
7	13	56° 7.024' N	20° 26.411' E
7	14	55° 46.000' N	20° 26.713' E
8	15	55° 45.977' N	20° 21.932' E
8	16	56° 7.001' N	20° 21.587' E
9	17	56° 6.974' N	20° 16.762' E
9	18	55° 45.951' N	20° 17.151' E
10	19	55° 45.921' N	20° 12.370' E
10	20	56° 6.944' N	20° 11.938' E
11	21	56° 6.911' N	20° 7.114' E
11	22	55° 45.889' N	20° 7.589' E
12	23	55° 45.853' N	20° 2.809' E
12	24	56° 6.875' N	20° 2.290' E
13	25	56° 6.836' N	19° 57.464' E
13	26	55° 45.815' N	19° 58.026' E
14	27	55° 51.056' N	20° 19.453' E
14	28	56° 1.336' N	20° 19.274' E
15	29	56° 1.361' N	20° 24.086' E
15	30	55° 51.080' N	20° 24.245' E

Transect	Waypoint	Latitude	Longitude
16	31	55° 51.06' N	20° 19.45' E
16	32	56° 06.15' N	20° 19.19' E
17	33	56° 06.18' N	20° 24.01' E
17	34	55° 51.08' N	20° 24.24' E

The second transect design includes the same 13 transects of the first design with transect lengths of 39 km. In addition, 6 shorter transects were included in between, to cover the planned wind farm area. Two of these transects have a length of 23.4 km (transects 14 and 15), and four have a length of 28.0 km (transects 16 to 19). The total transect length reached was 665.87 km. The long transects run parallel to each other and are separated by 4 km, the shorter transects are located in between at 2 km distance. The area covered by the transect design is however the same: 2,340 km² (Table 2.2, Table 2.3, Figure 2.2).

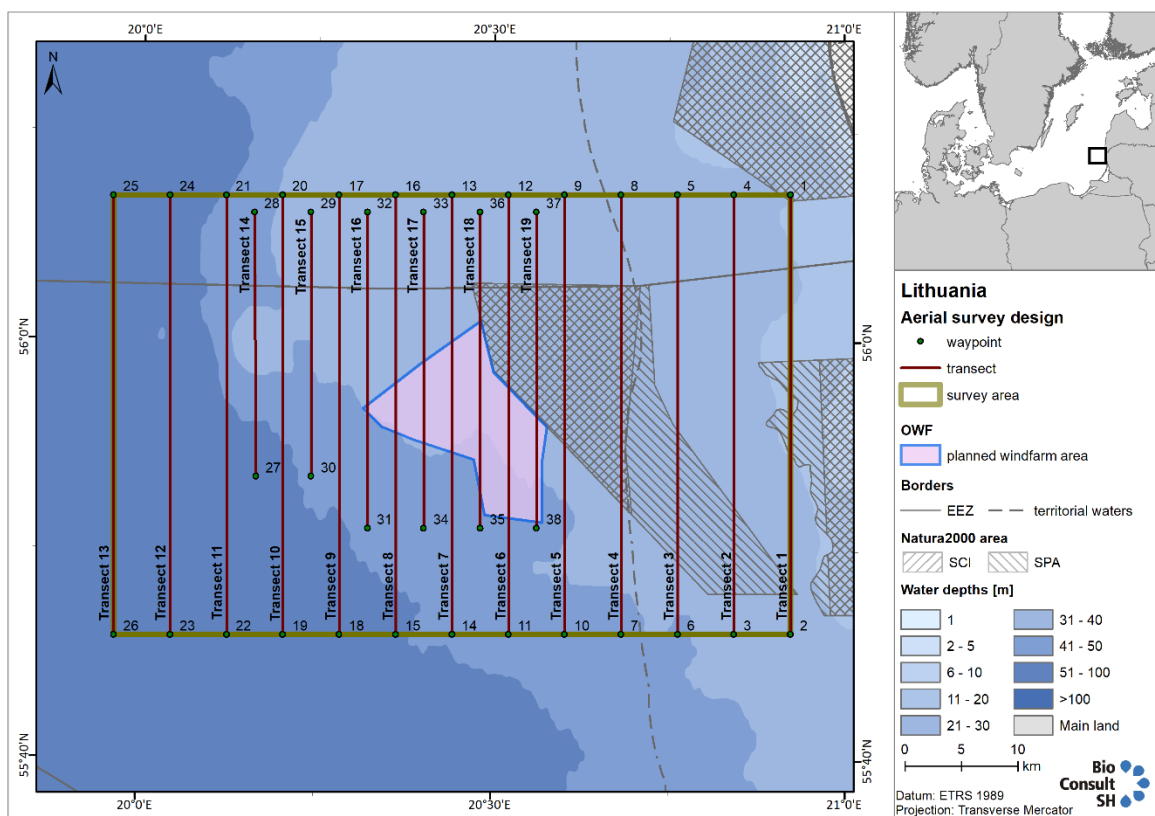


Figure 2.2 Aerial survey transect design for the survey area used for the last three flights.. The figure includes the planned wind farm area (filled in light pink). The total study area covers 2,340 km².

Table 2.2 *Geographical coordinates and length of aerial survey transects in the study area during the last three flights.*

Transect	Waypoint	Latitude	Longitude
1	1	56° 7.099' N	20° 55.360' E
1	2	55° 46.074' N	20° 55.401' E
2	3	55° 46.069' N	20° 50.620' E
2	4	56° 7.094' N	20° 50.535' E
3	5	56° 7.086' N	20° 45.710' E
3	6	55° 46.061' N	20° 45.838' E
4	7	55° 46.051' N	20° 41.057' E
4	8	56° 7.075' N	20° 40.885' E
5	9	56° 7.061' N	20° 36.060' E
5	10	55° 46.037' N	20° 36.275' E
6	11	55° 46.020' N	20° 31.494' E
6	12	56° 7.044' N	20° 31.236' E
7	13	56° 7.024' N	20° 26.411' E
7	14	55° 46.000' N	20° 26.713' E
8	15	55° 45.977' N	20° 21.932' E
8	16	56° 7.001' N	20° 21.587' E
9	17	56° 6.974' N	20° 16.762' E
9	18	55° 45.951' N	20° 17.151' E
10	19	55° 45.921' N	20° 12.370' E
10	20	56° 6.944' N	20° 11.938' E
11	21	56° 6.911' N	20° 7.114' E
11	22	55° 45.889' N	20° 7.589' E
12	23	55° 45.853' N	20° 2.809' E
12	24	56° 6.875' N	20° 2.290' E
13	25	56° 6.836' N	19° 57.464' E
13	26	55° 45.815' N	19° 58.026' E
14	27	55° 53.47' N	20° 09.92' E
14	28	56° 06.10' N	20° 09.54' E
15	29	56° 06.13' N	20° 14.37' E
15	30	55° 53.50' N	20° 14.61' E

Transect	Waypoint	Latitude	Longitude
16	31	56° 51.06' N	20° 19.45' E
16	32	56° 06.15' N	20° 19.19' E
17	33	56° 06.18' N	20° 24.01' E
17	34	55° 51.08' N	20° 24.24' E
18	35	55° 51.10' N	20° 29.04' E
18	36	56° 06.20' N	20° 28.83' E
19	37	56° 06.22' N	20° 33.66' E
19	38	55° 51.12' N	20° 33.83' E

Table 2.3 Overview of the digital aerial surveys carried out in the study area between November 2022 and April 2023.

Date of the aerial survey	Distance (km)	Effort (km ²)	Coverage (%)
02.11.2022	536.15	281.08	12.0
19.01.2023	574.09	309.17	13.2
14.02.2023	618.51	336.06	14.4
25.03.2023	669.54	363.74	15.5
28.04.2023	672.00	364.77	15.6
Sum	Total: 3,070.29	Total: 1,654.82	Average: 14.1

2.1.2 Data collection

The recording of resting birds was performed using the digital video technology developed by the company HiDef (<https://www.hidefsurveying.co.uk/>), explained in detail in Weiß et al. (2016), and summarized in the following paragraphs.

A twin-engined, high-wing propeller-driven aircraft (Partenavia P 68) was used for the acquisition of digital videos. This aircraft is equipped with four high-resolution video camera systems which take approximately seven images per second and can achieve a resolution of two cm at sea surface. Since the camera system is not directed vertically downwards (depending on the sun position, it can be slightly inclined or even set against the flight direction), interferences arising from solar reflections (glare) can be effectively reduced. The external cameras (indicated by A and D, Figure 2.3) cover a strip of 143 m width while the internal ones cover a width of 129 m each, resulting in 544 m effectively covered. There is however about 20 m distance between each strip to avoid double counting of individuals detected by the cameras. Thus, the total recorded strip of 544 m is distributed over a width of 604 m (see Figure 2.3).

The aircraft flew at a mean speed of approx. 220 km/h (120 knots) at an altitude of more than 500 m. A GPS device (Garmin GPSMap 296) records the position every second which permits to geographically assign a location to the images and the birds registered on them. The collected data were stored on mobile hard disks for subsequent review and analysis.

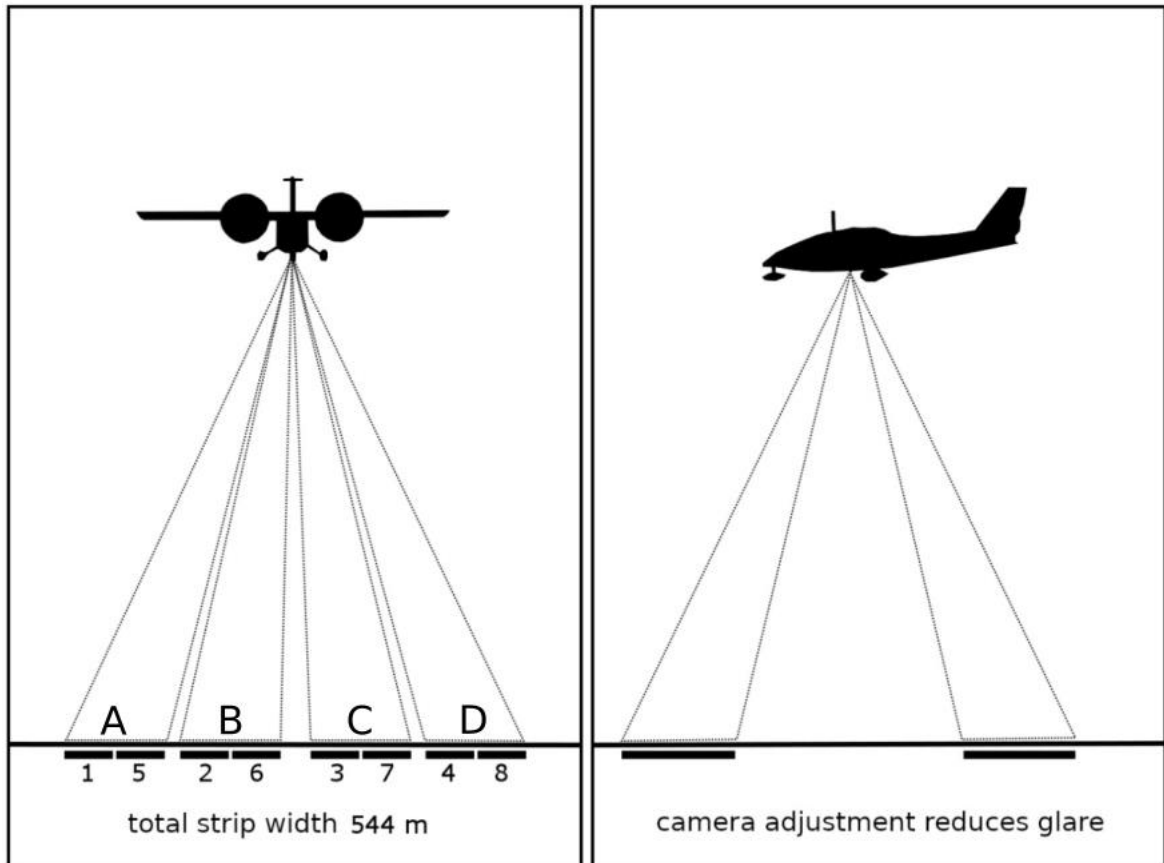


Figure 2.3 The HiDef Camera-System. The four cameras (A to D) cover an effective strip width of 544 m of the sea surface at a flight altitude of 549 m (left: frontal view; right: side view). The numbering indicates the camera images as they are used in the evaluation (the images from each camera are divided into two halves).

2.1.3 Data processing

To facilitate the detection of objects, the video sequences taken from each camera were split into two halves so that each half of the picture fitted the width of a large monitor. The video files were then processed, using an image capture and management software (StreamPix) for analysis. First, the images were examined and all the detected objects (birds, mammals, ships, etc.) were marked and pre-sorted for subsequent identification. To guarantee a consistently high quality, 20% of each film was randomly selected and processed again by another reviewer. If both reviewers agreed over 90% of the cases in that film, any discrepancy was rechecked, and the film approved for the next analysis step. If not, the film was reanalysed from scratch. Sections of the footage that could not be assessed due to backlight or the presence of clouds were not considered for further analysis.

The next step involved the identification of the previously marked objects (birds). This was done by experienced observers. Often birds can be identified on the images to species level. Because of the strong similarities between some species (e.g., common guillemot and razorbill, common and Arctic tern, and red-throated and black-throated diver), it is not always possible to identify the individuals to species level. However, it is usually possible to identify individuals as belonging to a species group formed by two (or few) closely related species. In addition to the identification, other information such as position, age, behaviour (swimming or flying) and flight direction were determined whenever possible. Environmental parameters (air turbidity, sea state, solar reflection, and water turbidity) were recorded every 500 images (approx. 4 km). In a second step for quality control, 20% of the objects identified were re-assessed by a second reviewer. All discrepancies between the first and second identification process were checked again by a third expert. If there was agreement by at least 90%, the data collected was released for further analysis. If agreement was lower than 90%, systematic errors (e.g., problems in determining specific species groups) were corrected and all objects viewed in the film concerned were re-identified.

2.1.4 Data analysis

All detected resting birds were either assigned a species or species group category (see below). Among these, relevant species/species groups were defined based on the frequency of occurrence in the survey area and the importance of the area as habitat for species according to reference literature. A list of all recorded species and their abundances is provided in the appendix A.1.

The individuals not identified to species level in the aerial surveys were initially grouped into a larger taxonomic group of very similar species. Examples of these are common guillemot/razorbill and unidentified divers (red-throated and black-throated diver). These “two species” species groups include a large proportion of the resting birds not identified to species level. Other resting birds, that could not be assigned to any of the previously mentioned or other two-species group, are in most cases identified to family level.

2.1.5 Calculation of densities

Densities (ind./km²) were calculated for all relevant resting bird species and species groups. To calculate densities the number of detected individuals of each species/taxon in each survey is divided by the area covered by the transects (“effort”). As the effect of the aircraft on any flight behaviour of the birds is negligible, no correction factors are applied to the abundances of species from aerial surveys. Therefore, it is assumed that all individuals are captured by the images.

The spatial distribution was determined for all surveys together or seasonally according to the species-specific classification by GARTHE et al. (2007) and displayed using grid density maps. In short, a grid was laid over the survey area with its grid cells aligned with the EEA grid (EEA 2019). The individual cells consist of rectangles with edge lengths of 5 km. In total, a grid of 104 cells was created for the survey area. Also, pinpoint-maps for individual surveys were produced and can be found in the Appendix (A.2).

2.2 Ship-based surveys

This report uses seabird abundances and distributions obtained from a total of 6 ship-based surveys conducted between May and October 2023.

The transect design includes 6 transects with transect lengths of 25.9 km. In total, a transect length of 155 km is reached. The transects run parallel to each other and are separated by 4 km. The area covered by the transect design is 533 km² (Figure 2.4).

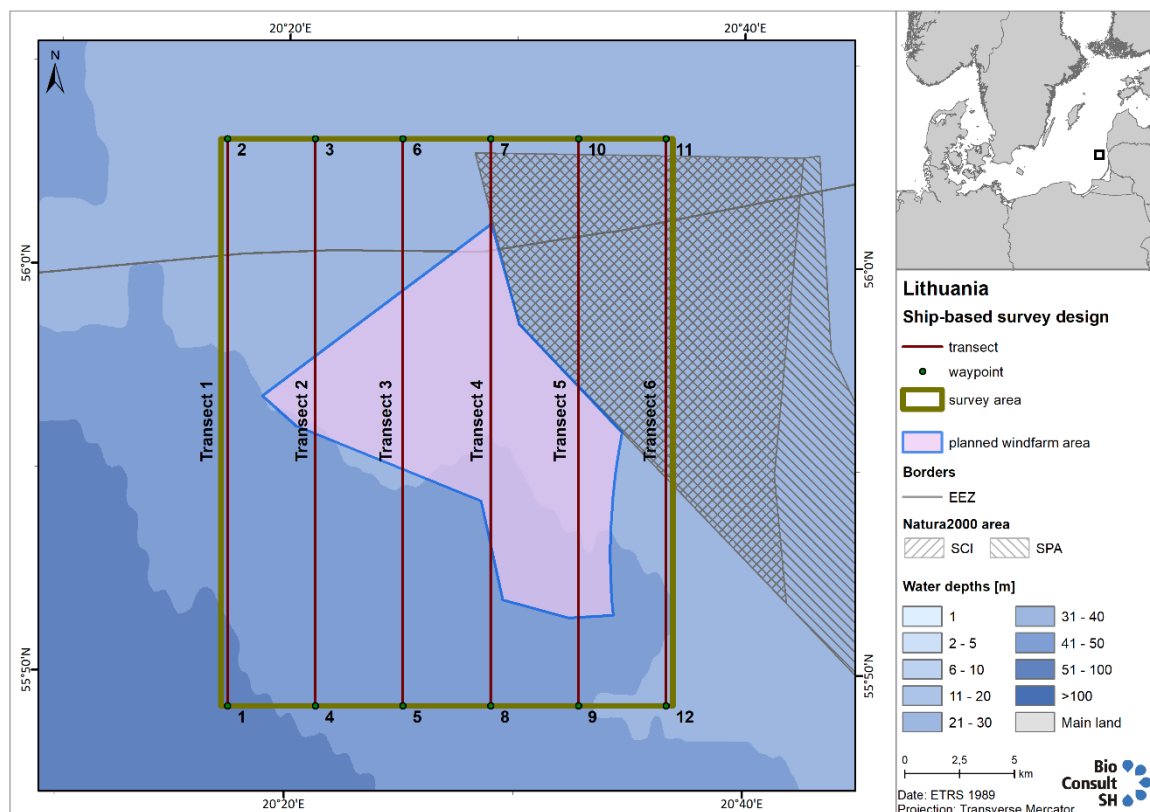


Figure 2.4 Transect design for ship-based resting bird monitoring from May to October 2023. The total study area covers 533 km².

Table 2.4 Geographical coordinates and length of ship transects in the study area.

Transect	Waypoint	Latitude	Longitude
1	1	55° 49.16' N	20° 17.53' E
1	2	56° 03.10' N	20° 17.27' E
2	3	56° 03.12' N	20° 21.12' E
2	4	55° 49.18' N	20° 21.36' E
3	5	55° 49.20' N	20° 25.19' E
3	6	56° 03.14' N	20° 24.98' E
4	7	56° 03.16' N	20° 28.83' E

Transect	Waypoint	Latitude	Longitude
4	8	55° 49.22' N	20° 29.02' E
5	9	55° 49.23' N	20° 32.85' E
5	10	56° 03.17' N	20° 32.68' E
6	11	56° 03.19' N	20° 36.54' E
6	12	55° 49.25' N	20° 36.68' E

Unfavourable sea state conditions or poor visibility meant that on occasion individual sections of the survey area could not be recorded or were excluded from the evaluation. The transect distance recorded and the degree of coverage of the survey area per sailing are shown in Table 2.5.

Table 2.5 Overview of the six ship-based surveys carried out in the study area between May and October 2023.

Survey	Distance [km] covered	Effort [km ²]	Ship	% Coverage
18.-19.05.2023	105.2	63.1	Lilian	11.8
25.-26.06.2023	102.1	61.3	Lilian	11.5
29.-30.07.2023	137.4	82.4	Lilian	15.4
16.-17.08.2023	145.6	87.4	Lilian	16.4
11.09.2023	72.6	43.6	Lilian	8.2
10.-22.10.2023	155.2	93.1	Lilian	17.5

2.2.1 Detection methodology

The surveys were performed closely on the basis of the methodology used in the European Seabird-at-Sea programme (GARTHE & HÜPPOP 1996, 2000) and the BSH guidelines of StUK4 (BSH 2013). The censuses were performed on board the ship *Lilian* (Ex *Coast Guard* ship, length 27 m).

The ship was sailing at a speed of between 7.5 and 10 knots. Two observers on each of the port and starboard sides recorded all swimming and flying birds in a 300 m wide transect parallel to the keel line of the ship. The boundary of the transect area to the stern of the ship was formed by a line perpendicular to the keel from the viewpoint of the observers.

In addition to the species affiliation, further information such as age, sex, moulting condition, behaviour, association with other species or ships, flight altitude and flight direction of the birds observed were determined where possible. In addition, the distance to the keel line was estimated for all swimming individuals or assigned to a distance category from A to E (Table 2.6); flying birds are always assigned the code F.

Table 2.6 Distance classes for swimming birds.

Distance range (m)	Band (ESAS-Code)
0 – 50	A
51 – 100	B
101 – 200	C
201 – 300	D
> 300	E

For flying birds, the so-called snapshot method was used. Here, birds are considered to be “in the transect” only if they are flying over the section to either side of the ship at the moment of the snapshot. The section of the transect that is deemed valid for snapshot acquisition is determined by the width of the transect (300 m perpendicular to the direction of travel) and the distance between the front and the rear ends of the route that is travelled within a defined time unit. At ten knots, this is approx. 300 m in one minute. At ship speeds between eight and twelve knots, snapshots are performed every full minute in accordance with StUK4. The distance to the front of the snapshot site is then approx. 250 m at eight knots and about 370 m at twelve knots. Thus, a transect area of 300 m (to the side) x 300 m (to the front) is usually recorded on both sides of the ship. All flying birds outside this site and those that are not flying within the 300 m for the full minute are treated as outside the transect. This method of data collection for flying birds prevents frequent and particularly fast flying birds from being overestimated in terms of quantity or being counted multiple times (GARTHE & HÜPPOP 1996).

Some species/species groups are characterized by the fact that they sometimes take flight while still far ahead of the ship (up to over 1 km) and are therefore often missed by the naked eye. For example, divers, common scoters, and grebes have large flight distances (BELLEBAUM ET AL. 2006; SCHWEMMER ET AL. 2011; FLIESSBACH ET AL. 2019). In order to collect data on these species nevertheless, an area within the range 500 to 2500 m (in the direction of travel) was scanned with binoculars by one person of the observation team from the bow of the ship (the “bow observer”). As the distance from the observer increases, the error in distance estimation also increases, and therefore it is often not possible to make the precise distance estimations perpendicular to the keel line (see above) that are required. The birds that take flight while far ahead of the ship were classified as either “inside” or “outside” the transect area, because the actual densities of individuals might otherwise be significantly underestimated. However, even with continuous observation with binoculars, many divers and scoters would only be spotted in flight ahead of the ship. In such cases it is not certain whether the birds flew because of disturbance by the ship or if they were in fact flying across the survey area.

In addition to the data collection of the birds within the transect, birds that were spatially and/or temporally outside the transect were also recorded. In this way, less common species that might otherwise not be recorded can also be taken into account. However, the results of these censuses are not included in the calculations of monthly and seasonal densities, but they are included in the list of species in the appendix A.1.

2.2.2 Assessment methodology

The number of swimming individuals recorded in the ship-based transect surveys was corrected for data collection errors (see Table 2.7). For the most frequent resting bird species and species groups densities (ind./km²) were calculated. For this purpose, the number of all birds counted within the transect per species/species group (taking into account the correction factors for swimming/diving birds, see below) was divided by the respective area total for the respective survey.

To show the spatial distribution of resting birds, the survey area was covered with a grid of 42 cells with a 4 x 4 km side length. The appendix additionally contains pinpoint maps of sightings (A.3).

2.2.3 Correction factors

Because swimming birds are more easily overlooked by the observer with increasing distance, the individual numbers recorded are adjusted with a correction factor (GARTHE ET AL. 2007, 2009). Only the numbers of swimming and diving individuals are corrected (GARTHE ET AL. 2007) and not those of flying birds. The factors used for correcting the population densities are shown in Table 2.7.

Table 2.7 Correction factors for swimming/diving birds according to values from the literature (GARTHE ET AL. 2007, 2009) as well as the correction factors used for the calculation of the densities. For Long-tailed Duck, no correction factor was applied.

Correction factors	Correction factors used for the calculations
Divers	1.7
Little Gull	1.7
Common Gull	1.7
Lesser black-backed Gull	1.6
Herring Gull	1.7
Common Guillemot	2.1
Razorbill	2.0

3 RESULTS

3.1 Species composition and abundance

As already described in the methods, the two survey methods covered different time periods respectively and are not comparable, but complementary. The number of resting birds recorded by each type of survey is summarised in Table 3.1. Few species dominate the communities in each case.

Table 3.1 Bird counts and percentages of all resting bird species during the digital aerial surveys and the ship-based transect surveys in the survey area between November 2022 and October 2023. Number of individuals for the ship-based surveys include only those counted within the transect area. In the results section, species that represent at least 0.5% of abundance in any of the survey methods are further described.

Species	Scientific name	Aerial Surveys		Ship-based surveys	
		N° ind.	%	N° Ind.	%
Red-throated Diver	<i>Gavia stellata</i>	684	7.2	1	0.1
Black-throated Diver	<i>Gavia arctica</i>	34	0.4	15	1.2
Unidentified diver	<i>Gavia sp.</i>	36	0.4	-	
Great Crested Grebe	<i>Podiceps cristatus</i>	4	0	1	0.1
Red-necked/Great Crested Grebe	<i>Podiceps grisegena/Podiceps cristatus</i>	2	0	-	-
Unidentified grebe		2	0	-	-
Great Cormorant	<i>Phalacrocorax carbo</i>	5	0.1	32	2.5
Long-tailed Duck	<i>Clangula hyemalis</i>	1,208	12.7	6	0.5
Common Scoter	<i>Melanitta nigra</i>	35	0.4	0	0
Velvet Scoter	<i>Melanitta fusca</i>	2,511	26.5	102	8.1
Common/Velvet Scoter	<i>Melanitta nigra/M. fusca</i>	152	1.6	-	-
Arctic Jaeger	<i>Stercorarius parasiticus</i>			1	0.1
Little Gull	<i>Hydrocoloeus minutus</i>	1,631	17.2	555	44.0
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	30	0.3	-	-
Unidentified small gull		77	0.8	-	-
Common Gull	<i>Larus canus</i>	256	2.7	74	5.9
Lesser Black-backed Gull	<i>Larus fuscus</i>	3	0	6	0.5
Herring Gull	<i>Larus argentatus</i>	387	4.1	194	15.4
Common/Herring Gull	<i>Larus canus/L. argentatus</i>	15	0.2	-	-
Great Black-backed Gull	<i>Larus marinus</i>	9	0.1	5	0.4
Unidentified large gull	<i>Larus (magnus) sp.</i>	20	0.2	-	-

Species	Scientific name	Aerial Surveys		Ship-based surveys	
		N° ind.	%	N° Ind.	%
Black-legged Kittiwake	<i>Rissa tridactyla</i>	1	0	-	-
Unidentified gull	<i>Larus sp.</i>	6	0.1	-	-
Sandwich Tern	<i>Thalasseus sandvicensis</i>	-		2	0.2
Common Tern	<i>Sterna hirundo</i>	-		2	0.2
Unidentified tern	<i>Sterna sp.</i>	1		-	-
Unidentified tern/gull		2	0	-	-
Common Guillemot	<i>Uria aalge</i>	1,085	11.4	262	20.8
Razorbill	<i>Alca torda</i>	773	8.2	4	0.3
Common Guillemot/ Razorbill	<i>Uria aalge/Alca torda</i>	503	5.3	-	-
Black Guillemot	<i>Cepphus grylle</i>	4	0	-	-
Unidentified auk	<i>Alcidae</i>	2	0	-	-
Total		9,478	100	1,262	100

The following tables show the density of the most common species and groups in each of the months surveyed by the two methods.

Table 3.2 *Monthly mean densities (ind./km²) of selected species/species groups recorded in the survey area during digital aerial surveys from November 2022 to April 2023. The indication “0” means that no individual of this species was found in that month.*

Survey Method	Digital aerial surveys					
Species/Species-group	Nov 22	Jan 23	Feb 23	Mar 23	Apr 23	Max
Red-throated Diver	0.38	0.27	0.61	0.64	0.16	0.64
Black-throated Diver	0.07	0	0.02	0	0.02	0.07
Great Cormorant	0	0	0	0.01	0	0.01
Long-tailed Duck	0.03	2.08	1.19	0.42	0.01	2.08
Common Scoter	0	0	0.09	0.01	0	0.09
Velvet Scoter	0.11	2.89	3.66	0.94	0.04	3.66
Little Gull	4.06	0.84	0.46	0.15	0.06	4.06
Common Gull	0.61	0.04	0.09	0.10	0.02	0.61
Lesser Black-backed Gull	0	0	0	0	0.01	0.01
Great Black-backed Gull	0.00	0.00	0.02	0.00	0.01	0.02
Herring Gull	0.68	0.24	0.16	0.15	0.03	0.68
Common Guillemot	1.43	0.51	0.55	0.68	0.26	1.43
Razorbill	0.96	0.48	0.51	0.49	0.02	0.96
Divers	0.49	0.28	0.67	0.65	0.19	0.67
Ducks	0.01	0.00	0.02	0.01	0.01	0.02
Gulls	1.32	0.31	0.27	0.26	0.06	1.32
Auks	2.97	1.24	1.37	1.58	0.31	2.97
No. of surveys	1	1	1	1	1	

Table 3.3 Monthly mean densities (ind./km²) of selected species/species groups recorded in the survey area during the ship-based transect surveys between May and October 2023. The indication “0” means that no individual of this species was found in that month.

Survey Method	Ship-based transect surveys						
Species/Species-group	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Max.
Red-throated Diver	0	0	0	0	0	0.01	0.01
Black-throated Diver	0.22	0	0	0	0	0.04	0.22
Great Cormorant	0	0.03	0	0.35	0	0	0.35
Long-tailed Duck	0.02	0	0	0	0	0.03	0.03
Common Scoter	0	0	0	0	0	0	0
Velvet Scoter	0	0	0	0	0	1.1	1.1
Little Gull	0.19	1.43	6.36	2.73	0.08	0.44	6.36
Common Gull	0	0.03	0.38	0.17	0.12	0.35	0.38
Lesser Black-backed Gull	0	0.02	0	0.06	0	0	0.06
Great Black-backed Gull	0	0	0	0.05	0	0.02	0.05
Herring Gull	0.11	0.16	0.54	1.07	0.87	0.57	1.07
Sandwich Tern	0	0	0	0.01	0.02	0	0.02
Common Tern	0	0	0	0.02	0	0	0.02
Common Guillemot	0.02	0.02	0.46	0	10.46	0.29	10.46
Razorbill	0.08	0	0	0	0	0	0.08
Divers	0.22	0	0	0	0	0.05	0.22
Ducks	0	0	0.04	0	0	0.03	0.04
Gulls	0.11	0.21	0.92	1.34	0.99	0.94	1.34
Auks	0.1	0.02	0.469	0	10.46	0.29	10.46
No. of surveys	1	1	1	1	1	1	

3.1.1 Digital aerial surveys

A total of five surveys were conducted between November 2022 and April 2023 (see Table 2.3). During this period, 9,941 birds belonging to 28 species were recorded, of which 9,478 were resting birds (Table 3.1). There were 817 resting birds which could not be identified to species level (8.6% of the total). Nonetheless, resting birds could be classified into 18 species.

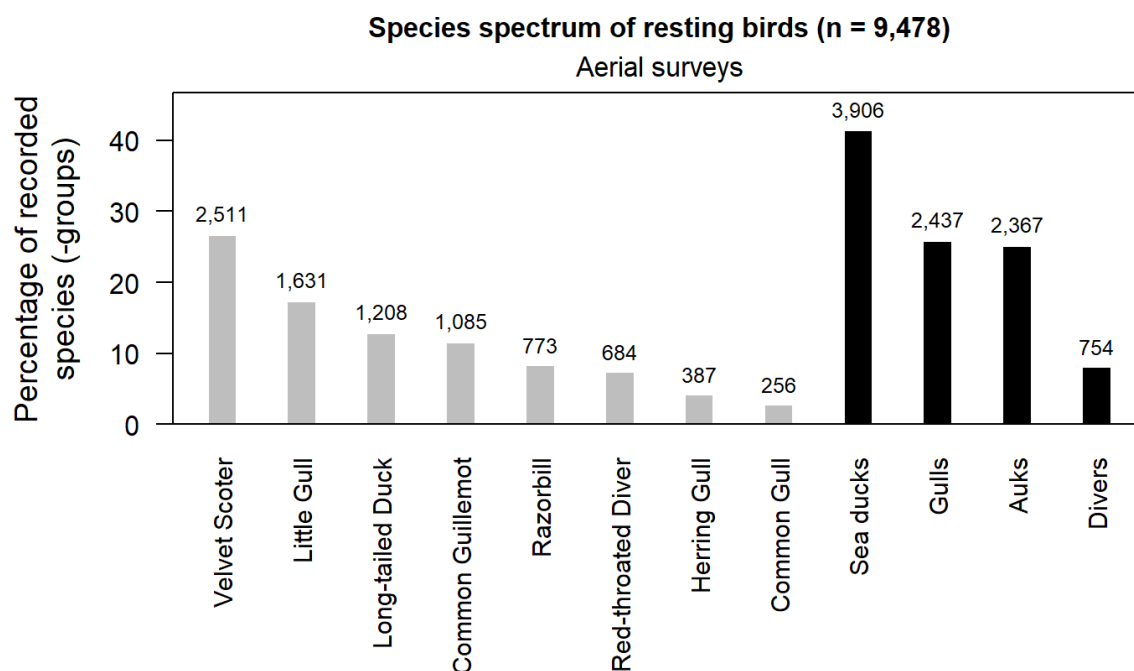


Figure 3.1 Percentage of the most common species or species groups representing at least 0.5% of the total number of resting birds recorded during aerial surveys in the survey area between November 2022 and April 2023 (number of individuals shown above each bar). Species are depicted in grey, species groups in black.

Sea ducks dominated the resting bird community making up 41.2% of the total. Gulls and auks represented 25.7% and 25.0% respectively. Divers (mainly Red-throated Divers) contributed 8.0% to the sum of birds observed in the survey period (Figure 3.1). In terms of species, the most common species was the Velvet Scoter, whose abundance made up 26.5% of the total resting birds. Other representative species included the Little Gull (17.2%), the Long-tailed Duck (12.7%) and the Common Guillemot (11.4%) (Figure 3.1). Razorbills, Red-throated Divers, Herring Gulls and Common Gulls contributed less of 10% than the total abundance of resting birds each (see Table 3.1).

3.1.2 Ship-based surveys

During the six ship-based transect surveys conducted between May and October 2023 a total of 1,675 birds were observed belonging to 34 species. In total, 1,435 resting birds were observed, 1,262 of which occurred within the transect area and are used for further analysis here (Table 3.1). These birds correspond to 17 species (within the transect area). All resting birds observed during the ship-based surveys could be identified to species level.

One species, the Little Gull dominated in numbers observed and accounted for 44.0% of all resting birds observed during all surveys. Two other species, the Common Guillemot and the Herring Gull followed in dominance with 20.8 and 15.4%, respectively. All other birds occurred at less than 10% of abundance (Figure 3.2). In contrast to the aerial surveys, and similar to the previous year of

analysis, sea ducks were not found to be abundant during ship-based surveys. Overall, gulls made up 66.1% of the total number of resting birds observed, whereas auks, sea ducks, cormorants and divers represented 21.8%, 8.6%, 2.5% and 1.3% of the whole, respectively.

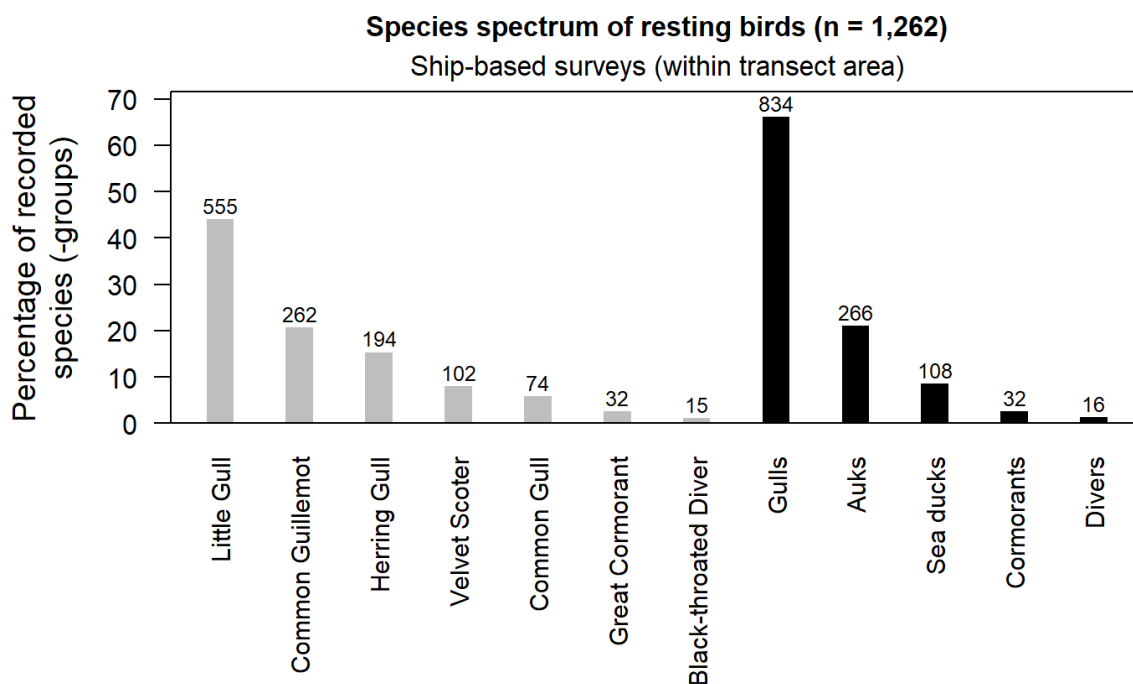


Figure 3.2 Percentage of the most common species or species groups representing at least 0.5% of the total number of resting birds recorded during ship-based transect surveys in the survey area within the transect area between May and October 2023 (number of individuals shown above each bar). Species are depicted in grey, species groups in black.

3.2 Frequency and distribution of most common species

In this chapter, all waterbird species that represented at least 0.5% of the total number of birds surveyed by any of the two different methods are further described. Each species description is followed by a distribution map of four seasons covered during the surveys for each survey method and a graph showing how their densities vary across the months. In addition, a full list of maps of all surveys can be found in the appendix for these species. The species' ranges and population sizes are obtained from the most recent available data (AEWA CSR 8) of species factsheets from Wetlands International (<http://wpe.wetlands.org>, accessed on 15.11.2023). Their conservation status is based on Birdlife International (2017), IUCN Red List Europe (<http://www.iucnredlist.org>, accessed 10.10.2022) and Annex I of the EU Bird Directive (EUROPEAN UNION 2010).

All pinpoint maps can be found in the Appendix A.2 and A.3.

3.2.1 Red-throated Diver

Red-throated Diver – <i>Gavia stellata</i>		LI: Rudakaklis naras
<i>Biogeographic population:</i> NW Europe (win)		
<i>Breeding range:</i> Arctic and boreal W Eurasia, Greenland		
<i>Non-breeding range:</i> NW Europe		
<i>Population size:</i> 210,000 – 340,000		
<i>1% value:</i> 3,000		
<i>Conservation status:</i>	EU Birds Directive, Annex I: listed EU SPEC Category: SPEC 3 IUCN Red List Category, Global & Europe: Least Concern	
<i>Trend:</i> DEC?	Trend quality: Reasonable	
<i>Key food:</i> fish		

As the name indicates divers are strongly linked to aquatic environments where they dive to obtain their food, which mainly consists of fish. Of the five species of divers existing in the world, two of them commonly occur in the North and Baltic Sea (HEMMER 2020), Red-throated and Black-throated Diver. All divers are migratory, breeding near northern freshwater lakes and spending the winter season at sea. In this section, we concentrate on the most common diver species observed during the surveys, the Red-throated Diver. These divers are distributed across the Arctic, occupying boreal areas in Europa, Asia and North America. The population that occurs in the survey area is the Northwest European population. According to the most recent estimates by Wetlands International, the population size of this population ranges between 210,000 and 340,000 and may be declining.

Two important wintering areas are the Irbe Strait and the Gulf of Riga. Skov and colleagues (2011) mention that the largest concentrations of both species of divers are found in the area extending from the Irbe Strait along the coasts of Lithuania, Latvia and Estonia up into the Pomeranian Bay.

The Pomeranian Bay is also considered an important wintering area in the Baltic Sea, probably because of its suitability as a spawning, nursery and feeding ground for many fish species. Zanders (*Sander lucioperca*) and herrings (*Clupeidae* spp.) constitute most of the consumed biomass of Red-throated Divers in winter and spring in the Baltic Sea (GUSE ET AL. 2009).

At the global scale, Red-throated Divers are not considered endangered, however, divers in general are considered among the most vulnerable seabird species to many anthropogenic factors, and the species is included in the Annex I of European Union (EU) Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds, EUROPEAN UNION 2010) and in the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (UNEP/AEWA SECRETARIAT 2022).

Among the main threats that affect divers are oil spills, bycatch in fish nets and habitat degradation (MENDEL ET AL. 2008). Moreover, both ship traffic and offshore wind farms exert negative effects on divers and the birds show strong avoidance behaviour towards offshore wind farms (DIERSCHKE ET AL. 2016; HEINÄNEN ET AL. 2020).

Density and distribution of Red-throated Divers in the survey area

During the five digital aerial surveys between November 2022 and April 2023, a total of 684 Red-throated Divers were recorded whereas during the six ship-based transect surveys between May and October 2023 only 1 individual was observed within the transect area (Table 3.1). During aerial surveys, also 36 unidentified divers were observed (4.8% of all divers).

For Red-throated Divers, a maximum monthly density of 0.64 ind./km² was recorded in March 2023 during the aerial surveys (Table 3.2). In contrast, Red-throated Divers were almost absent during the ship-based transect surveys and the only observation was made in October 2023 at 0.01 ind./km² (Table 3.3, Figure 3.3).

Spatially, the distribution of Red-throated Divers from the digital aerial surveys shows that they were present in most of the surveyed area at low to mid-densities both during winter and spring. Whereas, densities were higher in spring, Red-throated Divers appeared at higher overall densities towards the east of the study area next to the coast. Only in spring, grid cells with densities ranging between 1 and 2 ind./km² were observed within the limits of the planned OWF whereas in winter lower densities were observed within the planned OWF area (Figure 3.4).

With the very low number of Red-throated Divers observed within the transect area during ship-based surveys it is impossible to say anything about their spatial distribution. The only individual was spotted at one grid cell located at the southern border of the planned OWF in autumn (Figure 3.5).

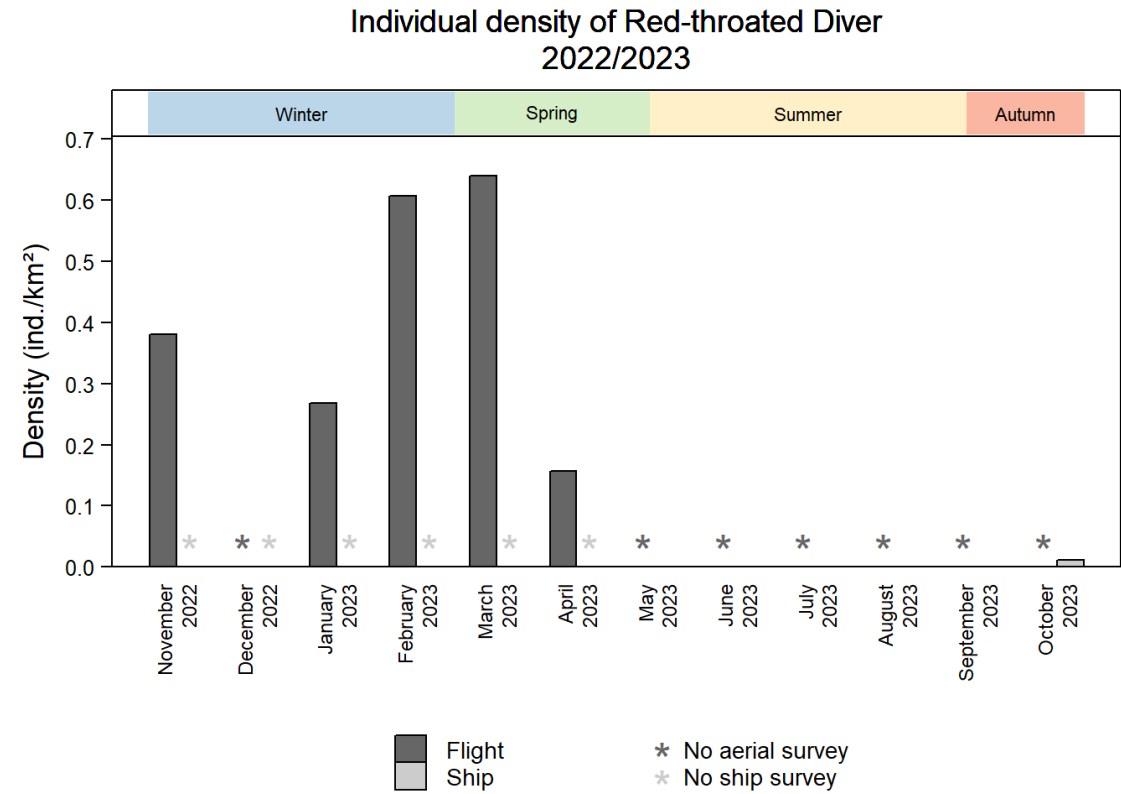


Figure 3.3 Monthly densities of Red-throated Divers during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

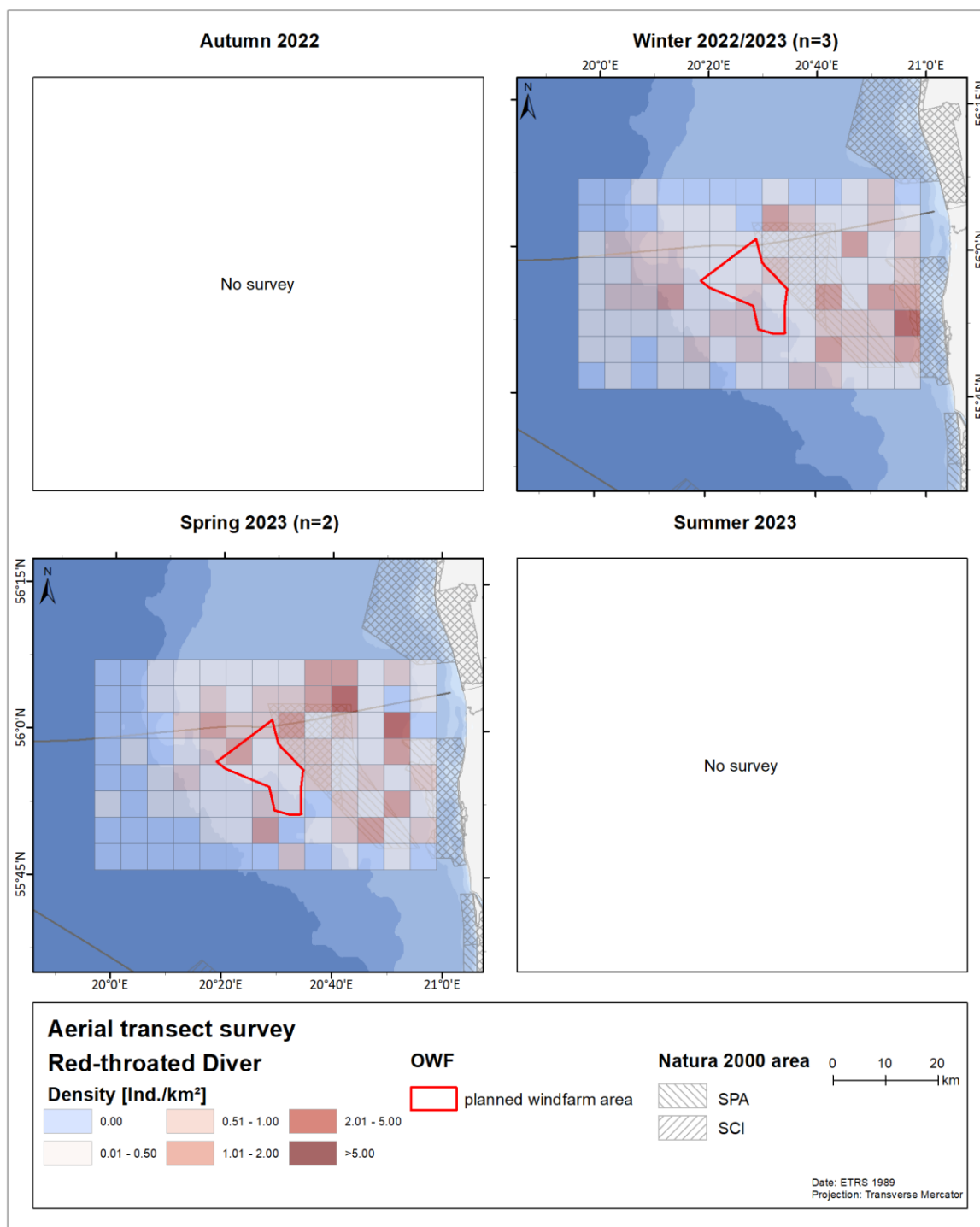


Figure 3.4 Distribution of Red-throated Divers in the survey area per season during the digital aerial surveys between November 2022 and April 2023.

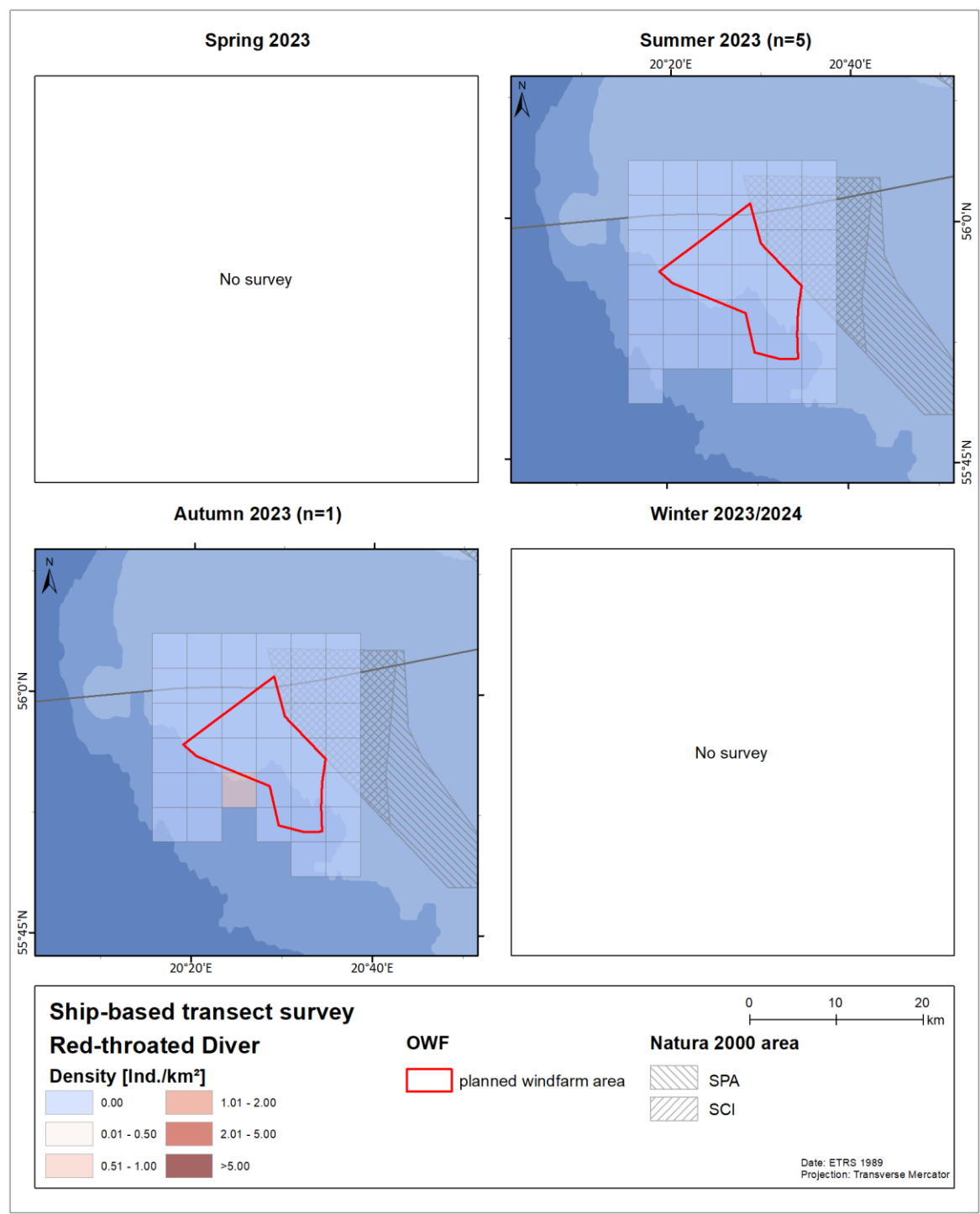


Figure 3.5 Distribution of Red-throated Divers in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.2 Black-throated Diver

Black-throated Diver – <i>Gavia arctica</i>		LI: Juodakaklis naras
<i>Biogeographic population</i> : Northern Europe & Western Siberia/Europe		
<i>Breeding range</i> : N Europe & W Siberia		
<i>Non-breeding range</i> : Coastal NW Europe, Mediterranean, Black & Caspian Seas		
<i>Population size</i> : 390,000 - 590,000		
<i>1% value</i> : 4,800		
<i>Conservation status</i> :	EU Birds Directive, Annex I: listed EU SPEC Category: SPEC 3 IUCN Red List Category, Global & Europe: LC	
<i>Trend</i> : DEC?	Trend quality: Poor	
<i>Key food</i> : fish		

The Black-throated Divers (also known as Arctic Divers/Loons) are also breeding in the Arctic and boreal zone and are distributed from Northwest Europe to Northeast Siberia and Northwest Alaska. There are two subspecies recognized, the nominate subspecies is estimated to range between 390,00 to 590,000 individuals, and the population is apparently decreasing. Black-throated Divers, as the other diver species occurring in the region, are a sensitive species and affected by many anthropogenic factors.

Density and distribution of Black-throated Divers in the survey area

This species of divers was only present at very small densities ranging between 0.02 and 0.07 ind./km² (max in November 2022, Table 3.2) during the aerial surveys. The monthly densities of Black-throated Divers during ship-based transect surveys ranged between 0.04 in October and 0.22 ind./km² in May 2023 (Table 3.3, Figure 3.6).

During the aerial surveys, Black-throated Divers were present in low densities and scattered across the survey area, but with no specific patterns (Figure 3.7). In spring, a few Black-throated Divers were also observed just outside of the planned wind farm. During the ship-based transect surveys, although relatively higher densities were recorded, no specific pattern was observed. In summer, divers were mainly distributed towards the north and middle of the survey area coinciding with the presence of shallower waters. Only in autumn, a single grid cell showed high densities (between 2 and 5 ind./km², Figure 3.8).

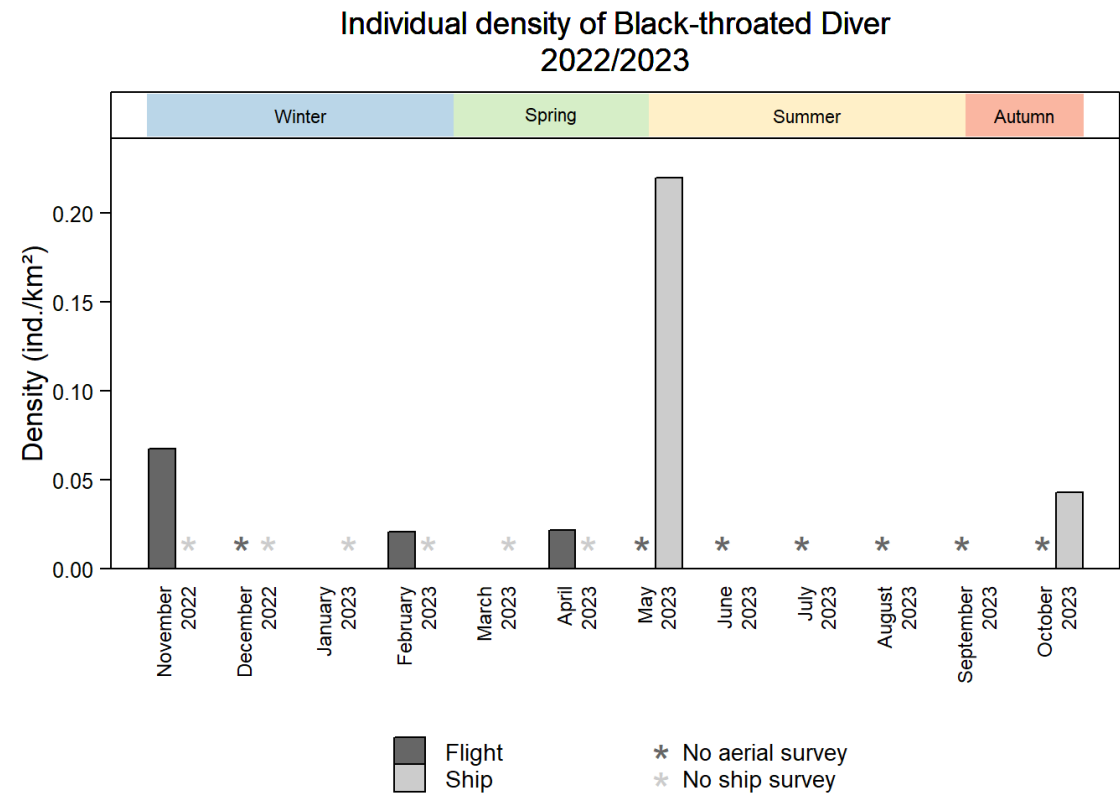


Figure 3.6 Monthly densities of Black-throated Divers during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

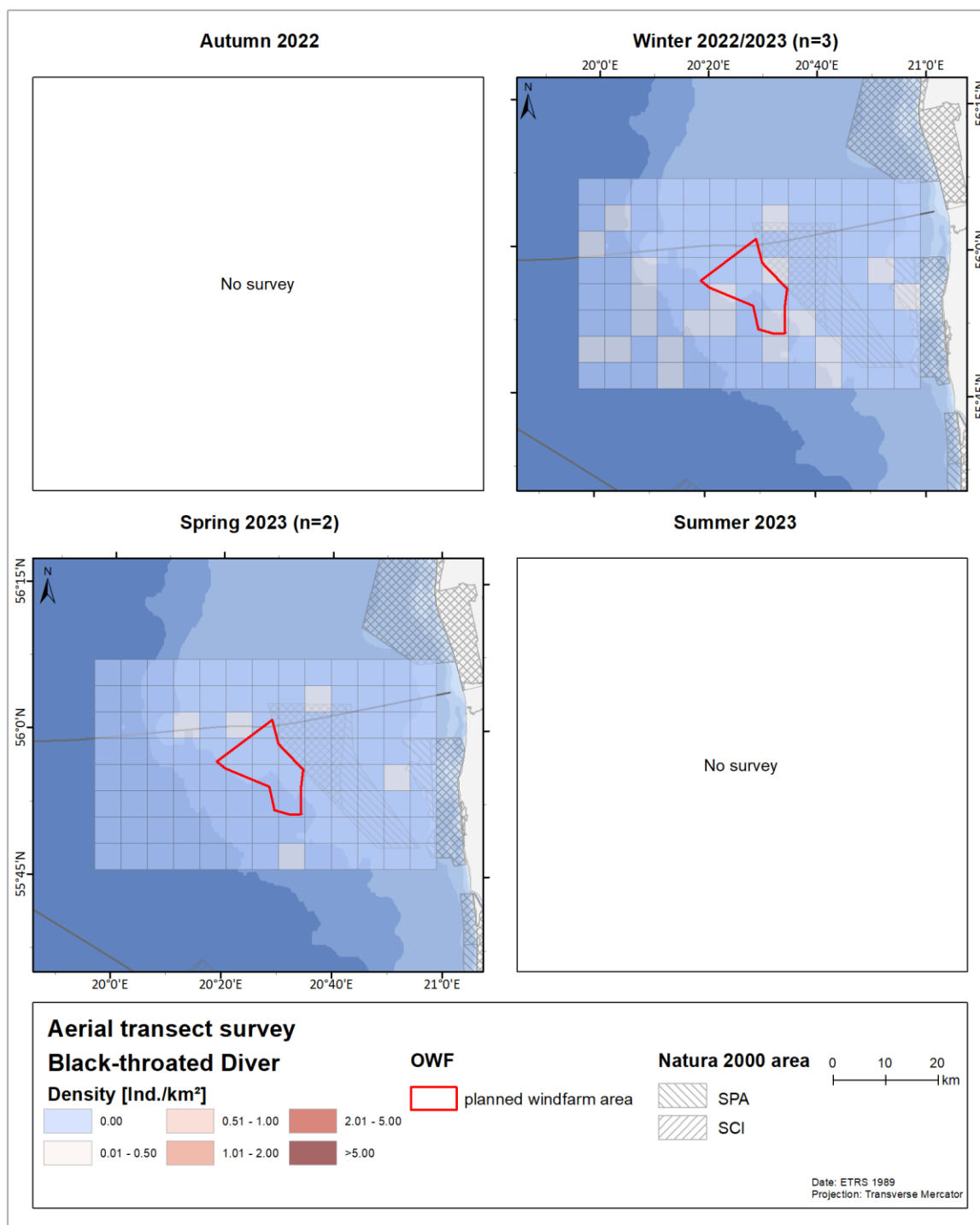


Figure 3.7 Distribution of Black-throated Divers in the survey area per season during the digital aerial surveys between November 2022 and April 2023.

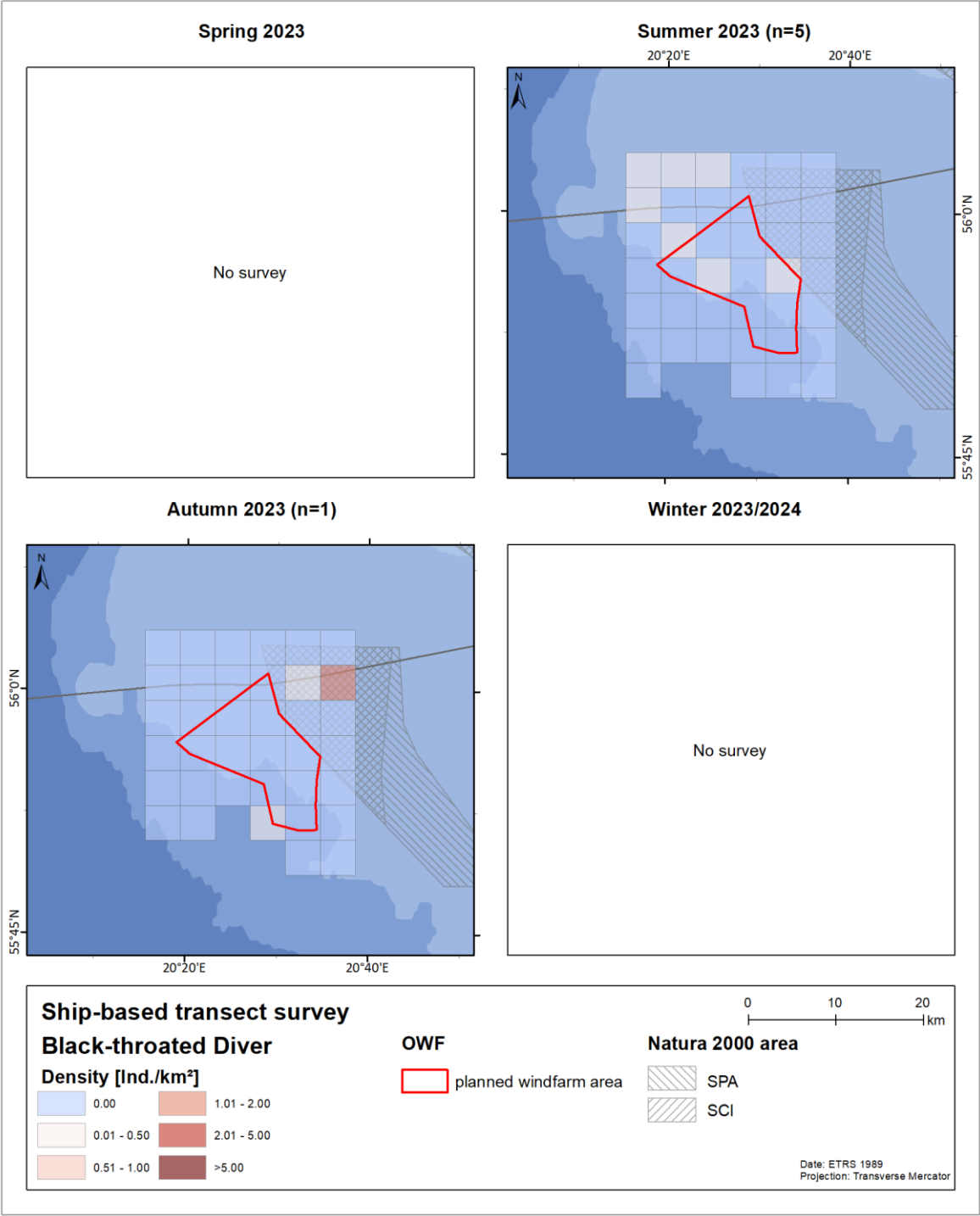


Figure 3.8 Distribution of Black-throated Divers in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.3 Great Cormorant

Great Cormorant – <i>Phalacrocorax carbo</i>		LI: <i>Didysis kormoranas</i>
<i>Biogeographic population</i> : North-west Europe (ssp. carbo); North and central Europe (ssp. sinensis);		
<i>Breeding range</i> : Iceland, Norway, Britain, Ireland (ssp. carbo); North and central Europe (ssp. sinensis);		
<i>Non-breeding range</i> : North and middle Europe, up to Mediterranean Sea (ssp sinensis)		
<i>Population size</i> : 86,000 – 110,000 (ssp carbo) 610,000 - 740,000 (sinensis)		
<i>1% value</i> : 1,200 (ssp carbo) 6,200 (ssp sinensis)		
<i>Conservation status</i> :		EU Birds Directive: Annex I: not listed EU SPEC Category: Non-SPEC IUCN Red List Category, Global & Europe: Least Concern
<i>Trend</i> : DEC (carbo) INC (sinensis)		Trend quality: Good/Good
<i>Key food</i> : fish		

In total, six subspecies of Great Cormorants are known to breed in the world (MENDEL ET AL. 2008). In the area, *P. c. sinensis* is widely occurring. After its almost complete disappearance at the beginning of the 20th century, the subspecies has recovered, increased in numbers, and recolonized former breeding areas, thanks to protection measures and the ban of DDT and PCB (HERRMANN ET AL. 2022). The most recent estimates suggest the numbers of breeding pairs to be ranging between 203,170-245,888 or approximately 610, 000 to 740,000 individuals (Waterbird Population Estimates, wpe.wetlands.org, accessed in November 2023). As generalist predators, their diet is mainly composed of small and medium sized fish of both the Baltic Sea and freshwater species (e.g., sticklebacks, herring, eelpout, ruffe, roach, and perch, (MENDEL ET AL. 2008).

Density and distribution of Great Cormorants in the survey area

Great Cormorants were more often observed during the ship surveys (32 individuals, within the transect area) than during the digital aerial surveys (only 5 individuals, Table 3.1). The densities were thus higher during the ship surveys than during the digital aerial surveys. Great Cormorants were only observed in March 2023 during the aerial surveys. The monthly densities of this species during ship-based transect surveys ranged from 0.03 (in June 2023) to 0.35 ind./km² in August 2023 (Table 3.3, Figure 3.6).

During the aerial surveys, Great Cormorants were present in spring and at a single grid cell at low densities (Figure 3.7). During the ship-based transect surveys and in summer, great cormorants were mainly distributed at low densities towards the east of the survey area, closer to the coast. In autumn, they were present all over the survey area but at low densities with the exception of one grid cell to the north-east with very high densities (> 5 ind./km², Figure 3.11).

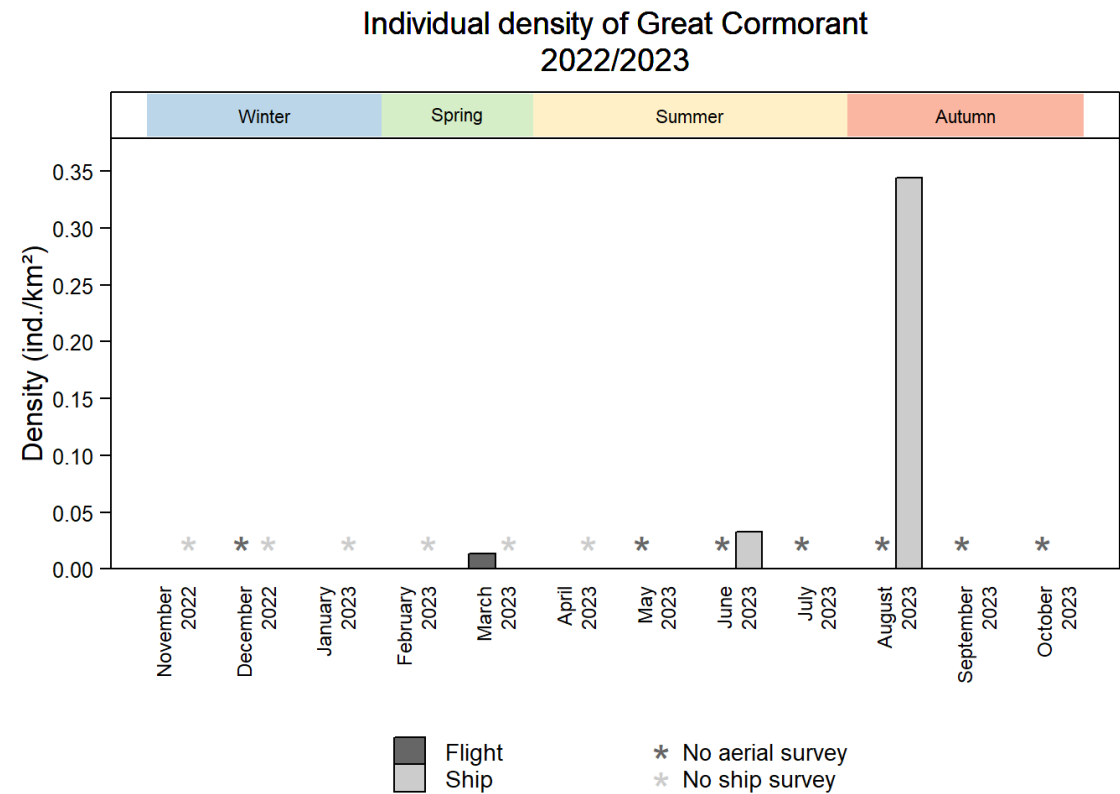


Figure 3.9 Monthly densities of Great Cormorants during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

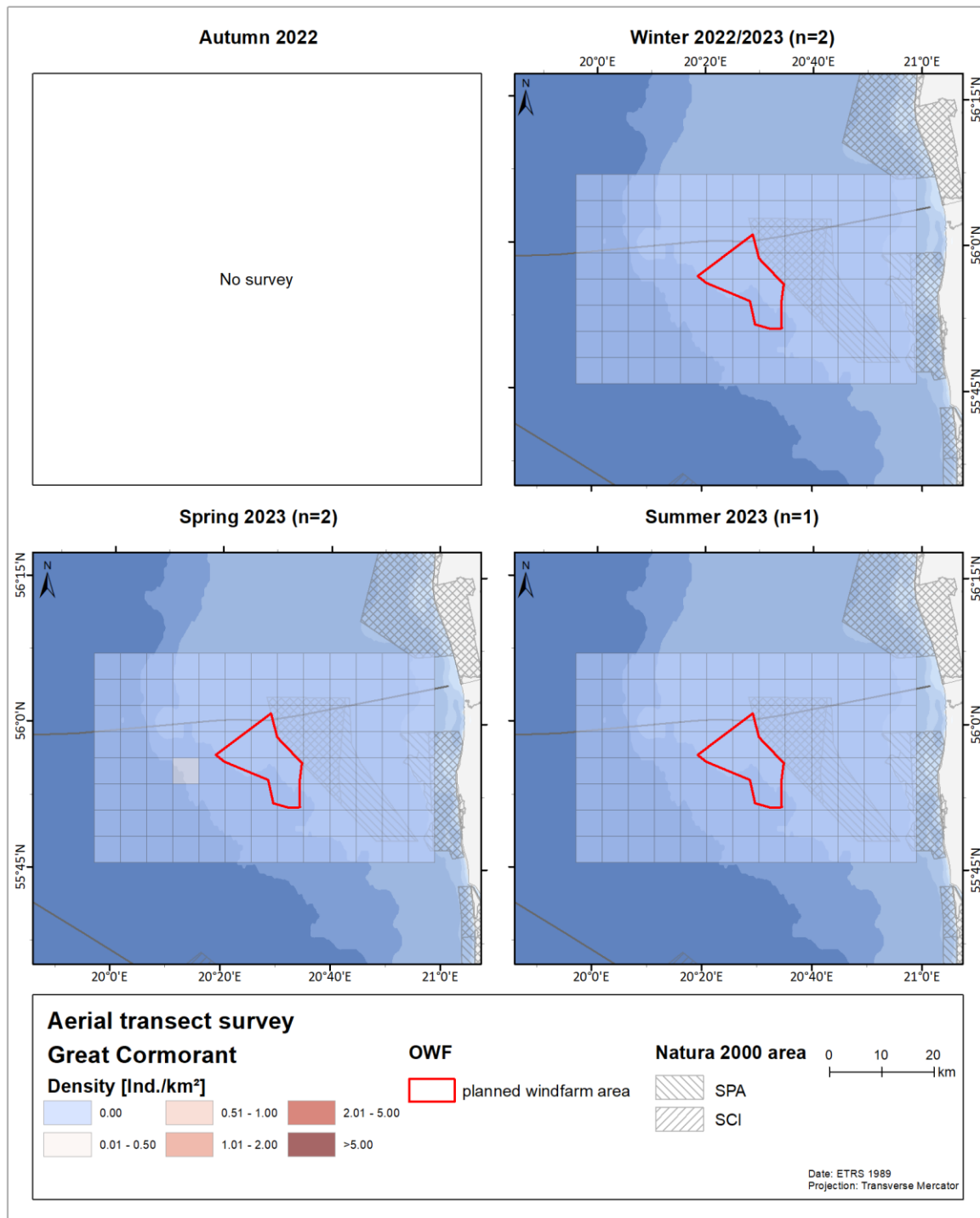


Figure 3.10 Distribution of Great Cormorants in the survey area per season during the digital aerial surveys between November 2022 and April 2023.

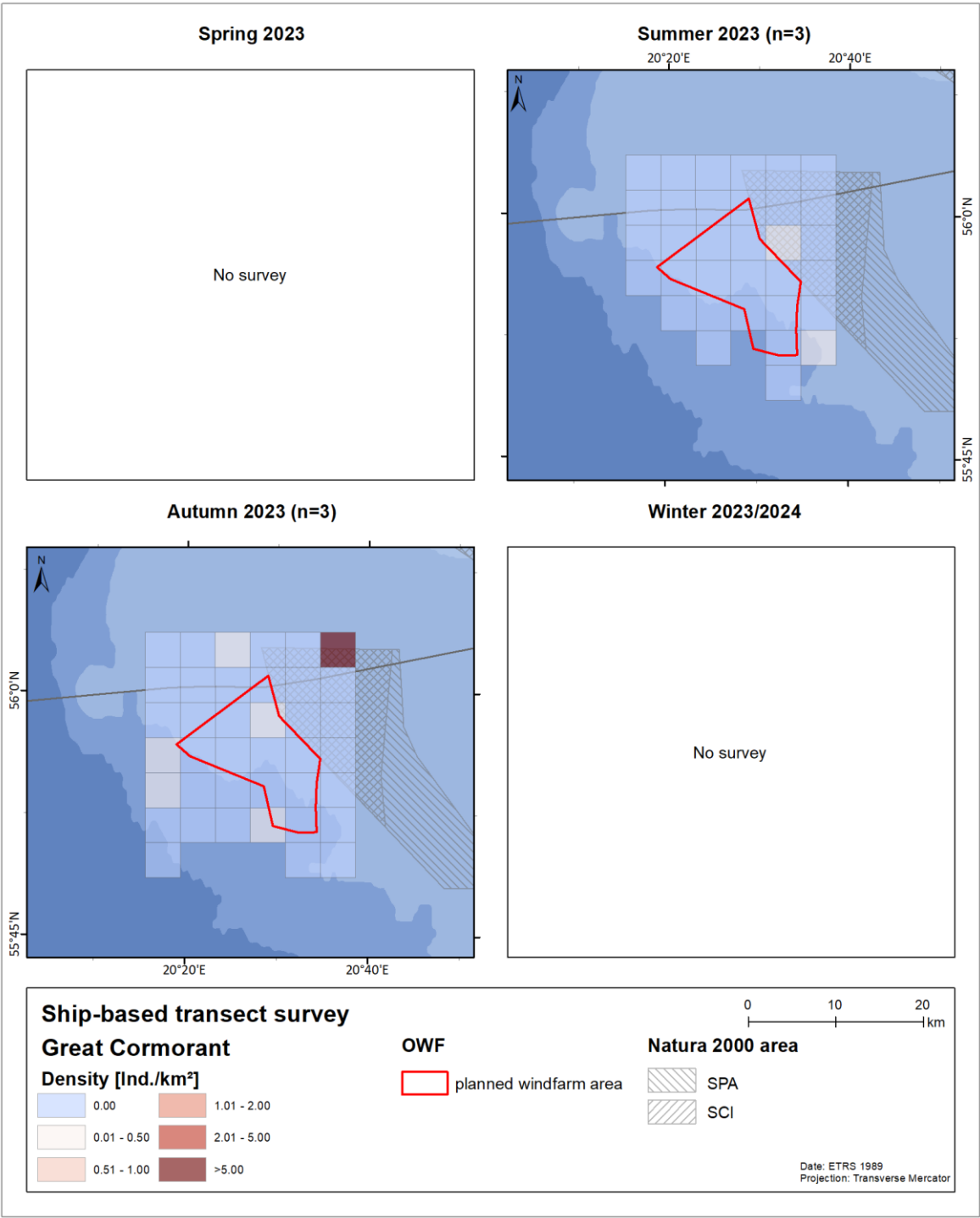


Figure 3.11 Distribution of Great Cormorants in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.4 Long-tailed Duck

Long-tailed Duck: – <i>Clangula hyemalis</i>		LI: Ledine antis
Biogeographic population: Western Siberia/North Europe		
Breeding range: W Siberia, N Europe		
Wintering / core non-breeding range: N Atlantic, Baltic, N Seas, C European Lakes		
Population size: 1,600,000		
1% value: 16,000		
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 1 IUCN Red List Category: VU (Global), LC (Europe)	
Trend: STA?	Trend quality: Reasonable	
Key food: mollusks, crustaceans and small fish		

Long-tailed Ducks are the most common duck species in the tundra zones and were the third most common species during the digital aerial surveys. They have a circumpolar distribution and breed in Arctic Eurasia and North America. Whereas no subspecies are recognized, Wetlands International recognizes four large populations. Almost two decades ago the world population was estimated at 6.2 – 6.75 million of individuals, currently this number has almost halved. The population breeding in Europe and occurring in the survey area has a size estimated at 1.6 million with a stable trend, preceded however by long periods of decreasing trend. The Baltic Sea holds about 90% of the birds wintering in Europe and three areas here are of particular importance: The Gulf of Riga/Irbe Strait, Hoburgs and Midsjö Banks and the Pomeranian Bay (DURINCK ET AL. 1994). Long-tailed Ducks are mainly found wintering in waters at depths of 10-35 m. The migration to the wintering grounds in the Baltic Sea starts in September/October and continues until December with a peak in November. Return movements to breeding areas start in March and by late May most birds have headed towards the White Sea (SKOV ET AL. 2011). They are opportunistic feeders and consume a wide range of resources including benthic macrofauna. In the Baltic, stomach analyses have shown that their diet includes bivalves such as *Ceratoderma* spp, *Mya arenaria*, *Mytilus edulis* and *Macoma baltica* and small fish and crustaceans or polychaetes. They dive to find their food at depths in the range of 20-30 m (MENDEL ET AL. 2008). Long-tailed Ducks have been reported to partly avoid OWF (DIERSCHKE ET AL. 2016) and are somewhat sensitive to ship traffic (FLIESSBACH ET AL. 2019).

Density and distribution of Long-tailed Ducks in the survey area

Large numbers of Long-tailed Ducks were observed during the aerial surveys (1,208 individuals) whereas during the ship-based surveys that took place during summer and autumn, only 6 individuals were spotted within the transect area (Table 3.1). During the aerial surveys, the largest

densities of these ducks were observed in January 2023 with 2.08 ind./km², and the lowest in April 2023 (0.01 ind./km², Table 3.2). During the ship surveys as expected, they were less common and were only observed in two months: 0.02 ind./km² in May 2023 and 0.03 ind./km² in October 2023 (Table 3.3, Figure 3.12).

During the aerial surveys, the distribution of Long-tailed Ducks was concentrated towards the north-eastern part of the survey area, especially in winter when some of the grid cells showed very high densities (> 20 ind./km²). These grid cells overlapped with the north-eastern border of the planned wind farm. Since densities were larger during aerial surveys, the ducks were present in many more grid cells, even within the area of the planned wind farm (up to 5 ind./km², Figure 3.13). During the ship-based surveys, the densities were too low and scattered to distinguish a spatial pattern, but all individuals were observed at locations with shallow waters (Figure 3.14).

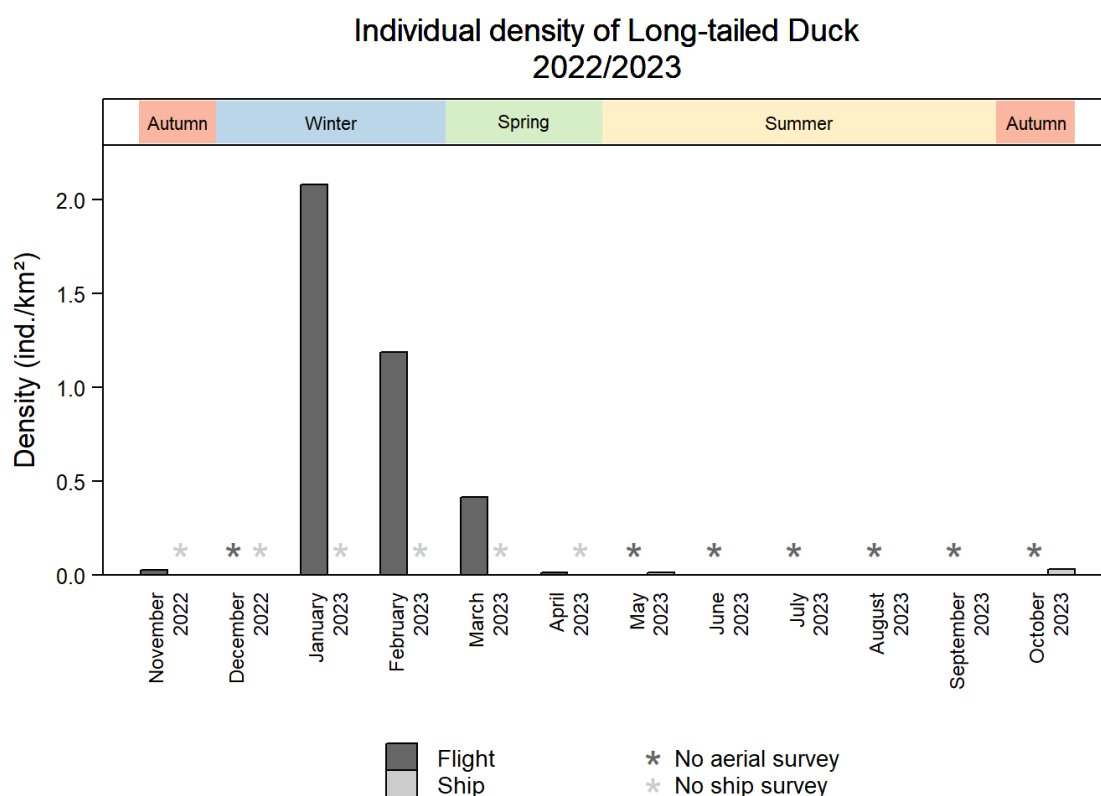


Figure 3.12 Monthly densities of Long-tailed Ducks during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

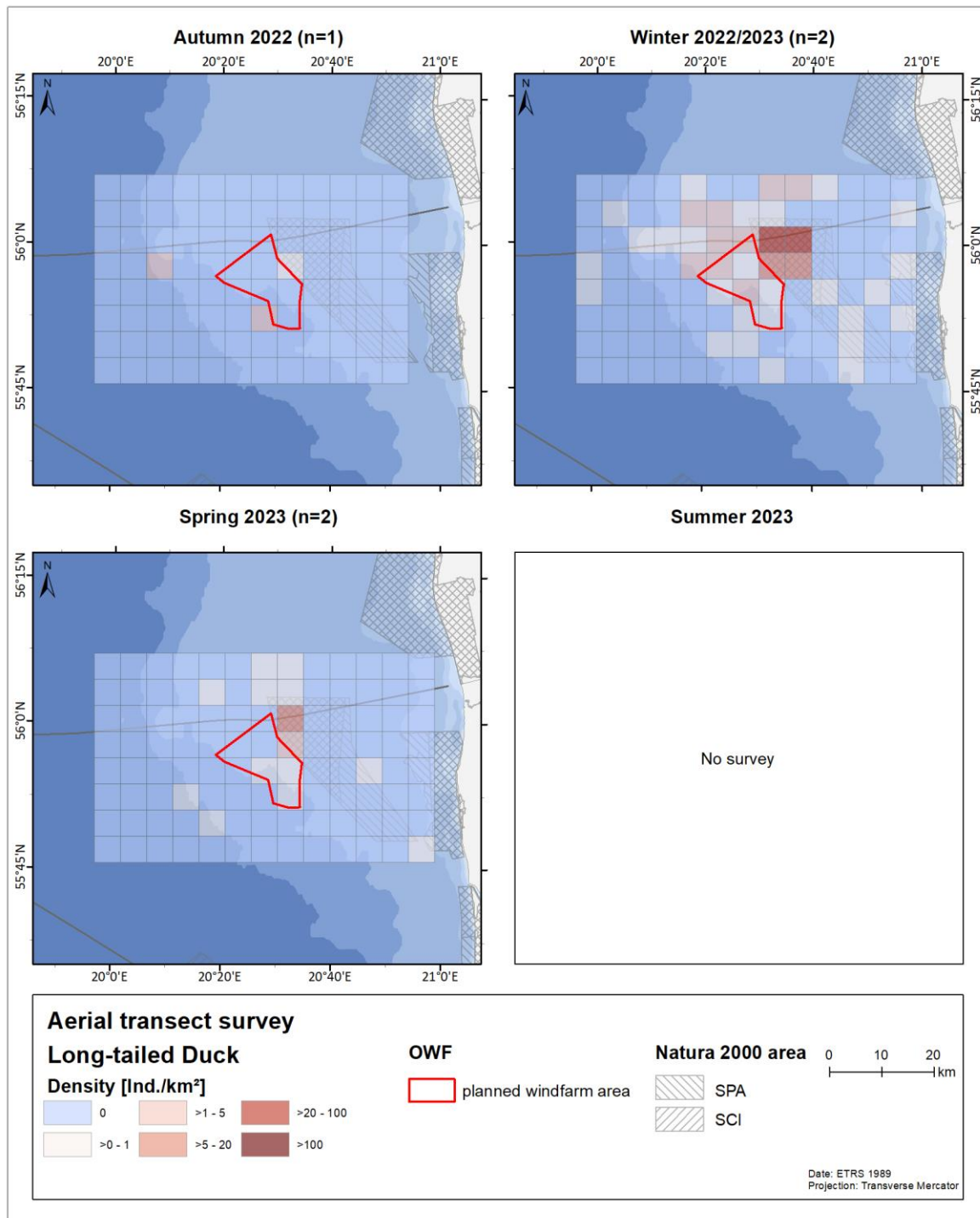


Figure 3.13 Distribution of Long-tailed Ducks in the survey area per season during the digital aerial surveys between November 2022 and April 2023.

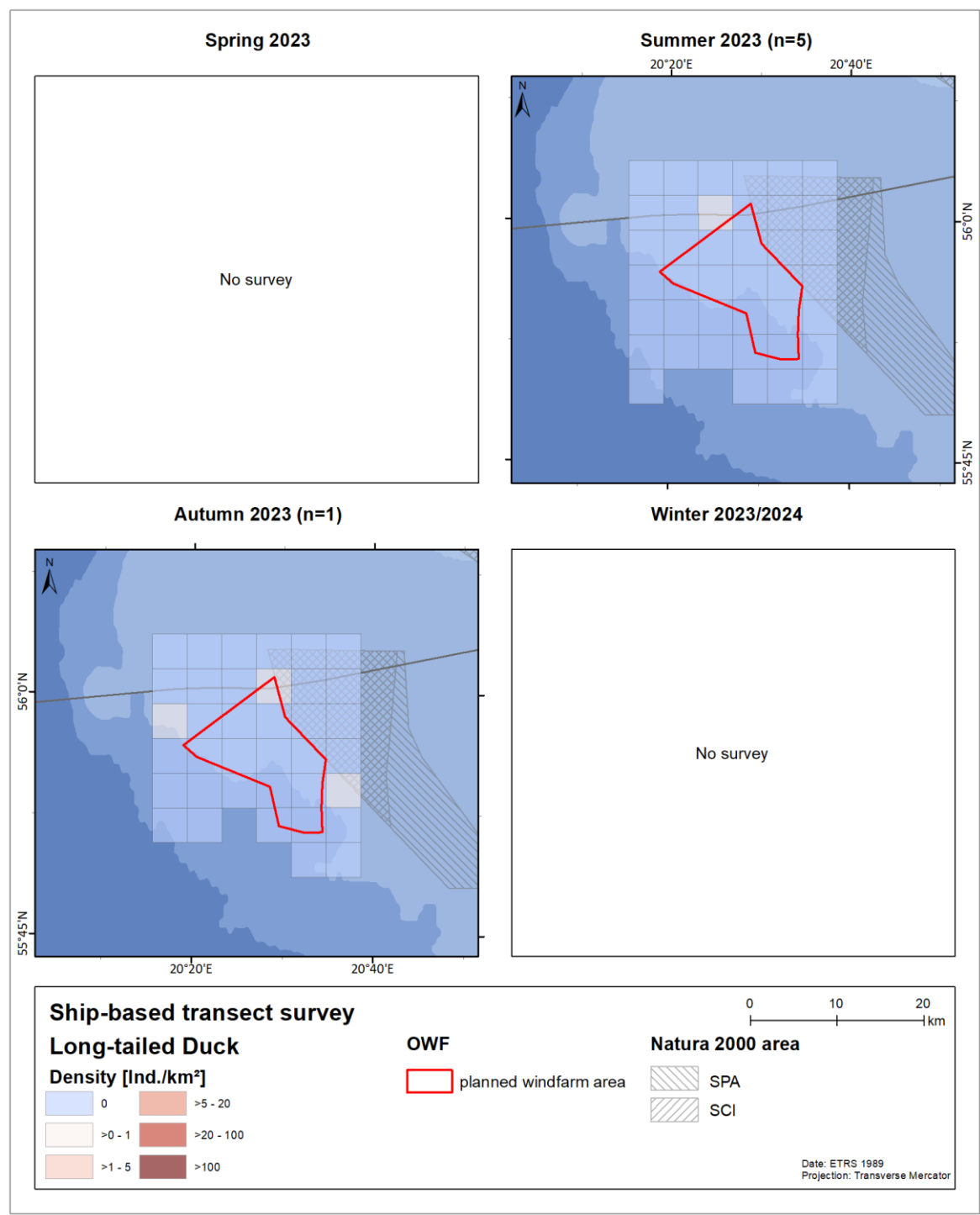


Figure 3.14 Distribution of Long-tailed Ducks in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.5 Velvet Scoter

Velvet Scoter – <i>Melanitta fusca</i>		LI: Paprastoji nuodegule
<i>Biogeographic population</i> : Western Siberia & Northern Europe/NW Europe		
<i>Breeding range</i> : W Siberia, N Europe		
<i>Wintering / core non-breeding range</i> : Baltic, W Europe		
<i>Population size</i> : 220,000 – 410,000		
<i>1% value</i> : 3,000		
<i>Conservation status</i> :	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 1 IUCN Red List Category: VU (Global & Europe)	
<i>Trend</i> : INC?	Trend quality: Reasonable	
<i>Key food</i> : mollusks, crustaceans		

Velvet Scoters mainly breed in northern parts of Fennoscandia and western Russia, and to a lesser extent along the Baltic Sea coast of Sweden, Finland, Russia and Estonia (MENDEL ET AL. 2008). DURINCK ET AL. (1994) mentioned that about 93% of the European population was wintering in the Baltic Sea. Birds start the migration to their wintering areas in September and migrate back to their breeding grounds around March, but the last birds may leave the wintering areas only in May (MENDEL ET AL. 2008).

Velvet Scoters are thought to prefer waters with depths below 20 m. Often, the larger abundances are found in shallow waters (5-10 m of depth). Nonetheless, they tend to be more common in deeper waters (20-30 m) than the two other common sea duck species: Common Scoters and Long-tailed Ducks. Velvet Scoters feed mainly on mussels, but fish, polychaetes and crustaceans also make up part of their diet (MENDEL ET AL. 2008).

The European population of Velvet Scoters is estimated to range between 220,000 to 410,000 with a tendency to increase. They are listed as Vulnerable under the IUCN Red List of Threatened Species and is a species of European Conservation Concern (Category 1). Lithuania supports about 4% of the European wintering population of this species (STANEVA & BURFIELD 2017).

Not much is known about the response of Velvet Scoters to OWF, but some weak avoidance can be expected, similar to the closely related Common Scoter (DIERSCHKE ET AL. 2016). Also, Velvet Scoters are sensitive to ship traffic, but less so than Common Scoters (FLIESSBACH ET AL. 2019).

Density and distribution of Velvet Scoters in the survey area

Velvet Scoters occurred at higher numbers during aerial surveys. A total of 2,511 Velvet Scoters were recorded and it was the second most common species registered during aerial surveys. The densities were highest in February 2023 with 3.66 ind./km² and were lowest in April 2023 (0.04 ind./km², Table 3.2, Figure 3.15). During ship-based surveys, still a considerable number of Velvet

Scoters (102 individuals, about 8.1% of all resting birds observed during ship-based surveys) were observed but only during October 2023. This resulted in a similar level of densities of Velvet Scoters for ship-based surveys (1.1 ind./km², Table 3.3, Figure 3.15).

Spatially, Velvet Scoters were also concentrated towards the eastern part of the survey area coinciding with shallower waters. Only in winter, when their densities were very large, their distribution expanded further to the west with grid cells between 1 and 5 ind./km² occurring in much deeper waters and on the western edge of the survey area. The higher (very large) densities (> 20 ind./km²) were all observed in the east, and most of them within the SPA and SCI protected areas. In winter 2022/2023 when the largest densities occurred, Velvet Scoters were observed also within the limits of the planned OWF at high densities whereas in spring 2023 when the densities decreased, they also occurred within the area of the planned OWF but at lower densities (Figure 3.16).

During the ship-based surveys, Velvet Scoters were spotted only in the autumn specific season and concentrated towards the east of the survey area with grid cells showing densities above 5 ind./km², however, there was also one grid cell with a density between 1-5 ind./km² towards the west of the survey area but at shallow waters (Figure 3.17).

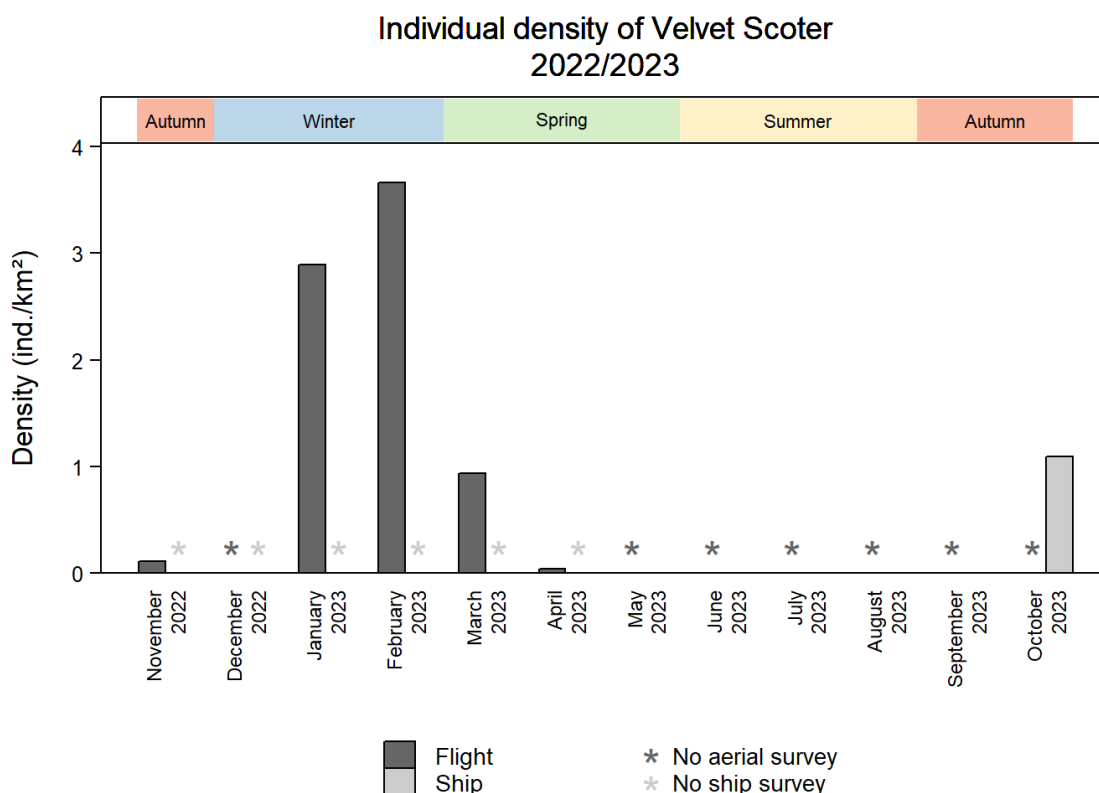


Figure 3.15 Monthly densities of Velvet Scoters during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

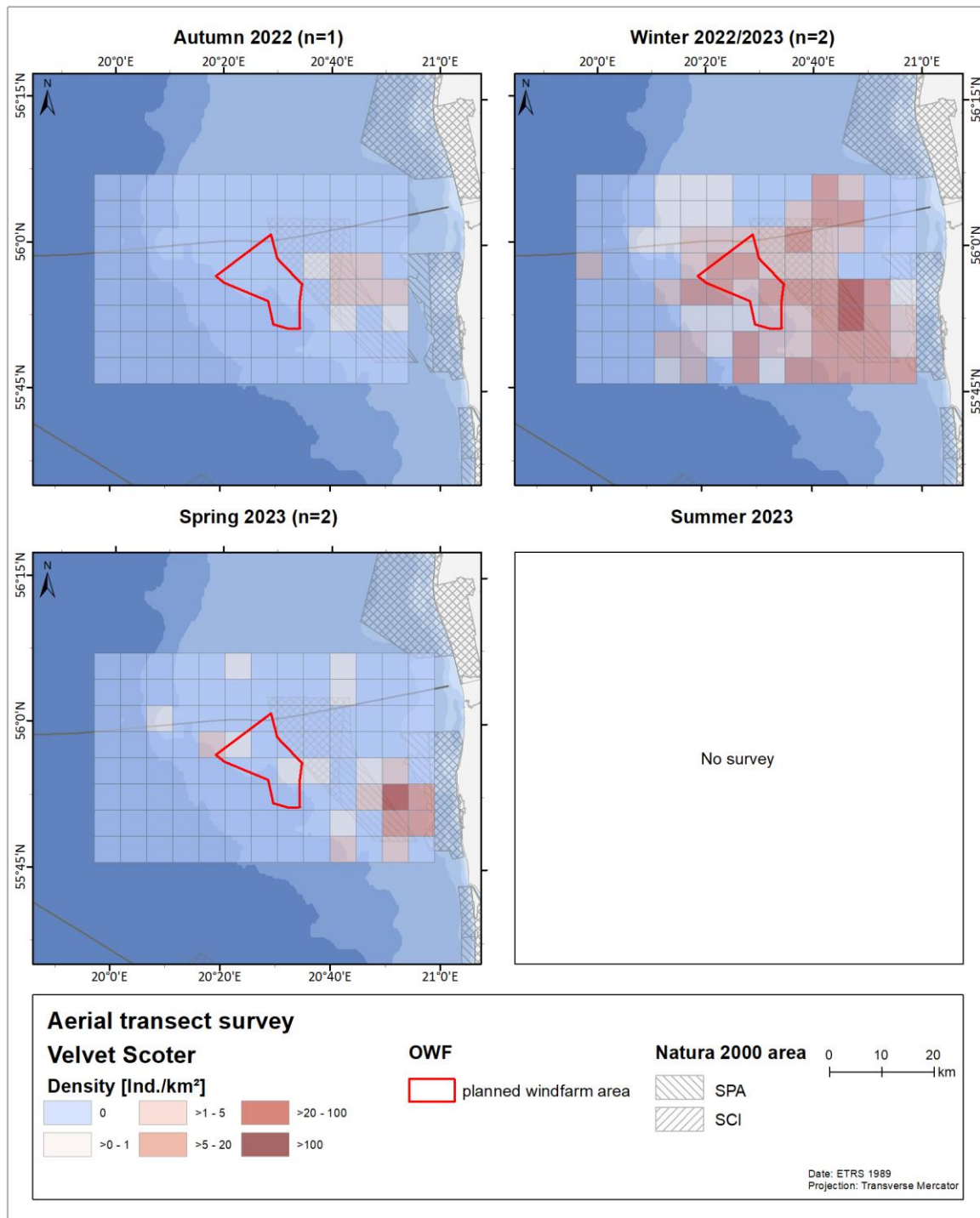


Figure 3.16 Distribution of Velvet Scoters in the survey area per season during the digital aerial surveys between November 2022 and April 2023.

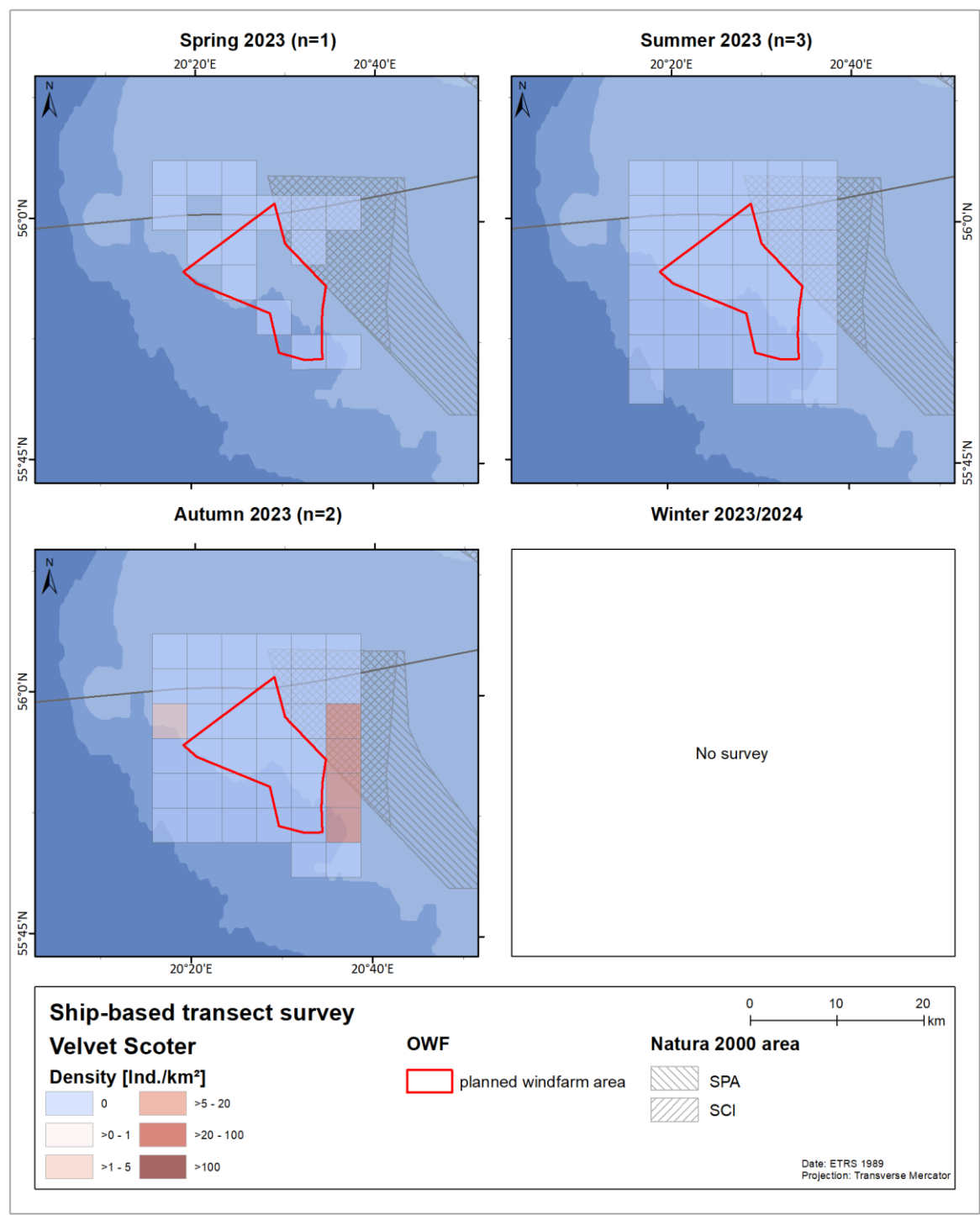


Figure 3.17 Distribution of Velvet Scoters in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.6 Little Gull

Little Gull – <i>Hydrocoloeus minutus</i>		LI: Mažasis kiras
<i>Biogeographic population:</i> Central & E Europe & W Mediterranean		
<i>Breeding range:</i> N Scandinavia, Baltic States, W Russia, Belarus, Ukraine		
<i>Wintering / core non-breeding range:</i> W Europe, NW Africa		
<i>Population size:</i> 96,000 – 180,000		
<i>1% value:</i> 1,300		
<i>Conservation status:</i>	EU Birds Directive, Annex I: listed EU SPEC Category: SPEC 3 IUCN Red List Category, Global & Europe:LC	
<i>Trend:</i> DEC	Trend quality: Reasonable	
<i>Key food:</i> mostly insects, some crustaceans, mollusk and small fish		

Little Gulls are distributed in Europe, west Asia and North America. The population that occurs in the survey area is the Central European population breeding in North Scandinavia to the Baltic Sea and Belarus and west Russia. Little Gulls are migratory, and their wintering grounds extend to west Europe and Northwest Africa (MENDEL ET AL. 2008). Within the Baltic, the main wintering areas are the Gulf of Riga, the Irbe Strait, the southwestern part of the Baltic among others (DURINCK ET AL. 1994). In late July and August, Little Gulls arrive from their breeding grounds to the coast of Lithuania, Latvia and Poland to moult (DURINCK ET AL. 1994). Little Gulls occur mainly at water depths ranging between 20 and 50 m, but they may also occur at much deeper waters (up to 100 m, DURINCK ET AL. 1994). Their diet mainly consists of insects and small fish. The European population is estimated at 96,000 to 180,000 individuals with a decreasing trend. Little Gulls are reported to be weakly affected by OWF, showing some avoidance behaviour (DIERSCHKE ET AL. 2016).

Density and distribution of Little Gulls in the survey area

Little Gulls were the most commonly recorded species during the ship-based surveys. A total of 555 individuals were observed during the six ship-based surveys within the transect area, while during the aerial surveys, 1,631 individuals were recorded, and it was the second most common species. Little Gulls were recorded during all surveys (aerial and ship-based surveys), but at varying densities. During the aerial surveys, the highest density was observed in November 2022 at 4.06 ind./km² and the lowest in April 2023 at 0.06 ind./km² (Table 3.2, Figure 3.18). The highest density during the ship-based surveys was observed in July 2023 (6.4 ind./km²) and the lowest density in September 2023 with 0.08 ind./km² (Table 3.3, Figure 3.18).

Spatially, Little Gulls preferred the offshore areas during winter, when the distribution of these birds was more widespread. During the aerial surveys, the highest densities were observed to the

west (grid cells of up to 5.0 ind./km²) and south (> 5 ind./km²) of the planned OWF in winter. In spring, however, the highest densities were observed towards the east and closer to the coast, but there were not many grid cells with birds to account for a clear spatial pattern. In both seasons, sightings of Little Gulls were observed within the limits of the planned OWF but at low to mid-densities (up to 1 ind./km², Figure 3.19). During the ship-based surveys in spring, Little Gulls were recorded at very high densities from a single grid cell towards the south of the survey area. In summer and especially in autumn, they were observed all over the survey area at high densities and occurring within the limits of the planned OWF (Figure 3.20).

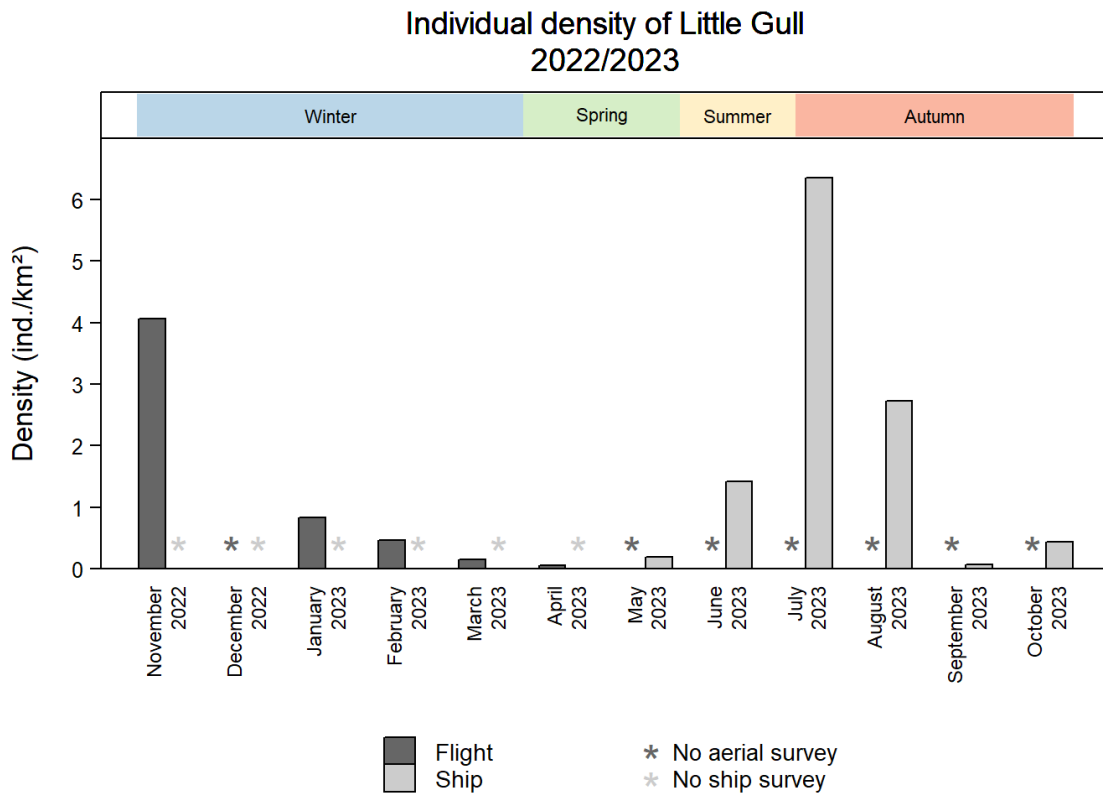


Figure 3.18 Monthly densities of Little Gulls during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

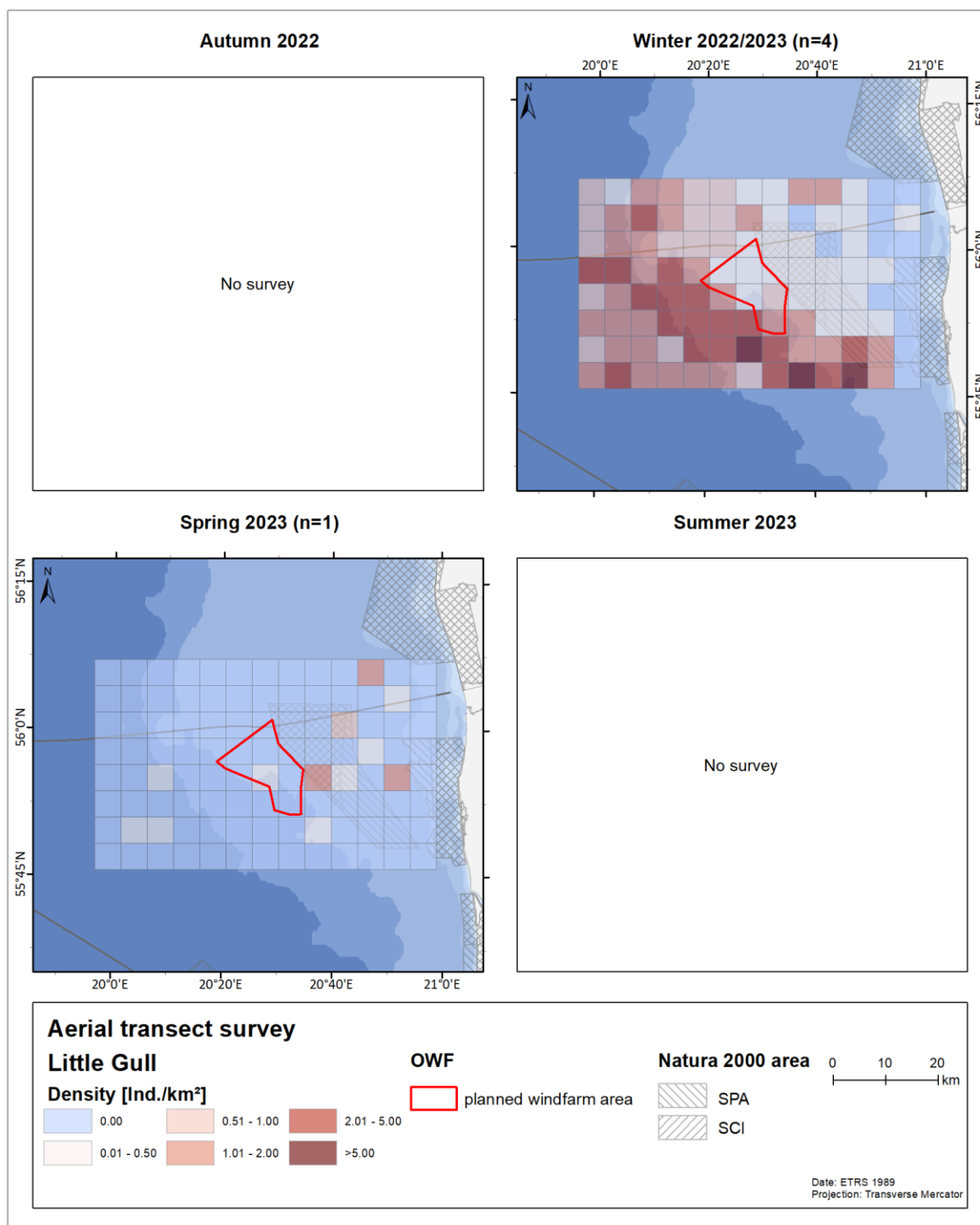


Figure 3.19 Distribution of Little Gulls in the survey area during the digital aerial surveys between November 2022 and April 2023.

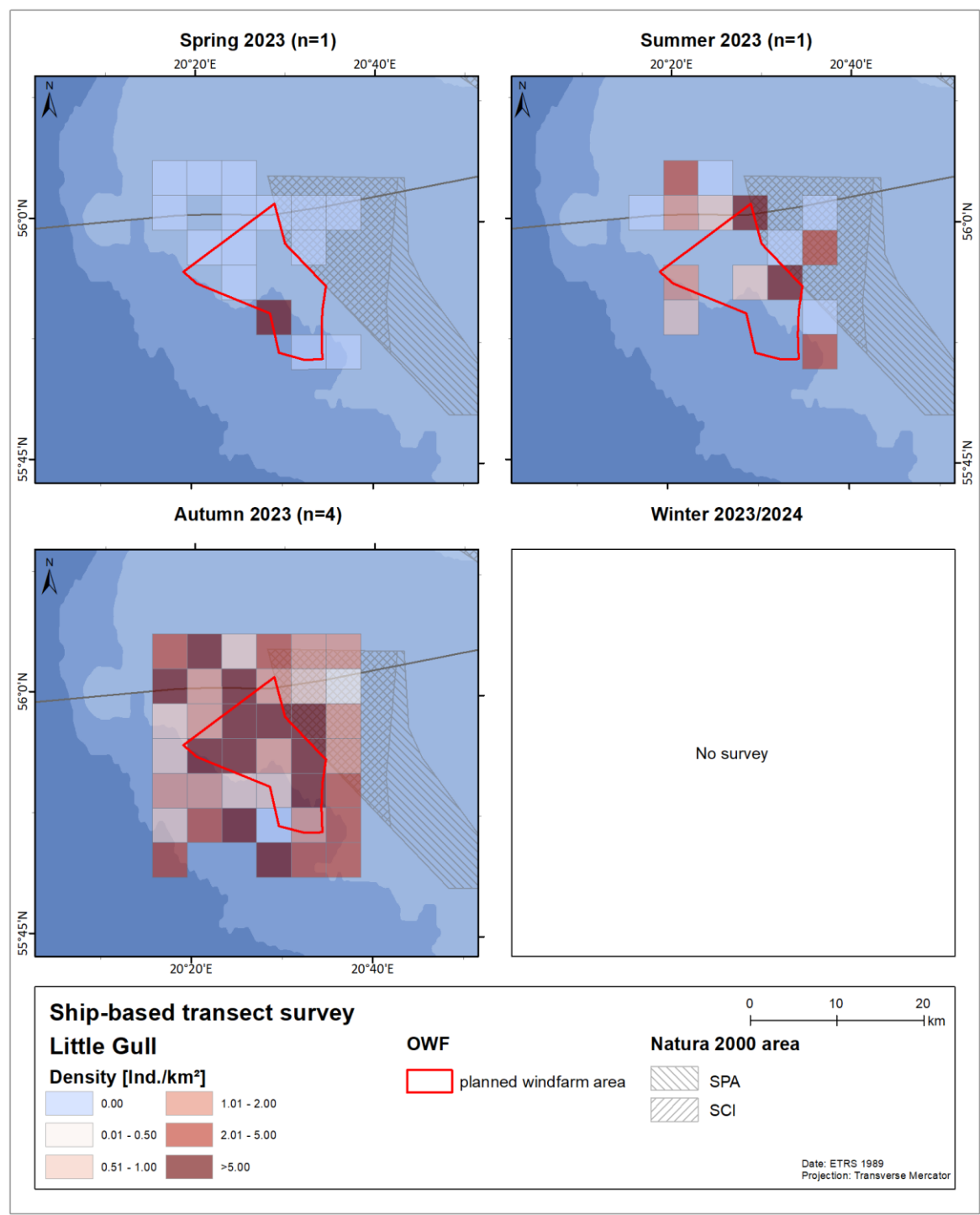


Figure 3.20 Distribution of Little Gulls in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.7 Common Gull

Common Gull – <i>Larus canus</i>		LI: Paprastasis kiras
<i>Biogeographic population:</i> <i>canus</i> , NW & C Europe/Atlantic coast & Mediterranean <i>heinei</i> , NE Europe & Western Siberia/Black Sea &Caspian		
<i>Breeding range:</i> <i>canus</i> : Iceland, Ireland, UK, eastwards to White Sea <i>heinei</i> : NW Russia, West and Central Siberia E to R. Lena		
<i>Wintering / core non-breeding range:</i> <i>canus</i> : Europe to N Africa; <i>heinei</i> : SE Europe, Black & Caspian Seas		
<i>Population size:</i> <i>canus</i> : 1,400,000 - 2,000,000	<i>heinei</i> : 2,200,000 – 3,500,000	
<i>1% value:</i> <i>canus</i> : 16,400	<i>heinei</i> : 16,400	
<i>Conservation status:</i>	EU Birds Directive, Annex I: not listed EU SPEC Category: Non-SPEC ^E IUCN Red List Category: LC (Global & Europe)	
<i>Trend:</i> DEC?/DEC?	Trend quality: Reasonable/Reasonable	
<i>Key food:</i> opportunistic		

The Common Gull is a medium-sized gull that breeds in the Palearctic, from Eurasia to western North America. The species has four subspecies and two of them may occur in the survey area. The nominate form: *L. c. canus* breeds from Iceland to Fennoscandia and winters from Central Europe to North Africa. The subspecies *L. c. heinei* breeds from Northeast Europe and Western and Central Siberia and winters in Northwest Russia down to the Black Sea and the Caspian area. DURINCK and colleagues (1994) mention that less than 4% of the *canus* subspecies winters offshore in the Baltic Sea and that high densities are often only recorded around the Gulf of Riga and to the north and northwest coast of Bornholm. They are generalist feeders with a large variety of food prey from terrestrial and marine ecosystems (MENDEL ET AL. 2008). They are also ship-followers and feed on fish discards. The sizes of the European populations of both relevant subspecies are summarized in the reference chart above these lines. Despite being relatively numerous both subspecies are showing potential declining trends.

Density and distribution of Common Gulls in the survey area

Common Gulls were frequent and recorded during all surveys. A total of 256 Common Gulls were recorded over the five aerial surveys. The highest density was recorded in November 2022 with 0.61 ind./km² and the lowest in April 2023 (0.02 ind./km², Table 3.2, Figure 3.21). During ship-based surveys, a total of 74 Common Gulls were recorded and the highest density was observed in July 2023 with 0.38 ind./km² and the lowest in June 2023 with 0.03 ind./km² (Table 3.3, Figure 3.21).

Spatially, Common Gulls were distributed quite evenly across the aerial survey area. In winter they appeared to be more concentrated towards the south-eastern part of the survey area (Figure 3.22). During ship surveys, individuals were distributed across the whole survey area in autumn, but with varying densities and higher densities occurred at deeper waters. In summer, birds were only present in two grid cells (Figure 3.23).

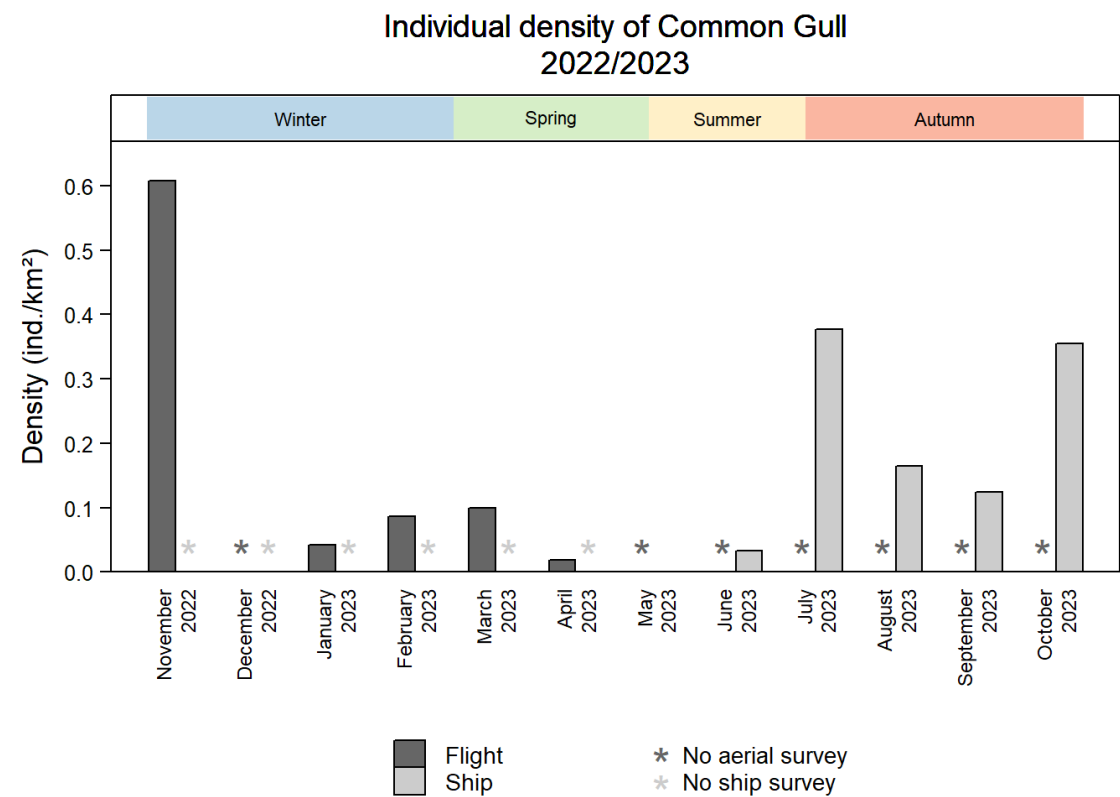


Figure 3.21 Monthly densities of Common Gulls during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

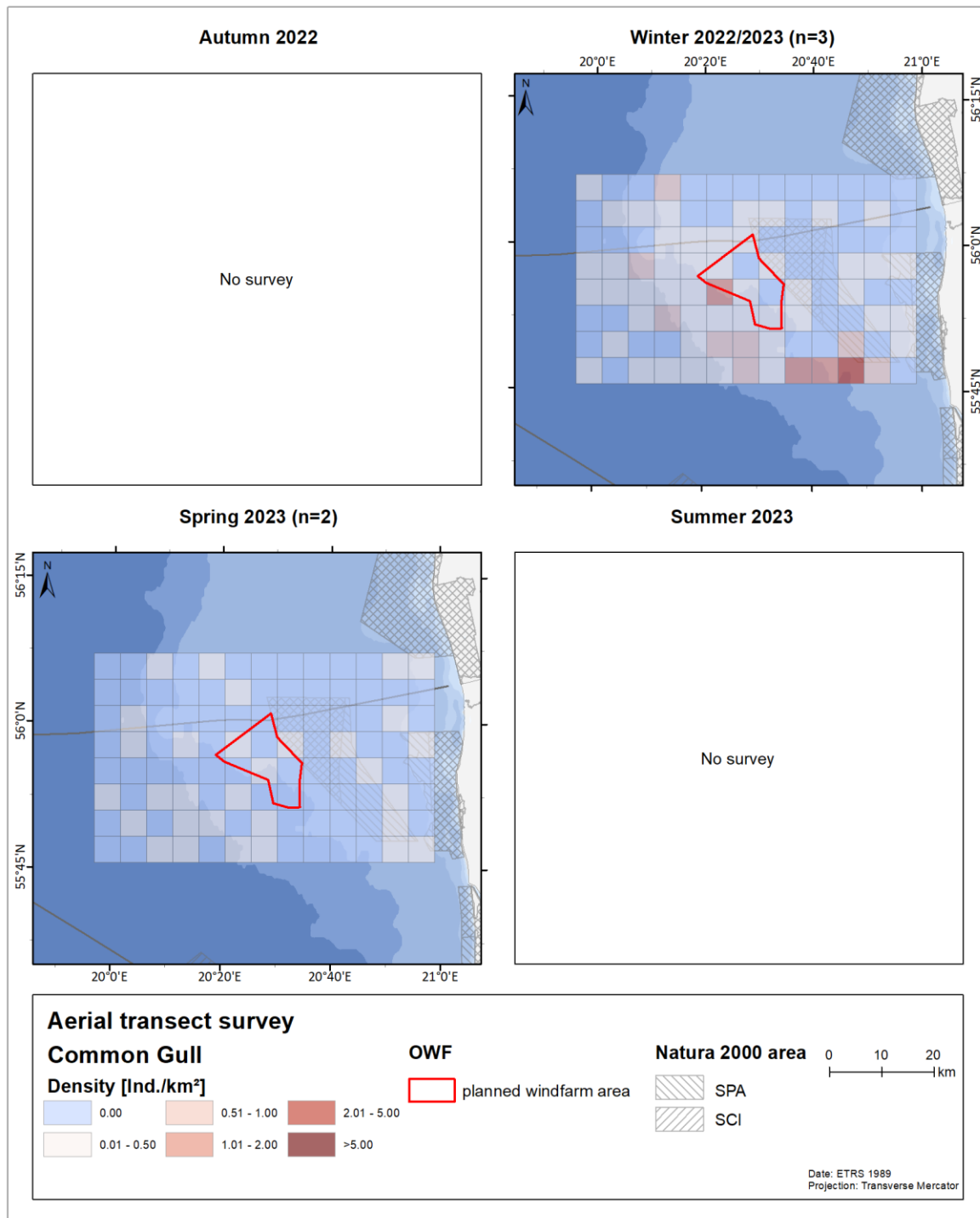


Figure 3.22 Distribution of Common Gulls in the survey area during the digital aerial surveys between November 2022 and April 2023.



Figure 3.23 Common Gull distribution in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.8 Herring Gull

Herring Gull – <i>Larus argentatus</i>		LI: Sidabrinis kiras
Biogeographic population: <i>argentatus</i> , North & North-west Europe*		
Breeding range: Denmark & Fenno-Scandia to E Kola Peninsula		
Non-breeding range: N & W Europe		
Population size: 860,000 – 1,000,000		
1% value: 9,300		
Conservation status:	EU Birds Directive, Annex I: not listed	
	EU SPEC Category: SPEC 2	
	IUCN Red List Category: LC (Global & Europe)	
Trend: DEC	Trend quality: Reasonable	
Key food: various different food sources		

The Herring Gull is a very widespread species in the northern hemisphere. There are two subspecies and the nominate form is the one occurring in the survey area. It breeds from Fennoscandia and Denmark to Svalbard. The other subspecies is distributed west from *L. a. argentatus* and can be found until Iceland. The species is partly migratory with birds occurring further north migrating and birds occurring further south being resident. Their diet is opportunistic and diverse, but their main prey are invertebrates. They are also ship-followers feeding on fish discards (MENDEL ET AL. 2008). The population size has been decreasing in the recent years and is currently estimated at 860,000 to 1 million individuals.

Density and distribution of Herring Gulls in the survey area

This gull species was also frequent and occurred in all surveys. During the five aerial surveys, a total of 387 individuals were observed which accounted for 4.1% of the total resting birds. With 194 individuals observed during ship-based surveys within the transect area the species was the third most common (15.4% of all resting birds) during the ship-based surveys. The highest density of Herring Gulls during aerial surveys was recorded in November 2022 with 0.68 ind./km² and the lowest density was in April 2023 (0.03 ind./km², Table 3.2, Figure 3.24). During ship-based surveys, the highest density was recorded in August 2023 with 1.07 ind./km², and the lowest in May 2023 (0.11 ind./km², Table 3.3, Figure 3.24).

Spatially, the distribution of Herring Gulls was similar to that of the Common Gull, with low densities quite evenly spread across the aerial survey area, with a south-eastern local concentration in winter (Figure 3.25). During ship surveys, individuals were distributed across the whole survey area (and planned wind farm area) in summer and autumn, but with varying densities, and the higher densities were observed at more offshore locations (Figure 3.26).

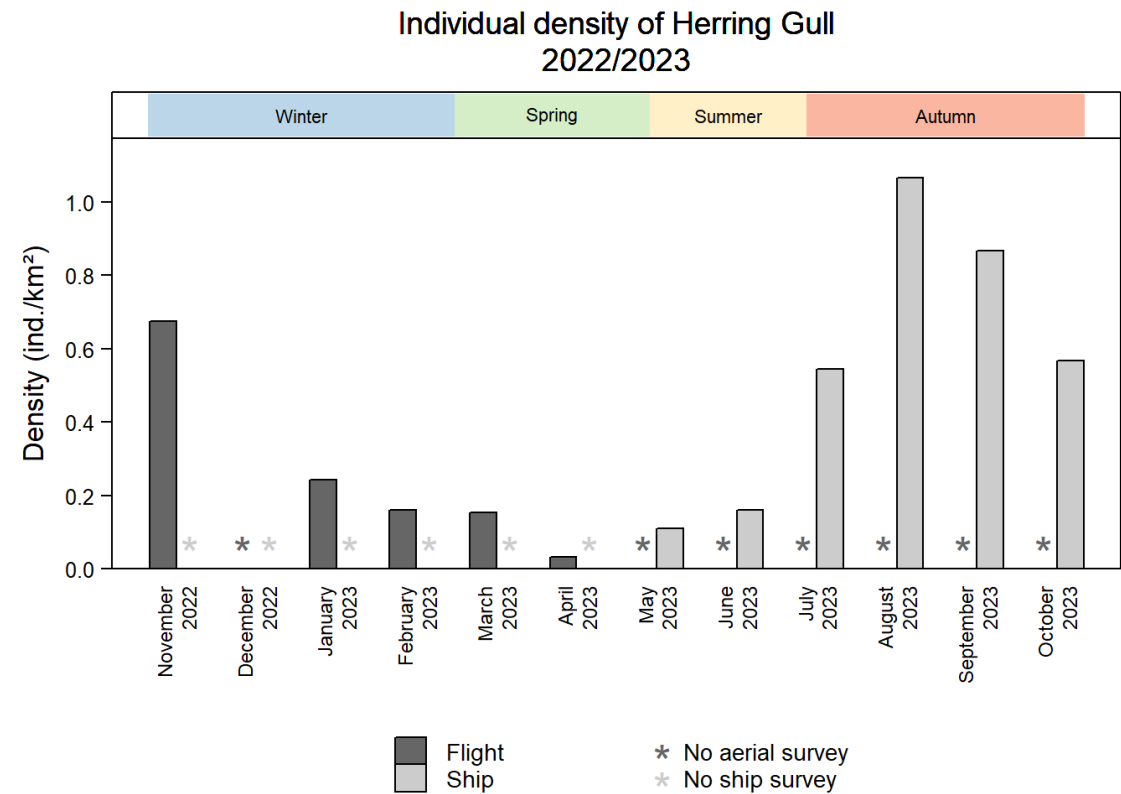


Figure 3.24 Monthly densities of Herring Gulls during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

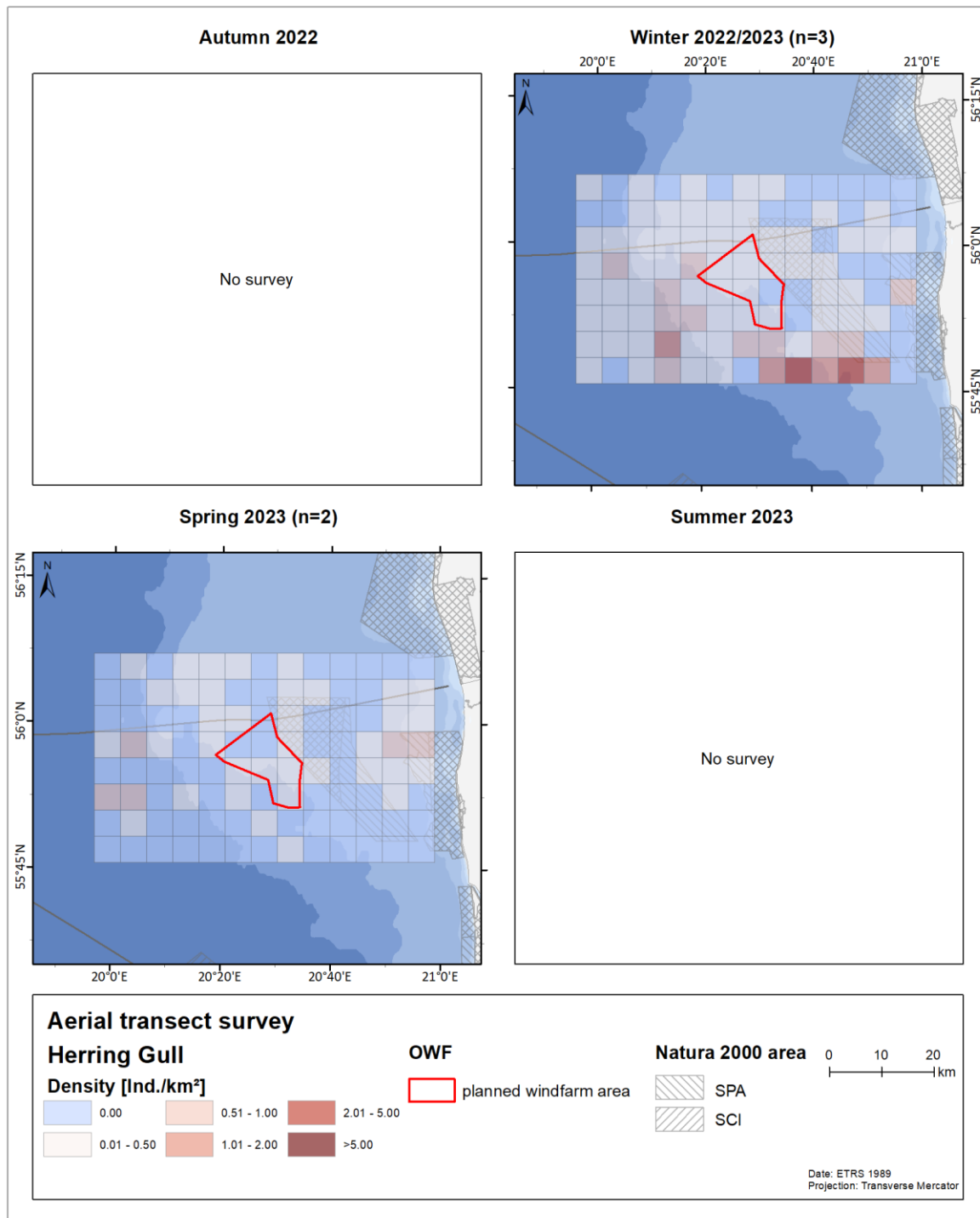


Figure 3.25 Distribution of Herring Gulls in the survey area during the digital aerial surveys between November 2022 and April 2023.

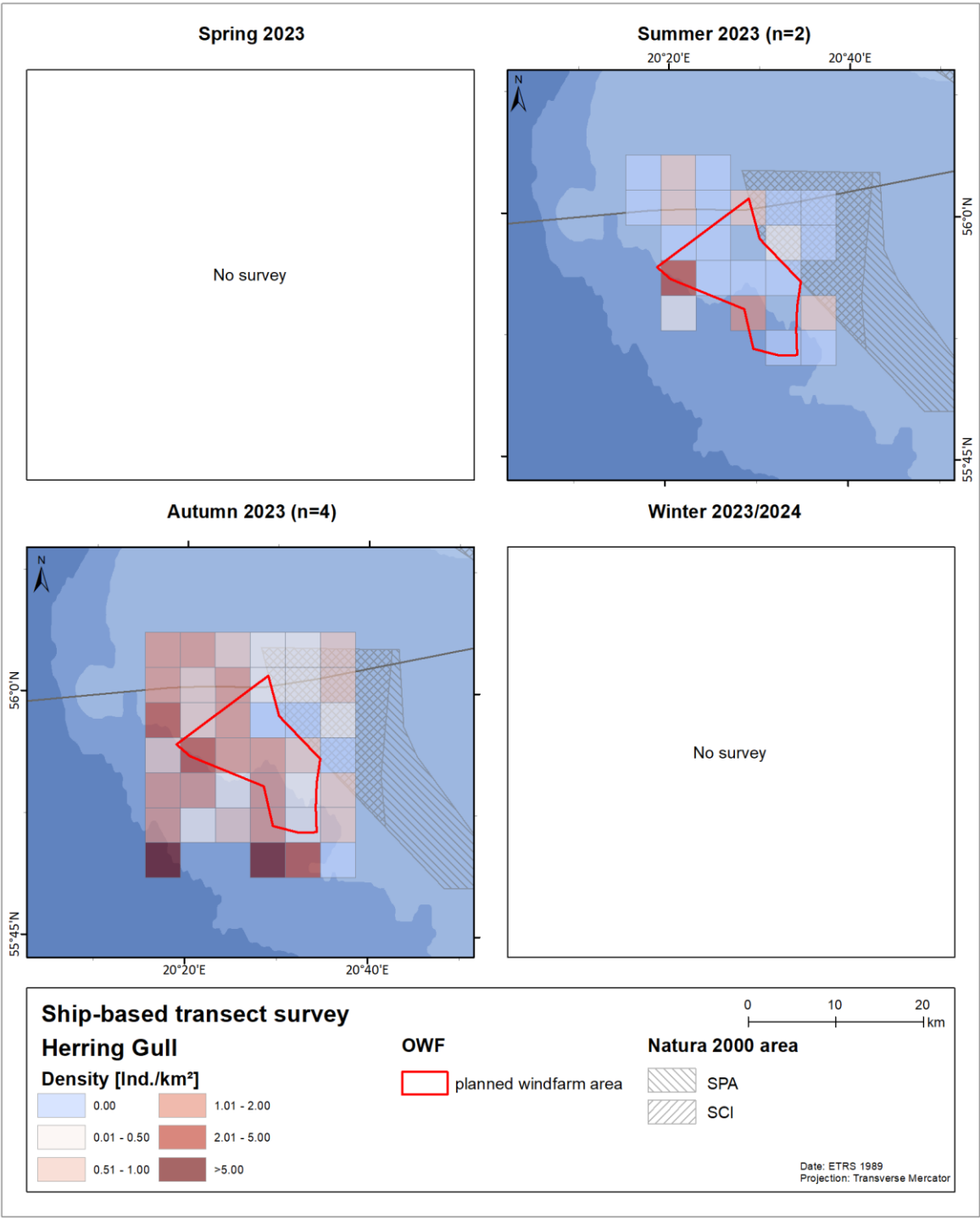


Figure 3.26 Herring Gull distribution in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.9 Common Guillemot

Common Guillemot – <i>Uria aalge</i>		LI: <i>Laibasnapis narunelis</i>
<i>Biogeographic population</i> : aalge, Baltic Sea*		
<i>Breeding range</i> : Sweden, Denmark, Finland		
<i>Non-breeding range</i> : Baltic Sea		
<i>Population size</i> : 77,000 – 100,000		
<i>1% value</i> : 880		
<i>Conservation status</i> :	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 3 IUCN Red List Category: LC (Global & Europe)	
<i>Trend</i> : INC	Trend quality: Good	
<i>Key food</i> : fish		

For Common Guillemots it is somewhat unclear to which extent, the North Atlantic flyway populations can be divided into sub-populations. MENDEL et al. (2008) used an estimate for the Baltic Sea breeding population of 50,000 individuals. During winter, the highest densities in the Danish Baltic Sea are found in the central Kattegat (PETERSEN & NIELSEN 2011) with about 76,500 individuals for the year 2008. These birds are assumed to mostly originate from breeding colonies in the North Sea or Atlantic (MENDEL ET AL. 2008). Common Guillemots have been found to avoid OWF, but responses varied from weak avoidance to strong avoidance in some cases (DIERSCHKE ET AL. 2016; PESCHKO ET AL. 2020).

Density and distribution of Common Guillemots in the survey area

During the five digital aerial surveys between November 2022 and April 2023, a total of 1,085 Common Guillemots were recorded whereas during the six ship-based transect surveys between May and October 2023, 262 individuals were observed within the transect area (Table 3.1). They were the second most observed resting bird of ship-based surveys (20.8%). During aerial surveys, also 503 unidentified auks (or Common Guillemot/Razorbill) were observed (21.2% of all auks). These are not considered here, and thus calculated densities for both species are somewhat underestimated.

During aerial surveys, the highest density was recorded in November 2022 with 1.43 ind./km² and the lowest in April 2023 (0.26 ind./km², Table 3.2, Figure 3.27). During ship-based surveys, the highest density was recorded in September 2023 with 10.46 ind./km² and the lowest in May and June with 0.02 ind./km² (Table 3.3, Figure 3.27).

Common Guillemots were widely distributed across the study area, especially during winter (aerial surveys) and autumn (ship-based surveys, Figure 3.28, Figure 3.29). The highest densities were mainly found in some distance from the coast, in deeper waters, and individuals were also recorded inside the planned OWF, at relatively high densities during both ship-based and aerial surveys.

During the ship survey in September, the overall highest densities were found within the limits of the planned OWF (Figure 3.29).

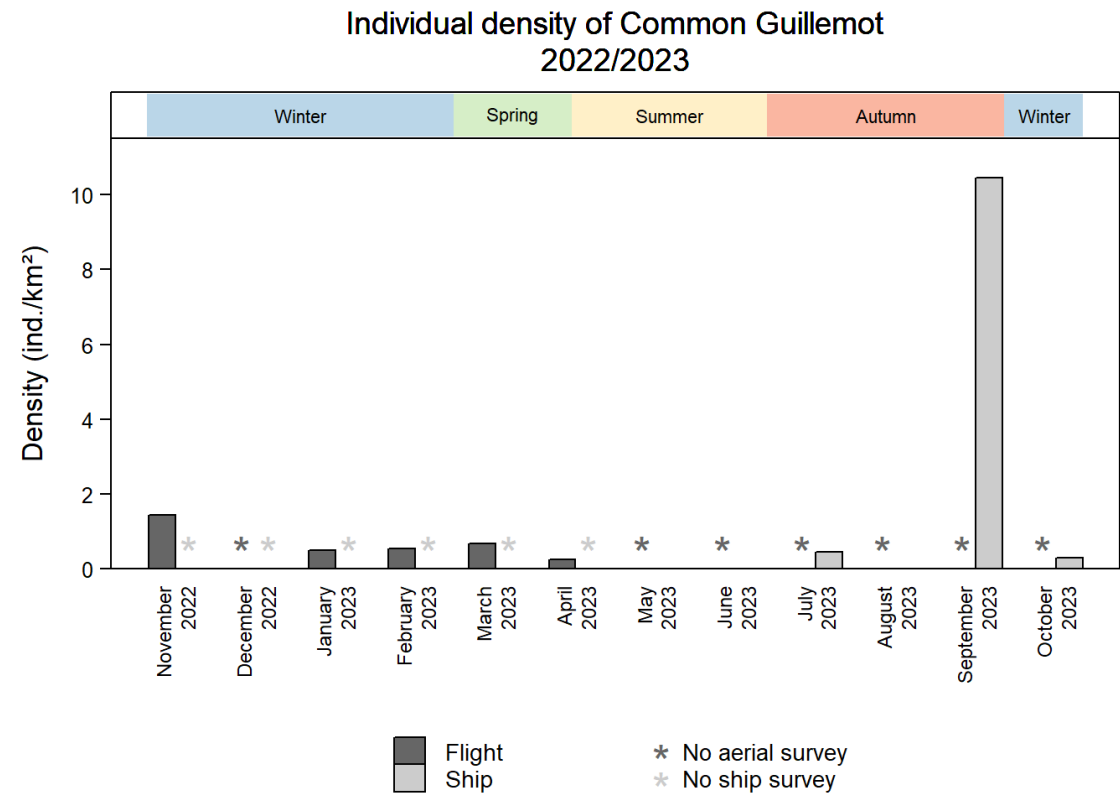


Figure 3.27 Monthly densities of Common Guillemots during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

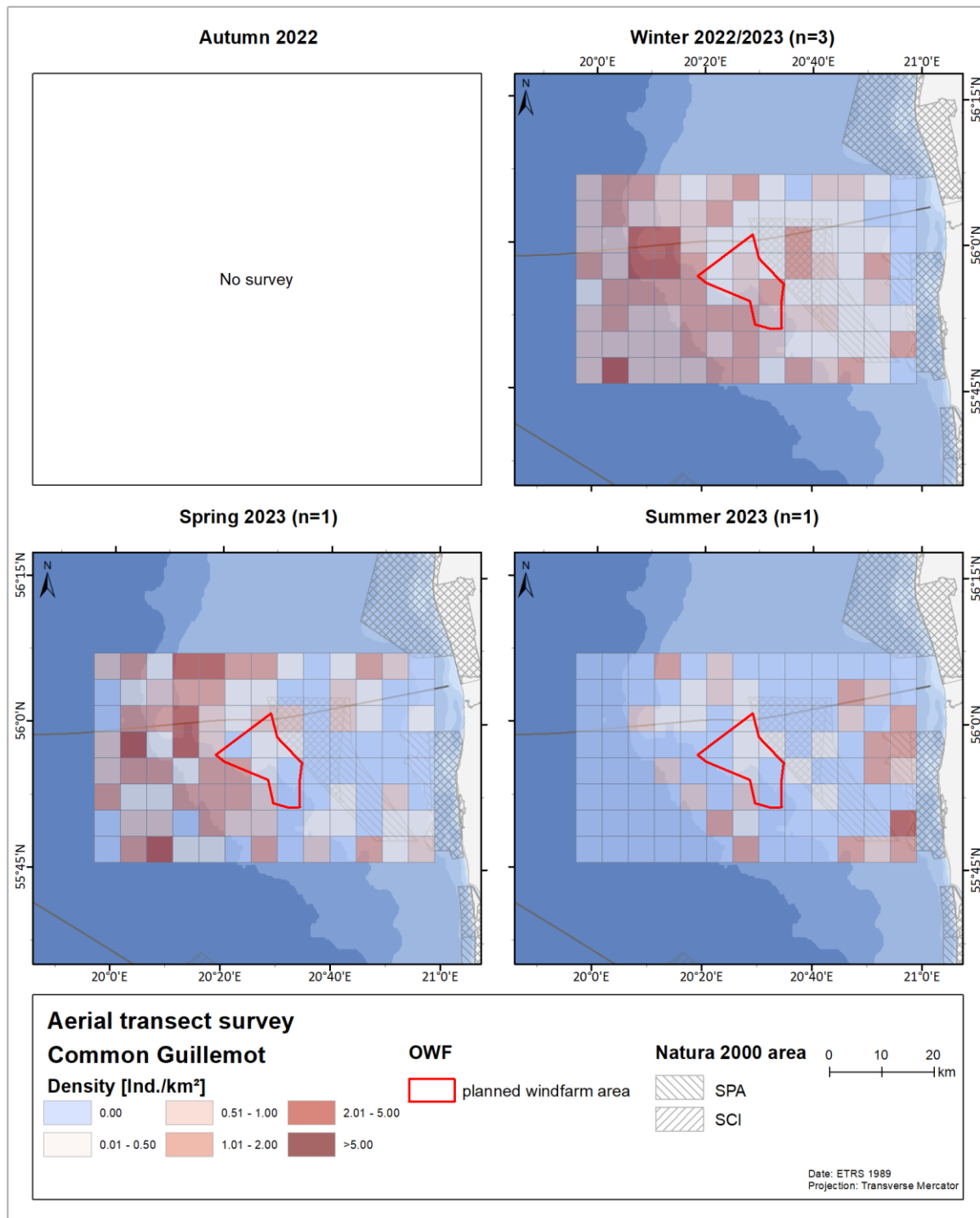


Figure 3.28 Distribution of Common Guillemots in the survey area during the digital aerial surveys between November 2022 and April 2023.

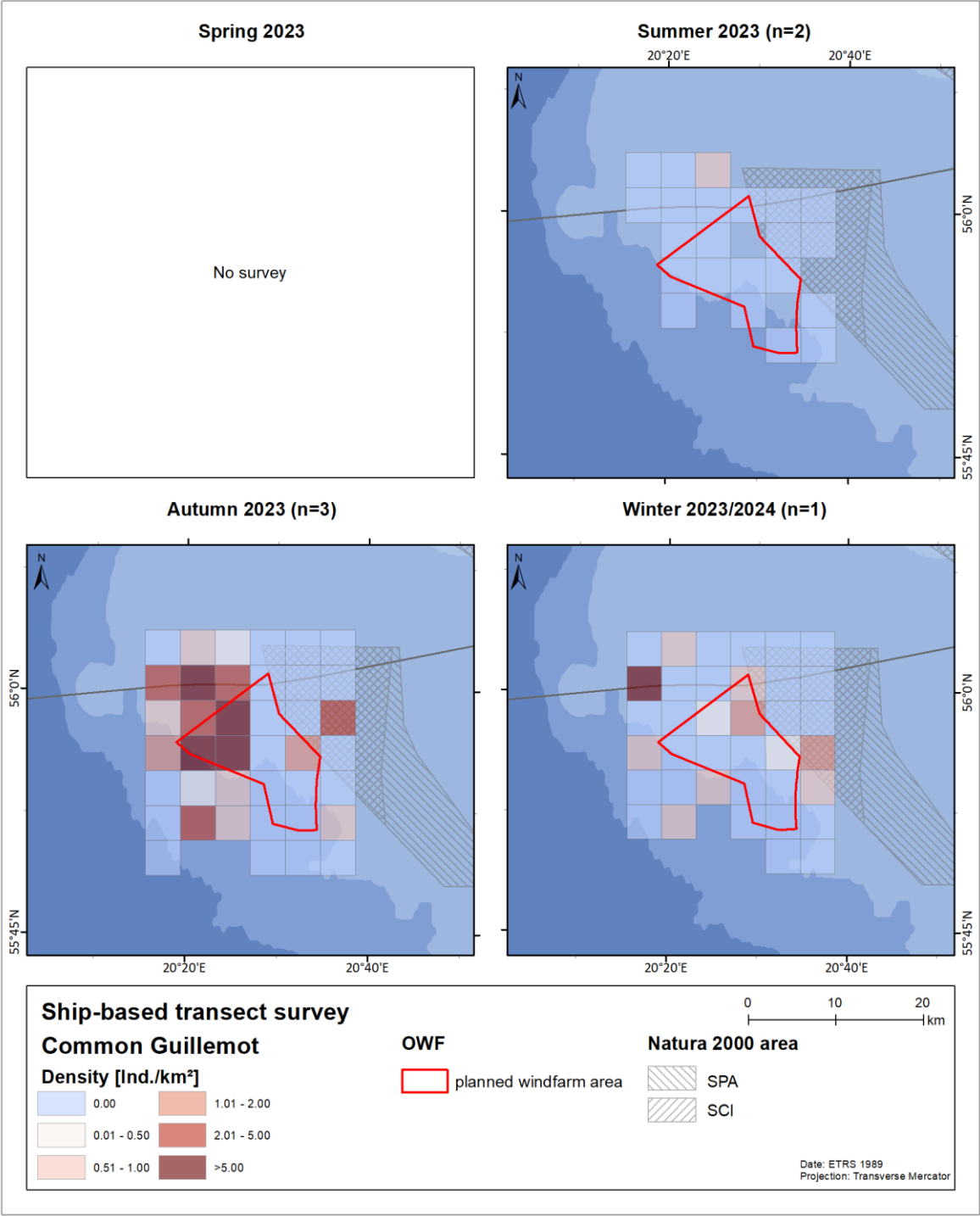


Figure 3.29 Distribution of Common Guillemot in the survey area per season during the ship-based transect surveys between May and October 2023.

3.2.10 Razorbill

Razorbill – <i>Alca torda</i>		LI: Alka
Biogeographic population: <i>torda</i> , E Atlantic		
Breeding range: -		
Wintering / core non-breeding range: -		
Population size: 290,000 – 350,000		
1% value: 13,800-		
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: 1 IUCN Red List Category: LC (Global & Europe)	
Trend: INC	Trend quality: Reasonable	
Key food: mainly fish		

Razorbills are distributed in the Holarctic from North Europe to the East and West coasts of the Atlantic. They are adapted to life at sea and spend their whole life in the marine environment (like the Common Guillemot). They breed mainly on edges of steep cliffs or on small isolated islands and most often in large colonies (MENDEL ET AL. 2008). There are two subspecies of Razorbills and three populations. The subspecies *torda*, is the one that occurs in the survey area. The size of the breeding 'East Atlantic' biogeographical population is estimated at 290,000-350,000 individuals for the period between 2008 and 2018. In total, however, the European population might range between 519,000 - 1,070,000 individuals according to BirdLife International (BIRDLIFE INTERNATIONAL 2021). The diet of Razorbills is dominated by fish, especially sprats which also constitutes the major component of the diet of its chicks (LYNGS 2001). Like Common Guillemots, Razorbills have been found to avoid OWF, but the extent of avoidance varied (DIERSCHKE ET AL. 2016).

Density and distribution of Razorbill in the survey area

During the digital aerial surveys between November 2022 and April 2023 a total of 773 Razorbills were recorded whereas during the six ship-based transect surveys, only 4 individuals were observed within the transect area (Table 3.1). As mentioned previously, also 503 unidentified auks (or Common Guillemot/Razorbill) were observed (21.2% of all auks) during aerial surveys. These are not considered here, and thus calculated densities for this species are probably somewhat underestimated.

During aerial surveys, the highest density was recorded in November 2022 with 0.96 ind./km² and the lowest in April 2023 (0.02 ind./km², Table 3.2, Figure 3.30). During ship-based surveys, Razorbills were only sighted in May at a density of 0.08 ind./km² (Table 3.3, Figure 3.30).

During aerial surveys, Razorbills were widely distributed across the whole study area in winter and spring, but with somewhat higher densities in some distance from the coast, in deeper waters. In summer, as expected, densities were low and they occurred at few grid cells (Figure 3.31). During ship-based surveys, they only occurred in summer at few grid cells at the north of the survey area (Figure 3.32).

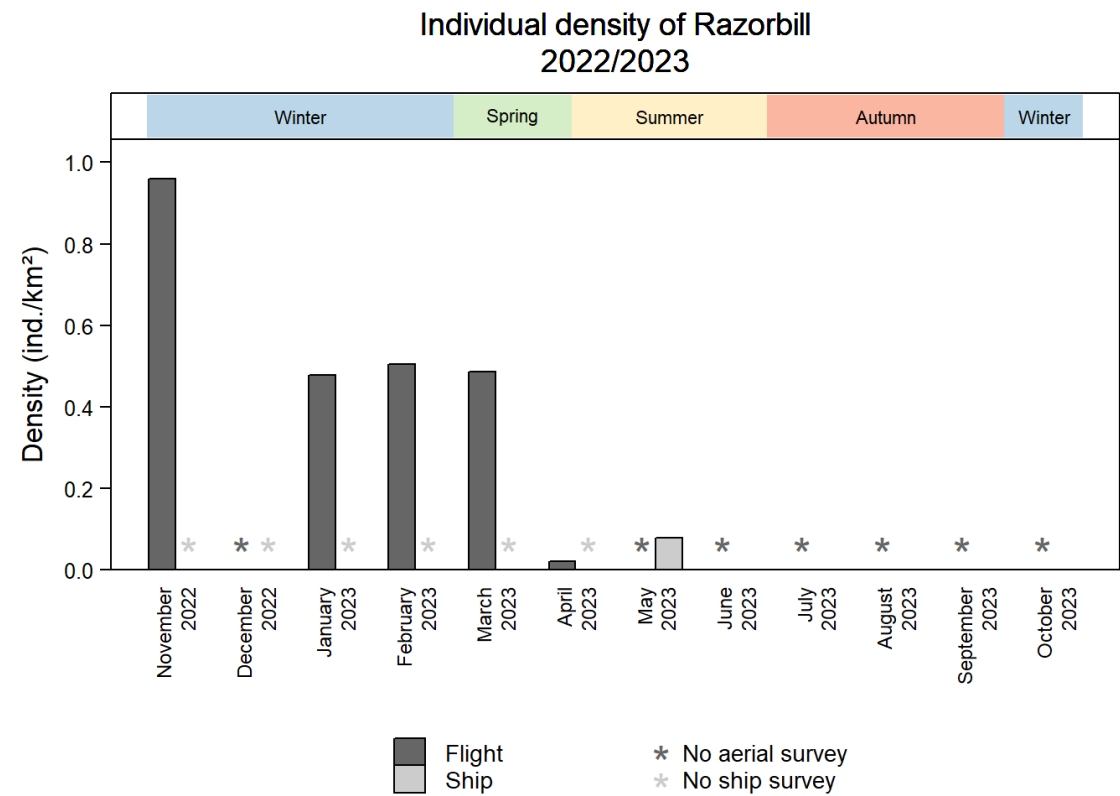


Figure 3.30 Monthly densities of Razorbills during aerial and ship-based transect surveys in the survey area between November 2022 and October 2023. The coloured rectangles above the bars indicate the specific seasonal classification according to Garthe et al. 2007.

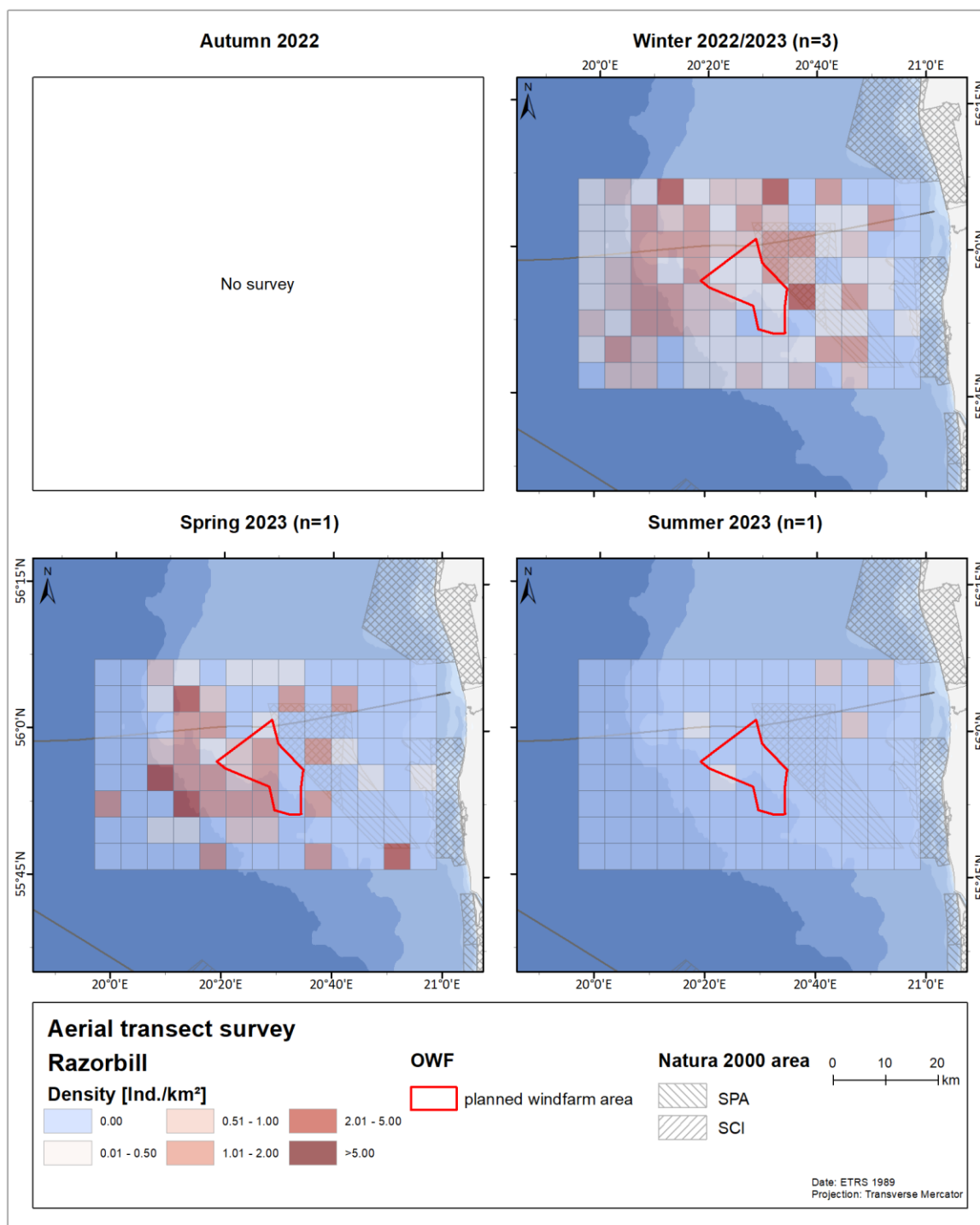


Figure 3.31 Distribution of Razorbills in the survey area during the digital aerial surveys between November 2022 and April 2023.

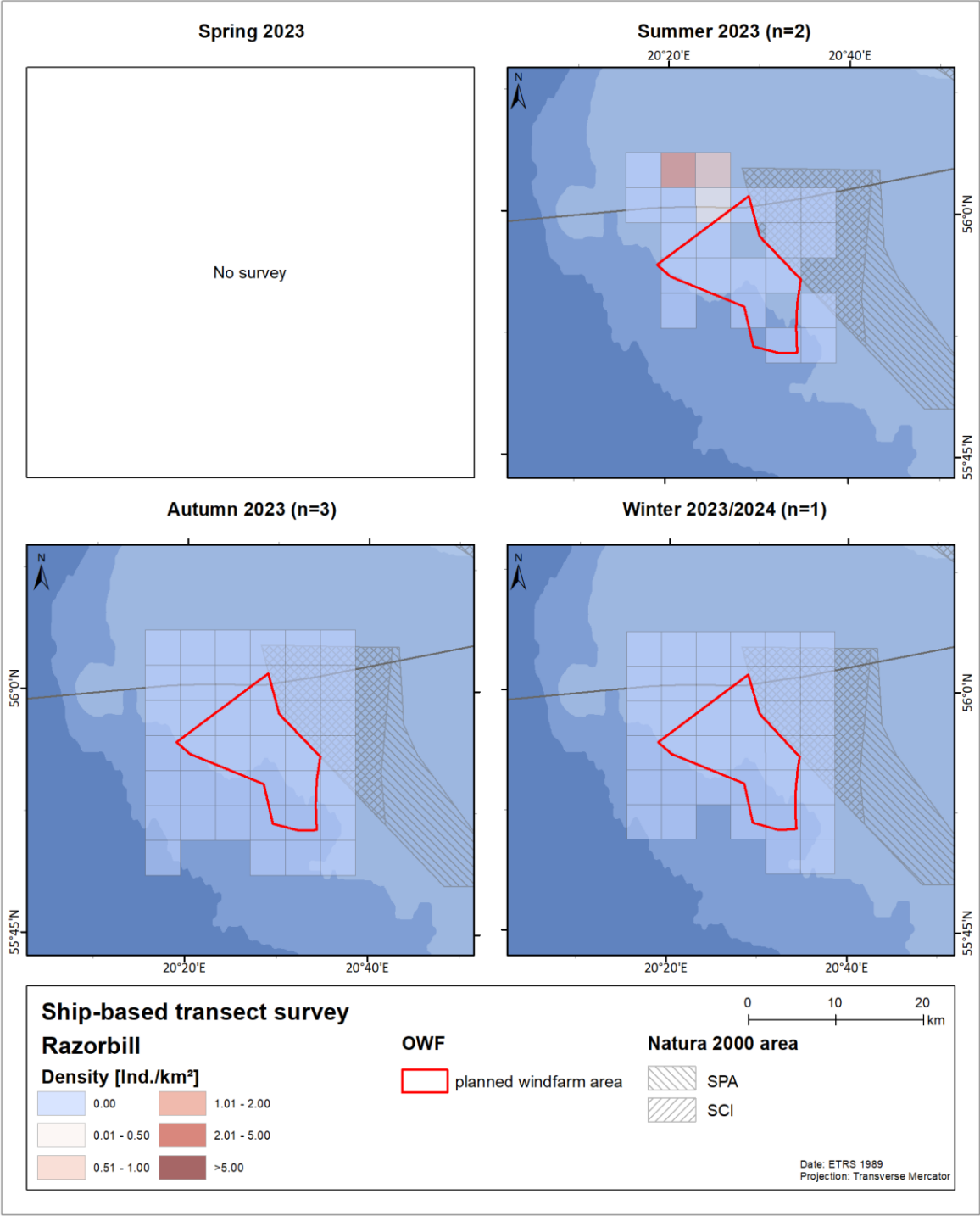


Figure 3.32 Distribution of Razorbills in the survey area per season during the ship-based transect surveys between May and October 2023.

4 DISCUSSION

4.1 Critique of methods

Just as for the previous year, the data collection has been achieved through two methods (digital aerial surveys and ship-based transect surveys). Both have advantages and disadvantages. For example, during aerial surveys, a very large area can be covered with a uniform collection effort, while the ship survey area is usually relatively small. Moreover, animal movement and deterrence effects are known from ships (FLIESSBACH ET AL. 2019), while they are negligible for digital aerial surveys, since disturbance to birds from a high-flying airplane is minimal (ŽYDELIS ET AL. 2019). One of the drawbacks of digital aerial surveys is however related to the identification of dark or small species such as Razorbills, Guillemots, and Common and Arctic Terns, which may be difficult to detect on the images and/or distinguish from each other. During ship surveys, these species can often be distinguished more easily. These differences need to be taken into account when comparing bird densities between ship and aerial surveys.

In addition, many factors can influence the distribution and the seasonal occurrence of resting birds. These include environmental factors such as season, local weather conditions during the collection date and preceding days, feeding resources and anthropogenic factors such as fishing and shipping. Furthermore, each survey is conducted over a short period of time and over a relatively small area, when compared to the Baltic Sea as a whole. It only represents a snapshot of what is happening, and a high degree of temporal and spatial variability is expected. Consequently, any short-term population shift away from or into the survey area can lead to considerable fluctuations in the population estimates of the species under consideration.

In this study, the two methods were applied consecutively throughout the year rather than simultaneously (both methods in each survey month). Therefore, a comparison of results between the methods is not possible. Rather, the two methods are complementary, covering all seasons across the two years of surveys.

4.2 Species abundance and distribution across years

The study area included (only partly for ship surveys) the Special Protection Area (SPA) “Klaipėdos–Ventspilio plynaukštė”, which extends to the east of the planned OWF area (EUROPEAN ENVIRONMENT AGENCY 2015). The SPA was designated for the protection of reefs, and as a place of regular wintering aggregations of Long-tailed Ducks, Velvet Scoters and Razorbills. The standard data form also gives site evaluations for the species Red-throated Diver and Common Guillemot.

Divers are considered winter visitors and migrants in the Baltic Sea (MENDEL ET AL. 2008). In Lithuanian waters, a key wintering area for the Red-throated Diver is located at the coast of Lithuania extending further north, with a core area off the Latvian coast (SKOV ET AL. 2011). The SPA standard data form considers the species as rare and provides low densities ranging between 0.06 and 0.16 ind./km² at the site. During aerial surveys, and concordant with the findings of the first year of study, medium densities of Red-throated Divers were found within the study area. The highest densities were found during spring (March, 0.64 ind./km²) and late winter (February, 0.61

ind./km²). Spatially, Red-throated Divers were found distributed across the whole study area during winter and concentrated in the eastern half of the area during spring, very similar to the spatial distribution of the previous year of study. Only one Red-throated Diver was observed during the ship-based surveys, but 15 Black-throated Divers, which is a rather high number. However, given the sensitivity of divers in general towards ships, densities observed of these species with this method are probably somewhat underestimated. Furthermore, ship surveys were only conducted during summer and early autumn, when divers are on the breeding grounds and are not expected to occur within the study area in high numbers. Despite a slightly larger density found in this second year of study with digital aerial surveys (0.64 ind./km² vs. 0.57 ind./km²), also during winter, the study area does not seem to be of high importance for this species or for Black-throated Divers (max 0.07 ind./km² observed through aerial surveys, and 0.22 ind./km² observed through ship surveys). Nonetheless, as divers are very sensitive to anthropogenic disturbances like ships or OWF, with displacement distances of up to 10-15 km in some studies (DIERSCHKE ET AL. 2016; MENDEL ET AL. 2019; HEINÄNEN ET AL. 2020), even individuals resting within the nearby SPA will likely be disturbed by the planned OWF.

Great Cormorants were observed at very high densities at one single grid cell during ship-based surveys in August 2023. Otherwise, they occurred at low numbers. Due to this single sighting of several cormorants, this species was the sixth most abundant resting bird during ship-based surveys. Nonetheless, results from both years of study suggest the species might be an occasional visitor of this area. Due to its known attraction towards man-made structures, especially for roosting and the possibility that wind turbines may enhance the availability of fish prey for these opportunistic birds (DIERSCHKE ET AL. 2016), it is possible, however that larger numbers of these birds may be attracted to the OWF.

Sea ducks were mainly recorded during aerial surveys, as these covered the relevant time period (no ship surveys during winter and early spring) and the study area also reached far to the east, into shallower waters. Of the sea duck species, **Long-tailed Ducks** were the second most abundant species. In general, the coasts of Lithuania are important wintering areas for this species, although the highest densities are reached in other parts of the Baltic Sea (SKOV ET AL. 2011). During aerial surveys, Long-tailed Ducks were frequently recorded in monthly densities of up to 2.08 ind./km², a value a bit below the highest monthly density achieved in the previous year of study (2.8 ind./km²). The SPA standard data form gives a density of between 6.3 and 23.2 ind./km² for this species at the site. As expected, most birds were recorded within the SPA, which is located in shallower waters, but partly also within the borders of the planned OWF. Long-tailed Ducks have been shown to avoid wind farms and are sensitive to ship traffic, which might lead to habitat loss (DIERSCHKE ET AL. 2016). Although displacement distances vary somewhat, some habitat loss within the SPA can be expected with the currently planned OWF.

Velvet Scoters were the second most abundant species during aerial surveys, with the highest density in February (3.66 ind./km²). In the SPA standard data form, a density of between 31.3 and 89.8 ind./km² is given and thus, the highest densities in this study would be expected within the SPA. Velvet Scoters distribution during the second year of study coincides with the expected distribution, and they were occurring at higher densities at shallower waters within the SPA. The previous year, they were however, found in high numbers outside of the SPA, within the planned OWF area in deep waters of over 30 m, in contrast to their expected occurrence at waters between 10 and 30 m (SKOV ET AL. 2011). In the present study, Velvet Scoters were less dense than in the

previous year and their distribution is much closer to the coast, opposed to the distribution observed in the previous year of study in which many more birds were observed with a distribution into the western transect lines with even deeper water. Similar to Long-tailed Ducks, Velvet Scoters are sensitive to anthropogenic disturbances (DIERSCHKE ET AL. 2016), and are therefore expected to be displaced from the area of the planned OWF as well as from parts of the SPA, which borders the planned OWF area.

Of all gull species recorded during the surveys, **Little Gull** was by far the most abundant species. In agreement with the findings of the first year of study, **Little Gull** was again the most abundant resting bird species surveyed by ship transects and the second most abundant from aerial surveys. Nonetheless, their densities were not as high as the densities observed last year when a maximum of 36.1 ind./km² was recorded in autumn 2022. This year the maximum density was 6.4 ind./km² in July 2023. During the period of higher densities (winter, aerial surveys) and autumn (ship-based surveys), Little Gulls were distributed across the whole study area, including the planned OWF area. The area has not been identified as an important area by DURINCK ET AL. (1994), however data from both years of study suggest that it might be an important resting area for this gull species. Moreover, as this species shows weak avoidance behaviour towards OWF, some displacement from the planned OWF area can be expected. **Common Gulls** and **Herring Gulls** were observed frequently all over the year, at comparable densities from both survey methods. They shared also more or less the same spatial distribution, occurring all over the study area both during aerial and ship-based surveys. Of the two species, Herring Gulls were more abundant, reaching a maximum density of 1.07 ind./km² during ship-based surveys, compared with a maximum density of 0.38 ind./km² for Common Gulls with the same survey method. Densities were at the same level (~0.6 – 0.7 ind./km²) from digital aerial surveys. The previous year of collection also showed that densities of these two species were higher when surveyed from the ship, but the contrast was even larger. Maximum densities of these gulls from ship surveys ranged from 1.8 to 2.1 ind./km², whereas from digital aerial surveys the maximum densities reached only 0.1 – 0.2 ind./km². **Lesser Black-backed Gull** occurred unfrequently but they achieved mid densities during ship-based surveys (0.29 ind./km²) during the previous year of study. However, their numbers were too low to be evaluated this year (3 individuals observed during aerial surveys and 6 during ship-based surveys).

Of the auks, **Common Guillemots** were recorded in the study area at higher numbers than **Razorbills**, especially during ship surveys. During aerial surveys, about 21% of auks could only be identified as Common Guillemot/ Razorbill. Similar to the findings of the previous year of study, Common Guillemots occurred in the area almost throughout the year with varying densities, while the occurrence of Razorbills was more limited to the winter half of the year with no records between June and October. Both species were distributed across the whole study area, with lower numbers closer to the coast and higher numbers far offshore in the western part of the study area. In the SPA standard data form, both species are listed to occur with a maximum number of 100 individuals and thus a density of 0.3 ind./km². The maximum densities in this study were found during ship surveys for Common Guillemots, and these densities were much higher than those suggested by the SPA standard data form, with max. 10.46 ind./km². For Razorbill, the highest densities were observed from aerial surveys at 0.96 ind./km². Razorbills were neither frequent nor abundant from ship-based surveys during the current year of study. Nonetheless, and although densities can vary strongly from year to year, results from this and the previous year of study suggest that the study area is indeed of importance for these auks. DURINCK ET AL. (1994) also listed the Lithuanian coast as an important location for Razorbills (but not for Common Guillemots) with

densities ranging between 0.1 and 0.99 ind./km². As both species show avoidance of OWF, with varying distances, birds are expected to be displaced from the area of the planned OWF as well as parts of the SPA at the border the planned OWF area.

4.3 Comparison to previous year

In general, fewer resting birds were observed during the second year of analysis. In terms of numbers, this meant about two thirds of the total number of resting birds observed with aerial surveys and only less than one third of the total number of resting birds surveyed by ship in comparison to the previous year. In terms of species, similar number of species have been recorded, with a couple of more species observed during the current year of study by ship-based survey. Compared to the previous year of analysis, there were two fewer surveys (only five vs. six digital aerial surveys, and six vs. seven ship-based surveys). However, the density and distribution of species can be highly variable between years for reasons already mentioned above, and the fewer number of surveys cannot explain the big changes in abundance of sea ducks or gulls, which accounted for the major differences. Last year, the seabird community was much more dominated by these two groups, especially by Velvet Scoters and Long-tailed Ducks (which accounted for almost 80% of all resting birds surveyed by planes) and by Little Gulls (which dominated the ship-based surveys). This year, the seabird community was more diversified with other groups also being observed. Nonetheless, the monitoring across two years shows that the area is important for sea ducks and also gulls (particularly Little Gulls). Auks are also regularly occurring and can also achieve locally high densities. The above-mentioned species are all to some extent sensitive to anthropogenic influences and thus, it is important to consider measurements to account for eventual conflicts within the planned OWF.

5 SUMMARY

This report describes the results of the second year of study for the survey area around the planned wind farm located 29 km off the coast of Lithuania. The planned OWF borders to the west with the Special Protection Area “Klaipėdos–Ventspilio plynaukštė”, which was designated for the protection of offshore boulder reef habitats and considered important for a number of species including Long-tailed Ducks and Velvet Scoters. Here, results of both survey years are summarized.

5.1 Results of the first year of surveys

The first year of study (September 2021 to September 2022) spanned over 14 months during which six digital aerial surveys and seven ship-based transect surveys took place. The two methods were surveyed exclusively, digital aerial surveys were used for the late autumn and winter months (November to April) while for the rest of the months ship-based surveys were used. During the first year of study, 14,039 resting birds belonging to 20 species were observed during the aerial surveys, while 4,276 resting birds of 14 species were observed within the transect area of the ship-based surveys. In terms of species relevance, two sea duck species were the most common resting birds during aerial surveys (> 75% of all resting birds of the study). Two species of auks (Common Guillemots and Razorbills) made up further 10% of the total resting birds. Winter was the season with highest densities of sea ducks with densities of Velvet Scoters reaching up to 9.2 ind./km² (December) and those of Long-tailed Duck (2.76 ind./km², February). Sea ducks start their migration towards their breeding areas by March and were therefore not present or only in low numbers during the ship-based surveys. Spatially, sea ducks' distribution coincided with shallow waters, and the highest densities occurred at the SPA site. The other species of importance in terms of abundance was the Little Gull, which was the most common species registered during the ship-based surveys (made up 87% of all resting birds). The species reached very high densities (36.1 ind./km² in July). Opposite to the sea ducks, this species arrives from their breeding grounds in Lithuania in late July to moult, so that they were observed at higher numbers with the ship than with the aerial surveys. Also, the spatial distribution of the species is mostly offshore and this was well observed here. Only in autumn, where the species attained very large densities it occurred densely also at coastal waters. Other two gull species were also occurring frequently and attained mid-densities: Common Gulls (max 2.1 ind./km² in July) and Herring Gulls (1.85 ind./km² in August). Their phenology and spatial distribution resemble those of the Little Gull, but low numbers of these gulls may still be found all over the year. Auks were common during the whole year but were more abundant during the autumn and winter, the maximum density of Common Guillemots was in September at 1.67 ind./km² while those of Razorbills occurred in October at 1.28 ind./km², both during ship-based surveys. Divers were not very abundant but still represented almost 5% of all resting birds observed during aerial surveys and 1% of all resting birds observed during ship-based surveys. Red-throated Divers were more abundant than Black-throated Divers during the aerial surveys, thus they were observed mainly during the winter season at densities reaching 0.57 ind./km², while Black-throated Divers were more abundant in May at 0.23 ind./km². The SPA area has been suggested to hold densities of 0.06 to 0.16 ind./km² for Red-throated Divers.

5.2 Results of the second year of surveys

The second year of study (November 2022 – October 2023) spanned exactly over a year and included five digital aerial surveys (Nov 2022 – Apr 2023) and six digital aerial surveys (May – October 2023). As with the first year of study, survey methods did not overlap. The second year yielded fewer resting birds with both methods, but the distribution of the main group of species was similar to that of the first year but with less dominance of the most common species. In total, 9,478 resting birds belonging to 18 species were surveyed by the digital aerial method while 1,262 resting birds of 17 species occurred within the transect area of the ship-based surveys. Four species made up over two-thirds of the total resting birds observed with digital aerial surveys: Velvet Scoters (26.5%), Little Gulls (17.2%), Long-tailed Ducks (12.7%) and Common Guillemots (11.4%). All other species represented less than 10% of the total abundance. For ship-based surveys, three species represented over 80% of the total resting birds: Little Gulls (44%), Common Guillemots (20.8%) and Herring Gulls (15.4%). As sea ducks are mainly winter visitors, their highest densities were observed by the aerial surveys. The maximum density of Velvet Scoter was 3.66 ind./km² (February 2023) and that of Long-tailed Duck was 2.08 ind./km² (January 2023). These species were mainly occurring in shallow waters with their focus of distribution in the SPA area. Nonetheless, mid densities occurred within the area of the planned OWF. Three species of gulls occurred frequently all year round but had larger densities in autumn and winter. Of all gulls, Little Gulls were the most abundant and dense of all. Lesser Black-backed Gulls occurred sporadically and at lower densities and its overall abundance did not represent 0.5% of all resting birds surveyed this year by any of the methods and was not further considered. All gulls however had a preferred offshore distribution and were also observed at mid-densities within the area of the planned wind farm. The maximum monthly density of Little Gulls was 6.4 ind./km² (July 2023), that of Herring Gulls was 1.07 ind./km² (August 2023) and that of Common Gulls, 0.61 ind./km² (in November 2022). Two species of auks occurred regularly in the survey area. Common Guillemots occurred throughout all the year while Razorbills were not surveyed in late summer and autumn. The largest monthly density of Common Guillemot was also the largest density of any resting bird observed in this year of study and was 10.46 ind./km² in September 2023. The maximum density of Razorbills was comparatively much lower, 0.96 ind./km² and observed in November 2022. Spatially, auks have a distribution at offshore areas but were present within the limits of the planned OWF, especially when the densities were high. Two species of divers occurred in the area. Red-throated Diver were present at higher densities than those suggested by the density at the SPA site (0.64 ind./km² vs. max 0.16 ind./km²), but they were mainly occurring in late autumn and winter, while Black-throated Divers were also surveyed throughout the year and their highest density occurred in May 2023 (0.22 ind./km²). Spatially, Red-throated Divers' distribution was more prevalent towards the eastern part of the study area, over the SPA area. Great Cormorants were observed sporadically but at one month they were locally abundant and dense which made them represent 2.5 % of all resting birds sampled via ship-based surveys. Their maximum density was 0.35 ind./km² in August 2023. Great Cormorants were not often occurring the previous year so they are occasional visitor to the area, but their numbers may increase after the construction of the planned OWF since they are known to be attracted to wind turbines as places for roosting and also might profit from an increase availability of fish prey in the area.

5.3 Important resting birds in the area

In summary, the analysis of the two years of monitoring studies using digital aerial survey methods for the colder seasons and ship-based transect surveys for the warmer seasons suggest that the following species are important resting birds to consider when planning the construction of the OWF. Two species of sea ducks are particularly abundant in the area specially during winter: Velvet Scoters and Long-tailed Ducks, which can attain large densities. On average, maximum monthly densities of 9.2 ind./km² were observed for Velvet Scoters in the first year of study, which translated in local maximum densities of over 100 ind./km² (at certain coastal grid cells, but also within the limits of the planned OWF), during last winter period. These ducks are listed as VU at the global scale by IUCN with decreasing populations at the global and European scale according to the IUCN (<https://www.iucnredlist.org>, accessed in November 2023), are categorized as A1b by the Agreement for the Conservation of African Eurasian Migratory Waterbird species (UNEP/AEWA SECRETARIAT 2022) and are both considered in the red list of species of Lithuania. Common Gulls and Herring Gulls are frequently occurring in the area but of all gulls, Little Gulls are of particular importance, because they were very abundant, especially at the beginning of the species-specific autumn (July) when they arrive in the area to moult. In the first year of study, they attained particularly large maximum monthly densities (36.1 ind./km²). Little Gulls are listed in the Annex I of the bird's directive and are also listed in the red list of species of Lithuania. Other species groups with frequent distribution and varying densities were auks (Common Guillemot and Razorbills) and divers. Divers were not present at very high densities but were regularly occurring in the area at densities higher than those expected at the SPA. Both species of divers are listed under the Annex I of the European Birds Directive and are known to be sensitive toward anthropogenic factors and have been shown to show habitat displacement from OWF up to 15 km of distance from OWF (DIERSCHKE ET AL. 2016; MENDEL ET AL. 2019; HEINÄNEN ET AL. 2020), reduction in abundances after the construction of OWFs (GARTHE ET AL. 2023) and escape distances of about 750 m on average after ship disturbances (FLIESSBACH ET AL. 2019). Whereas sea ducks, auks and Little Gulls are not as sensitive towards anthropogenic factors, they are still showing a weak avoidance of OWF (DIERSCHKE ET AL. 2016) and show still escape distances of 100 to 500 m (FLIESSBACH ET AL. 2019).

6 LITERATURE

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A APPENDIX

A.1 Species Lists

Table A. 1 Overview of the total number of registered species in the aerial survey area from November 2022 to April 2023, including number of individuals and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU27-Gef.: EU27 Red List Category (Status: 2017); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2022); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadde924aa85003>, accessed 13.10.2022)).

Species	Name in Lithuanian	Status	Ind. Σ	EU Directive	EUR-Cat.	EU28-Cat.	AEWA	Red List Lithuania
Red-throated Diver	Rudakaklis naras	R/M	684	Annex I	LC	LC	B 2e	
Black-throated Diver	Juodakaklis naras	R/M	34	Annex I	LC	LC	B 2c	*
unidentified diver		R/M	36					
Great Crested Grebe	Ausuotasis kragas	R/M	4		LC	LC	C 1	
Red-necked/Great Crested Grebe		R/M	2					
Unidentified grebe		R/M	2					
Great Cormorant	Didysis kormoranas	R/M	5		LC	LC	C1	
Mute Swan	Gulbė nebylė	M	4		LC	LC	C1	
Greylag Goose	Pilkoji žasis	M	6		LC	LC	C1 / B 1	
Mallard	Didžioji antis	M	1		LC	LC	C 1	
Long-tailed Duck	Ledinė antis	R/M	1,208		LC	LC	A 1b	*
Common Scoter	Juodoji antis	R/M	35		LC	N/A	B 2a	
Velvet Scoter	Paprastoji nuodegule	R/M	2,511		VU	VU	A 1b	*
Common/Velvet Scoter		R/M	152					
Red-breasted Merganser	Vidutinis danciasnapis	M	9		NT	NT	B 2c	*
Unidentified merganser/goosander		M	2					
unidentified duck		M	7					
Hen Harrier	Javinė linė	M	1	Annex I	LC	VU		
Common Kestrel	Paprastasis pelesakalis	M	1		LC	LC		*
Common Crane	Pilkoji gervė	M	2	Annex I	LC	LC	C1	
Unidentified wader		M	2					
Little Gull	Mažasis kiras	R/M	1,631	Annex I	LC	LC	A (3c 3e)	*

Species	Name in Lithuanian	Status	Ind. Σ	EU Directive	EUR-Cat.	EU28-Cat.	AEWA	Red List Lithuania
Black-headed Gull	Rudagalvis kiras	R/M	30		LC	VU	B 2c	
Common Gull	Paprastasis kiras	R/M	256		LC	LC	C 1	
unidentified small gull		R/M	77					
Lesser Black-backed Gull	Silkinis kiras	R/M	3		LC	LC	C 1	
Herring Gull	Sidabrinis kiras	R/M	387		LC	VU	B 2c 2e /C1	
Caspian Gull	Kaspijinis kiras	R/M	1		LC	LC	C 1	
Common/Herring Gull		R/M	15					
Great Black-backed Gull	Balnotasis kiras	R/M	9		LC	NT	C 1	
Black-legged Kittiwake	Tripirštis kiras	R/M	1		VU	EN	A 1b	
Great/Lesser Black-backed Gull		R/M	1					
unidentified large gull		R/M	20					
Unidentified gull		R/M	6					
Common/Arctic Tern		R/M	1	Annex I				
Common Guillemot	Laibasnapis narunelis	R/M	1,085		LC	LC	C 1	
Common Guillemot/Razorbill		R/M	503		LC	LC		
Black Guillemot	Taiste	R/M	4		LC	LC	C 1	
Razorbill	Alka	R/M	773		LC	LC	C 1	
unidentified auk		R/M	2					
Common Wood Pigeon	Keršulis	M	1	Annex I* only ssp azorica	LC	LC		
Sky Lark	Dirvinis vieversys	M	2	Annex I* only ssp ombriosa	LC	LC		
Chaffinch	Paprastasis kikilis	M	181		LC	LC		
unidentified songbird		M	123					
unidentified bird			121					
Total			9,941					

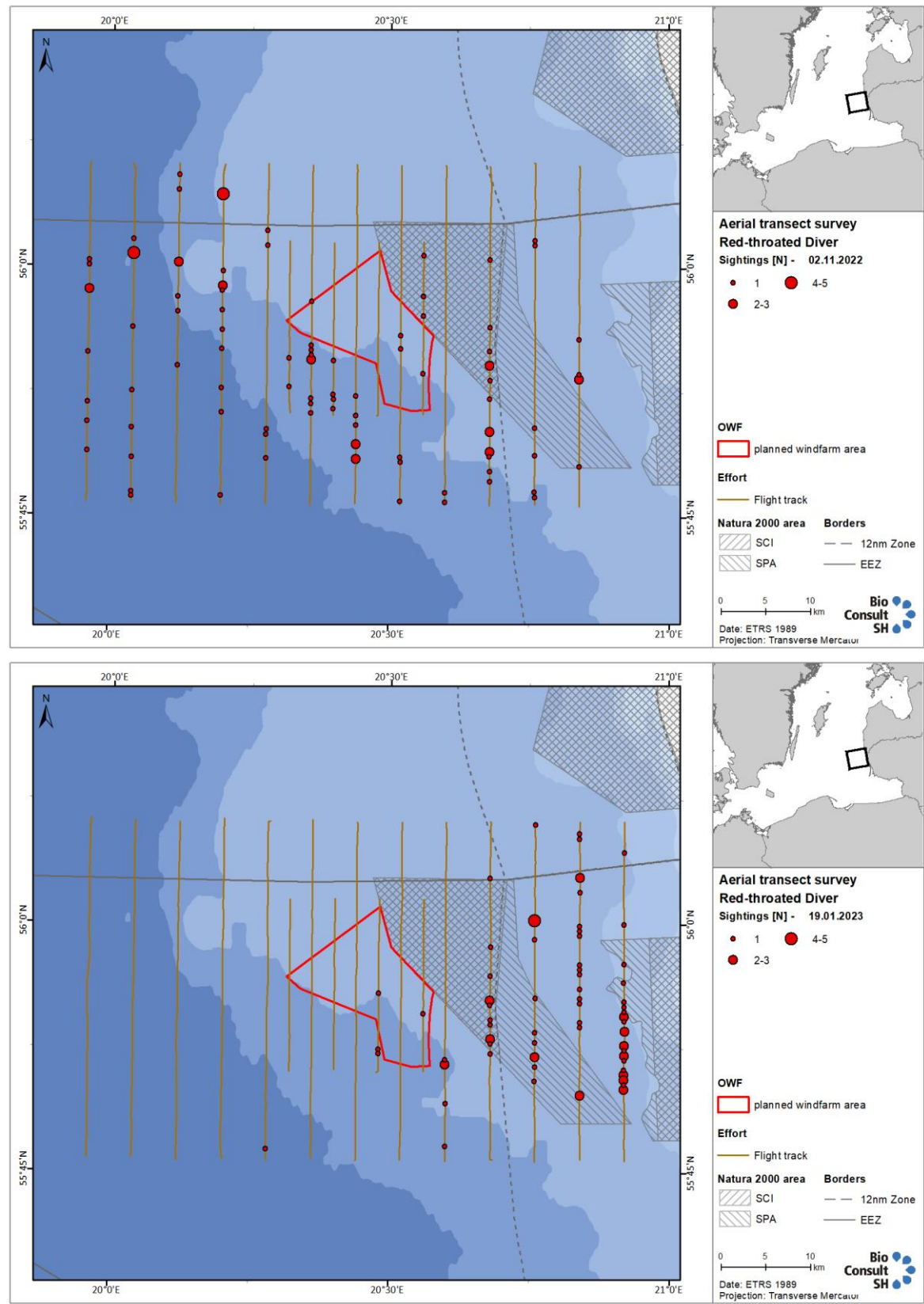
Table A. 2 Overview of the total number of registered species in the ship-based survey area from May and October 2023, including number of individuals (total and in transect) and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU27-Gef.: EU27 Red List Category (Status: 2017); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2022); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadde924aa85003>, accessed 13.10.2022)).

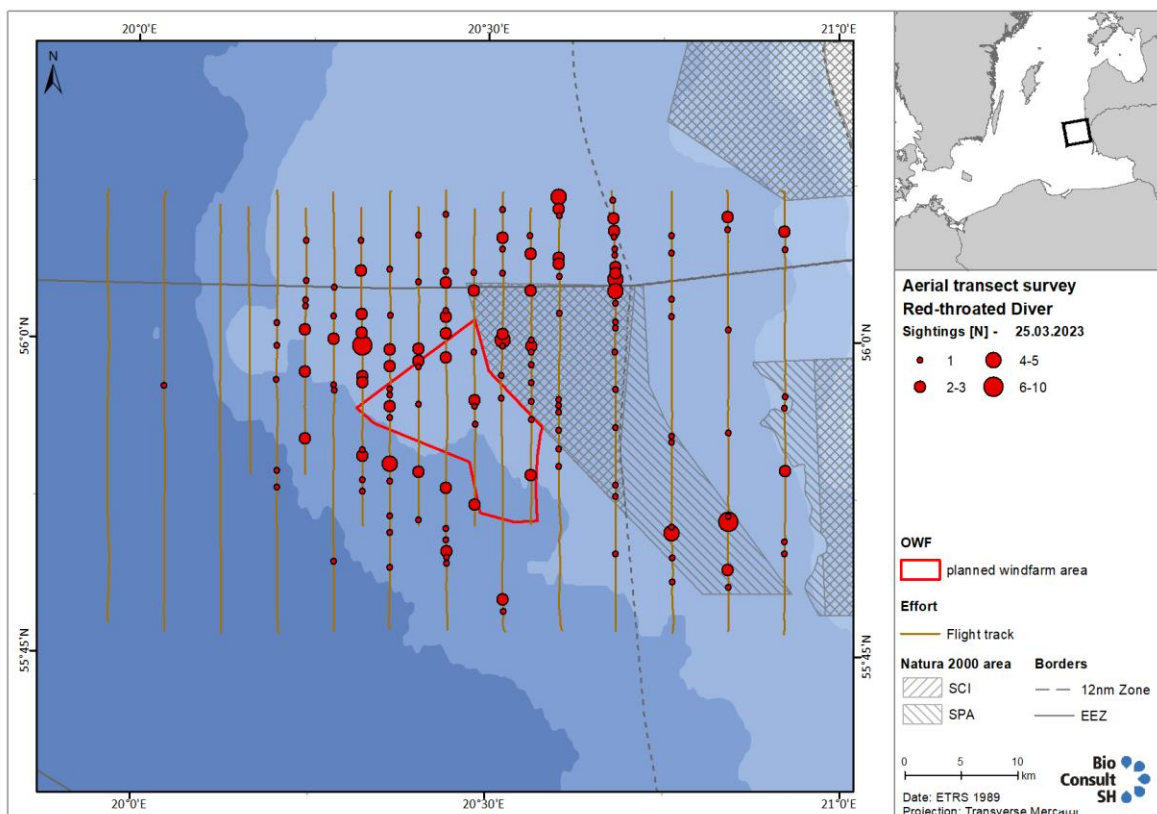
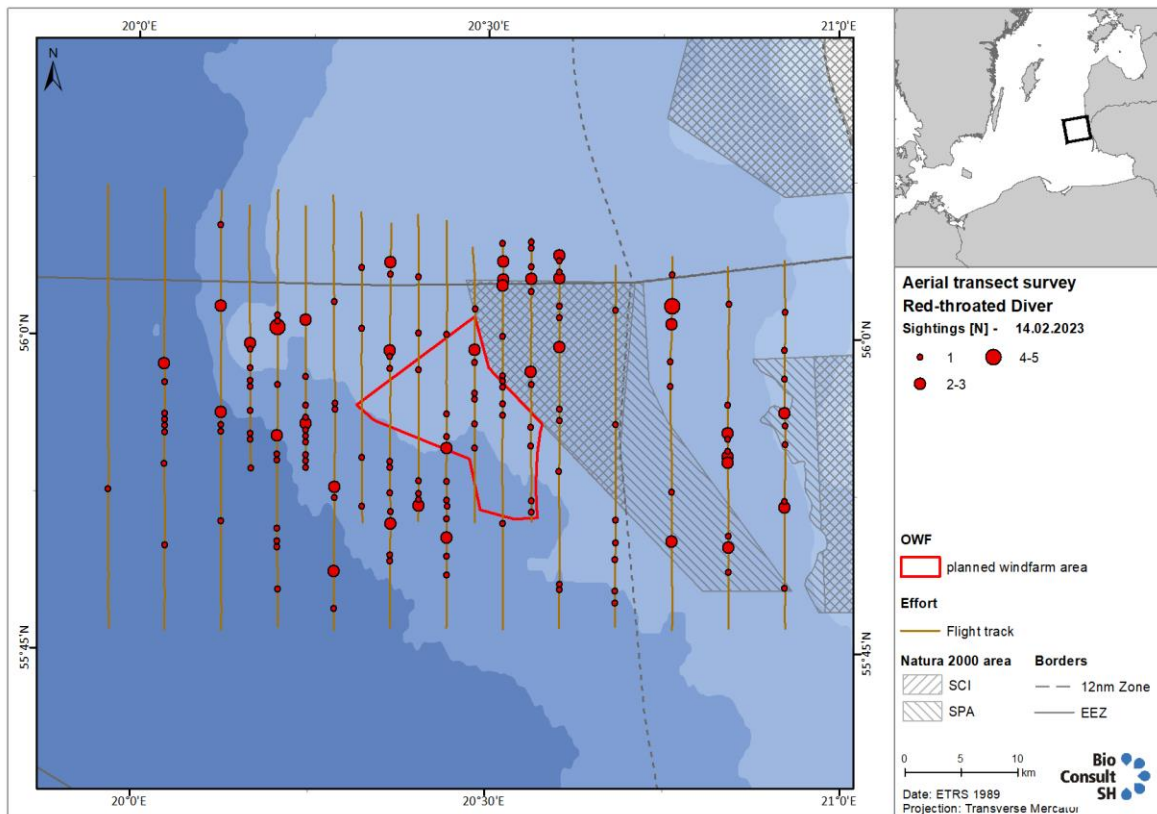
Species	Common name in Lithuanian	Status	Ind. Σ	Ind. transect	VSchRL	EUR-Cat.	EU28-Cat.	AEWA	Red List Lithuania
Red-throated Diver	Rudakaklis naras	R/M	1	1	Annex I	LC	LC	B 2e	
Black-throated Diver	Juodakaklis naras	R/M	19	15	Annex I	LC	LC	B 2c	*
Great Crested Grebe	Ausuotasis kragas	R/M	1	1		LC	LC	C 1	
Great Cormorant	Didysis kormoranas	R/M	34	32		LC	LC	C 1	
Mute Swan	Gulbė nebylė	M	2	2		LC	LC	C 1	
Bean Goose	Želmeninė žasis	M	2	2		LC	VU	A 3c*	
Greylag Goose	Pilkoji žasis	M	58	26		LC	LC	C 1 / B 1	
Eurasian Wigeon	Eurazinė cyplė	M	3	3		LC	VU	B 2c	
Mallard	Didžioji antis	M	3	3		LC	LC	C 1	
Tufted Duck	Kuoduotoji antis	M	24	0		NT	VU	B (2c)	
Long-tailed Duck	Lėdinė antis	R/M	6	6		LC	LC	A 1b	*
Common Scoter	Juodoji antis	R/M	2	0		LC	N/A	B 2a	
Velvet Scoter	Paprastoji nuodegėlė	R/M	145	102		LC	LC	A 1b	
Dunlin	Juodakrūtis begikas	M	1	1		LC	LC	C 1	
Eurasian Curlew	Didžioji kuolinga	M	1	1		NT	NT	A 4	
Arctic Jaeger	Smailiauodegis plešikas	M	2	1		EN	EN		
Little Gull	Mažasis kiras	R/M	613	555	Annex I	LC	LC	A (3c 3e)	*
Common Gull	Paprastasis kiras	R/M	80	74		LC	LC	B 2c	
Lesser Black-backed Gull	Silkinis kiras	R/M	6	6		LC	LC	A 3c / B 2e / C1	
Herring Gull	Sidabrinis kiras	R/M	230	194		LC	VU	B 2c 2e / C1	
Great Black-backed Gull	Balnotasis kiras	R/M	7	5		LC	NT	B 2c	
Sandwich Tern	Margasnapė žuvedra	R/M	2	2	Annex I	LC	LC	C 1	
Common Tern	Upinė žuvedra	R/M	2	2	Annex I	LC	LC	C 1	
Common Guillemot	Laibasnapis narūnelis	R/M	279	262		LC	LC	C 1 / B 1	
Razorbill	Alka	R/M	4	4		LC	LC	C 1	

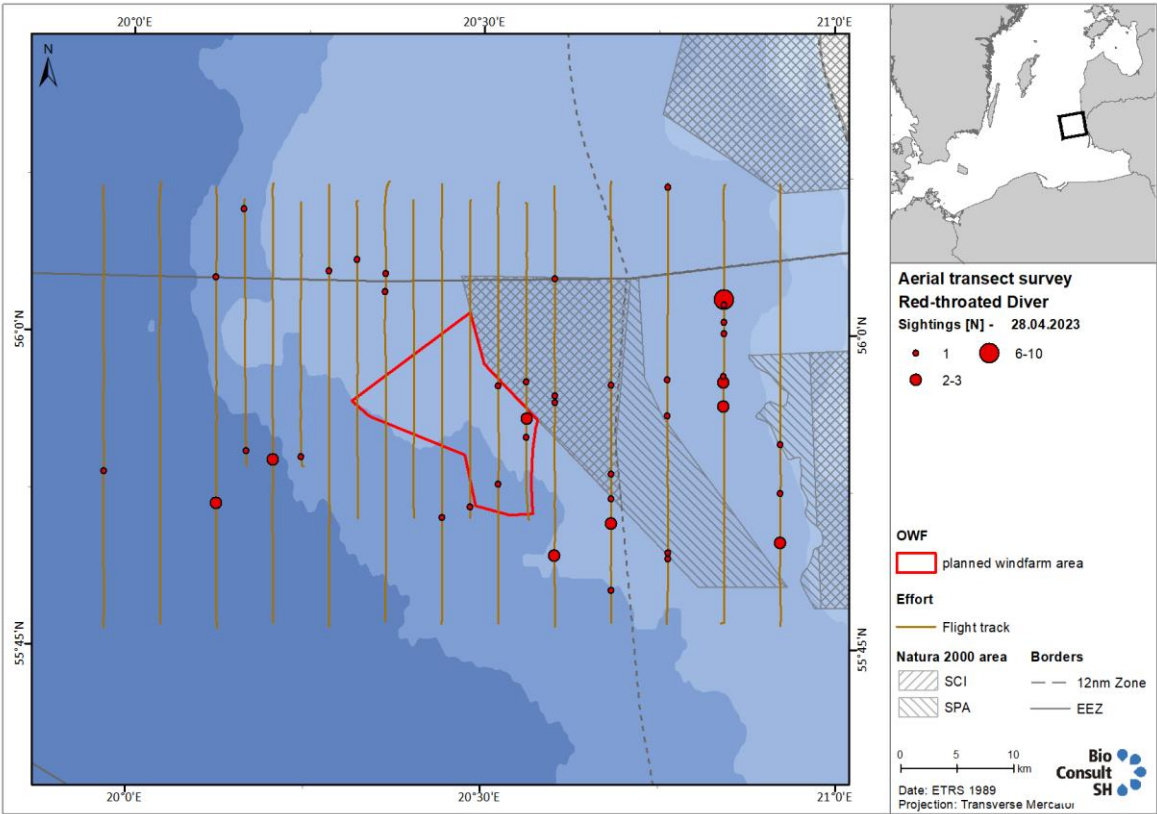
Species	Common name in Lithuanian	Status	Ind. Σ	Ind. transect	VSchRL	EUR-Cat.	EU28-Cat.	AEWA	Red List Lithuania
Short-eared Owl	Baline peleda	M	1	1	Annex I	LC	LC		*
Eurasian Skylark	Dirvinis vieversys	M	132	132		LC	LC		
Barn Swallow	Šelmeninė kregždė	M	4	1		LC	LC		
White Wagtail	Baltoji kiele	M	3	3		LC	LC		
European Robin	Liepsnele	M	1	1		LC	LC		
Common Redstart	Paprastoji raudonuodegė	M	1	1		LC	LC		
Common Chiffchaff	Pilkoji pecialinda	M	1	1		LC	N/A		
Willow Warbler	Ankstyvoji pecialinda	M	1	1		LC	LC		
Goldcrest	Paprastasis nykštukas	M	2	2		LC	LC		
Total			1,675	1,443					

A.2 Species Distribution Maps Aerial Surveys

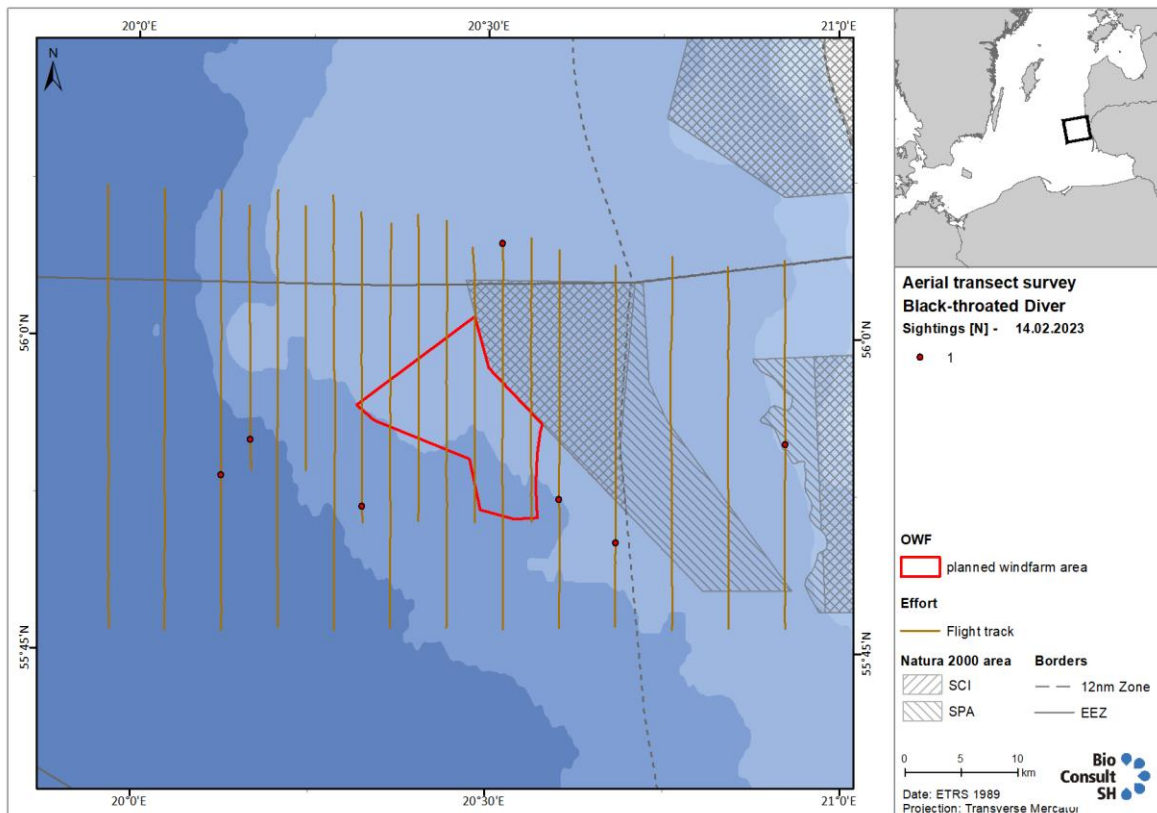
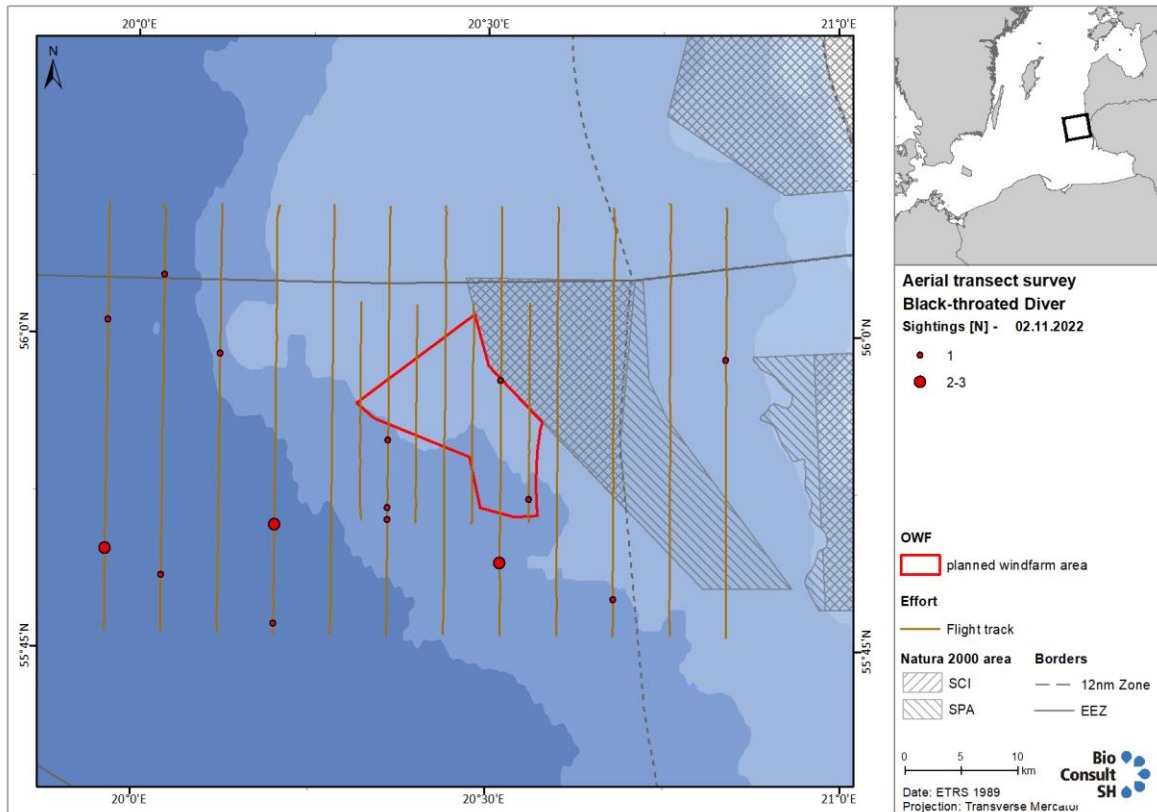
A.2.1 Red-throated Diver (*Gavia stellata*)

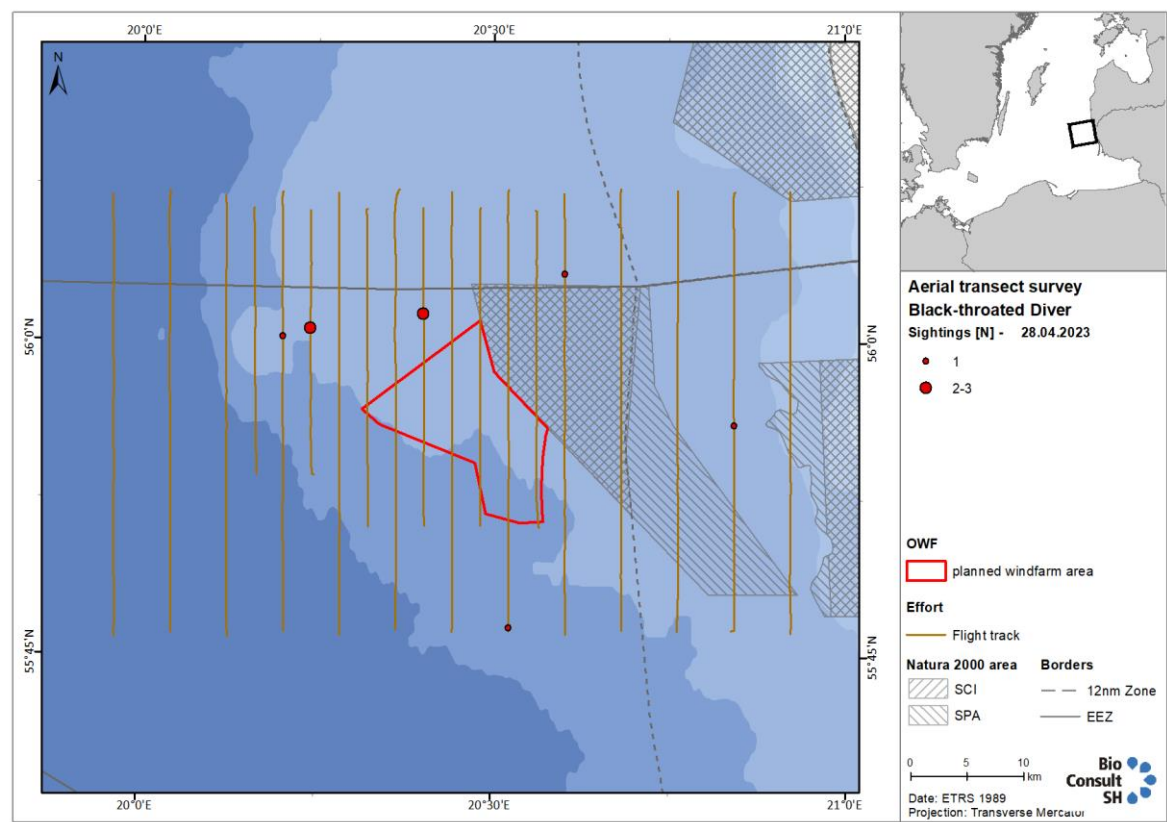




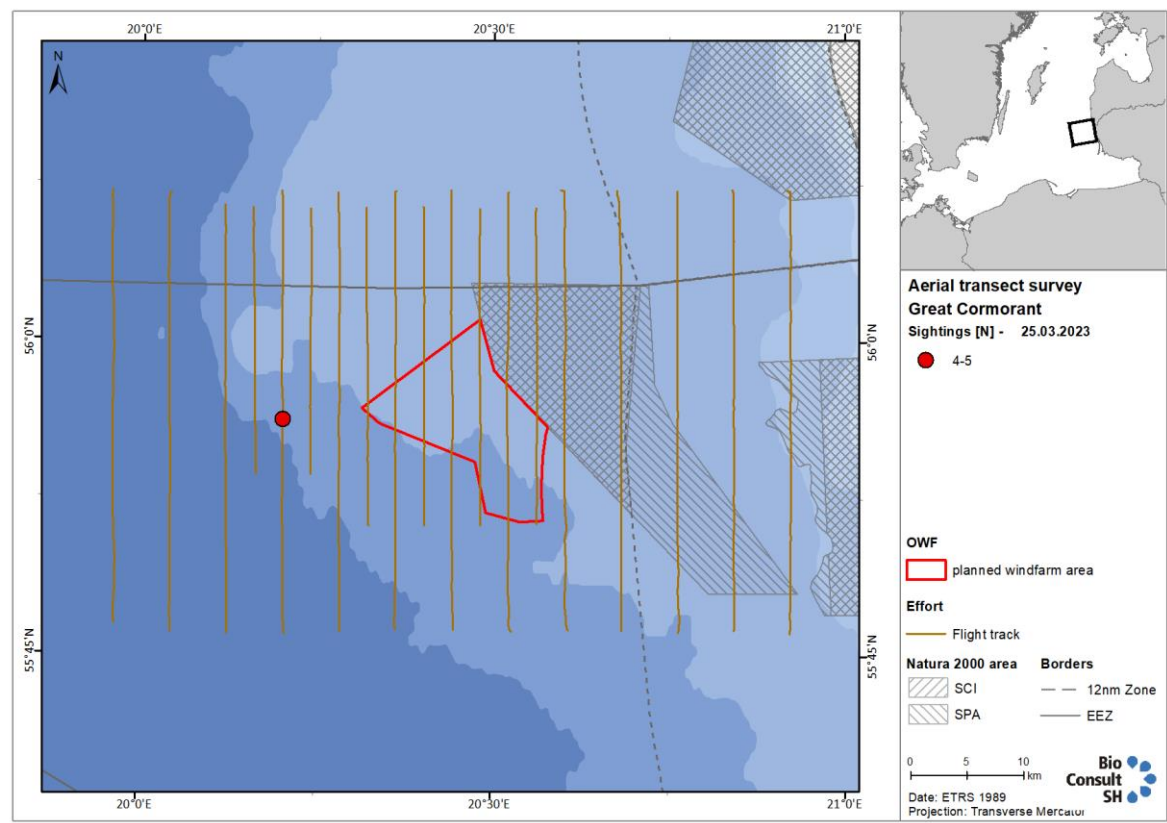


A.2.2 Black-throated Diver (*Gavia arctica*)

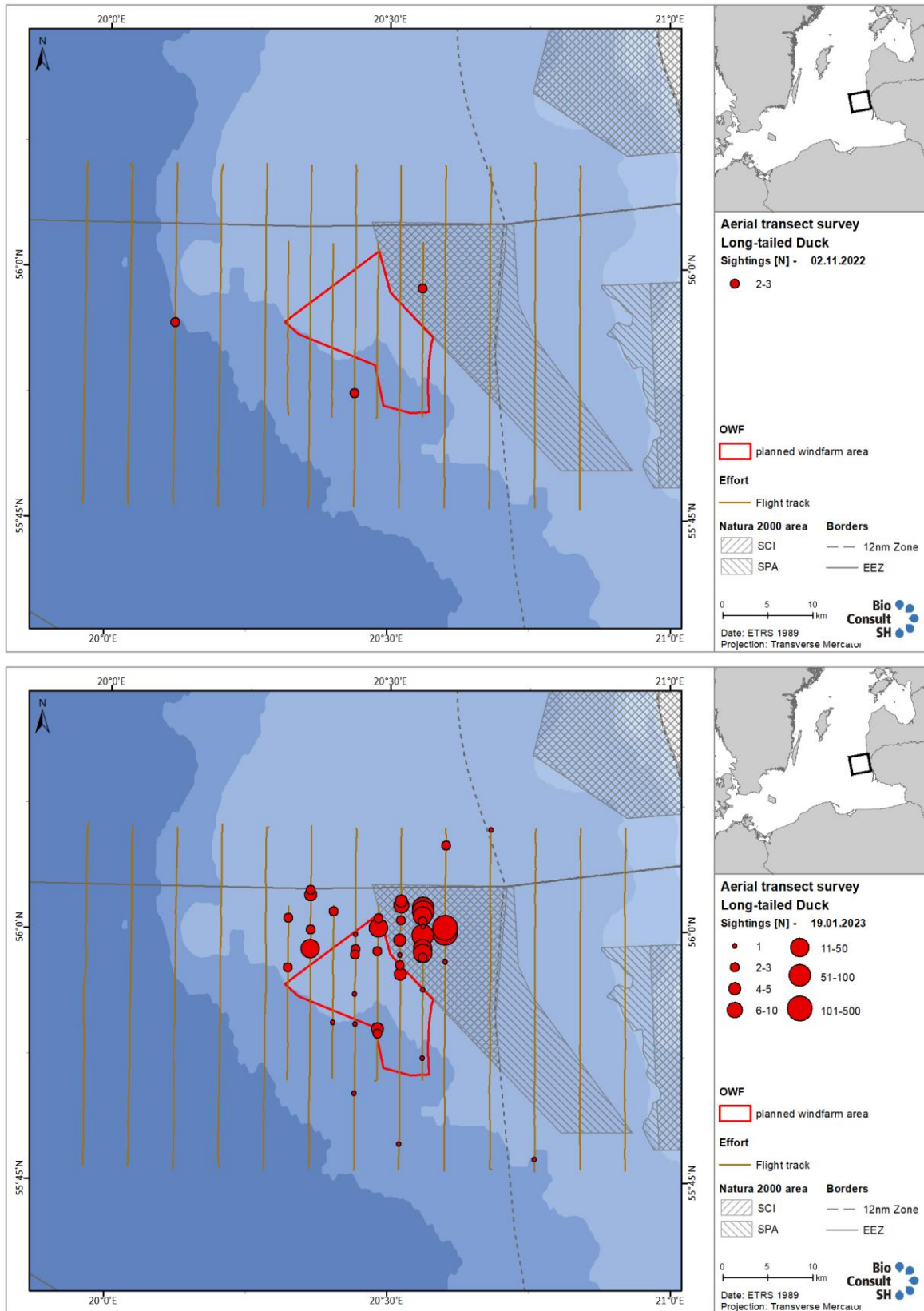


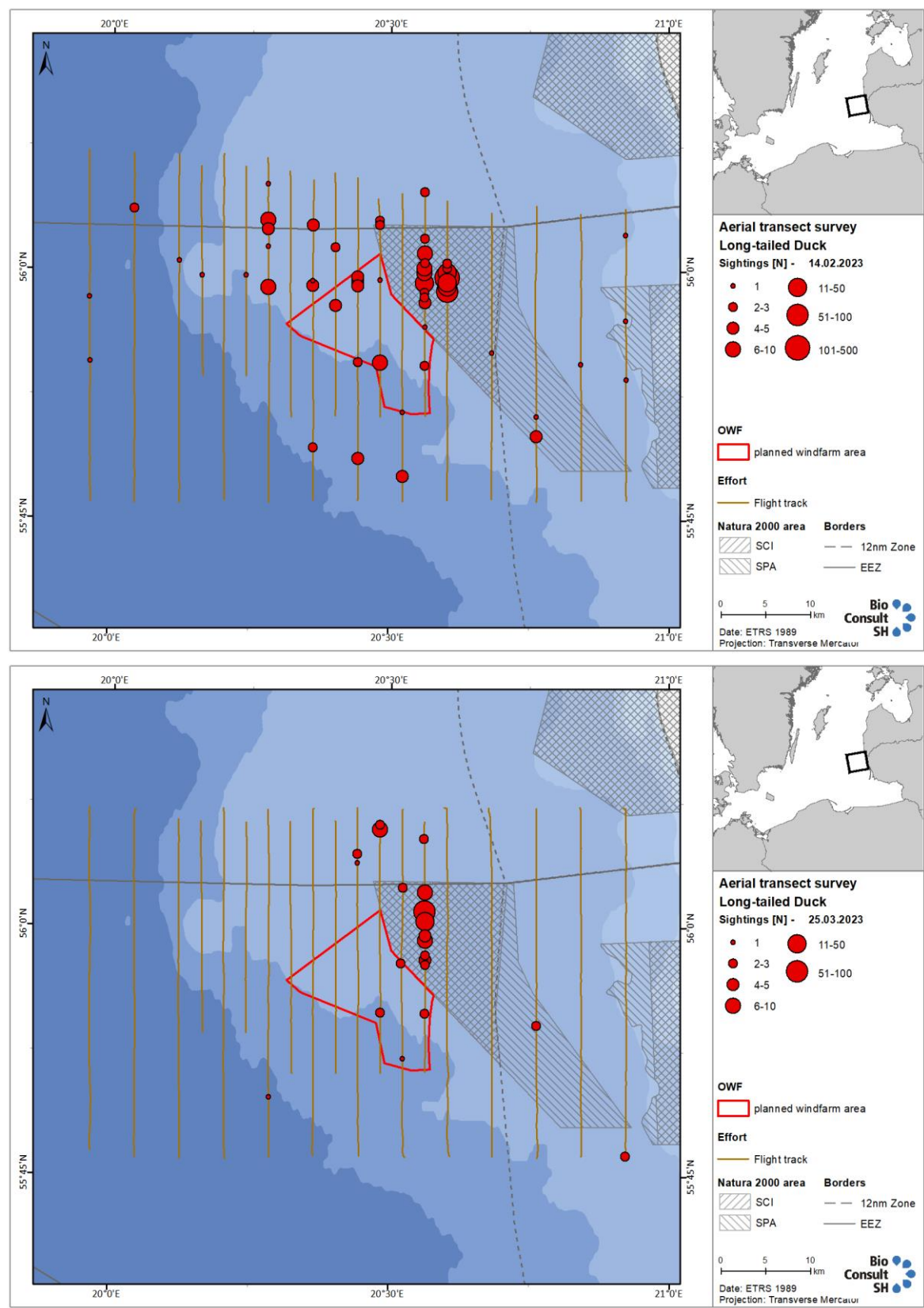


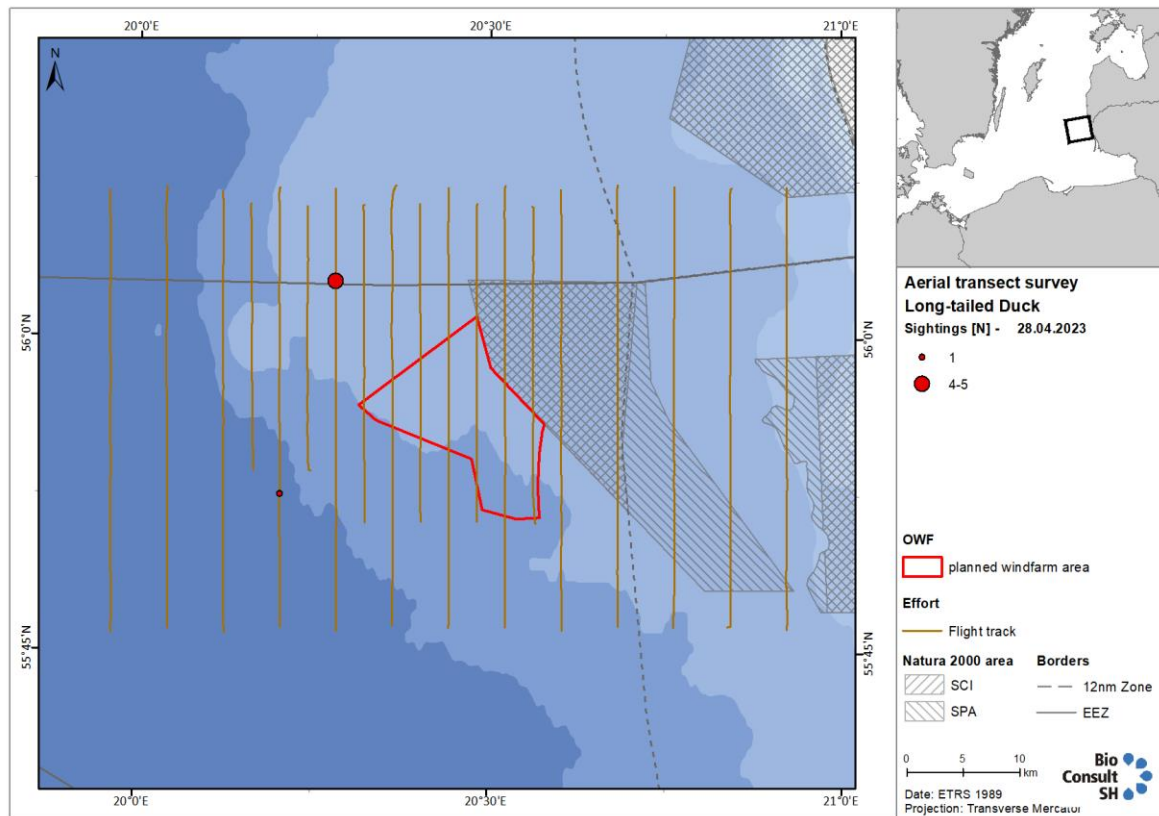
A.2.3 Great Cormorant (*Phalacrocorax carbo*)



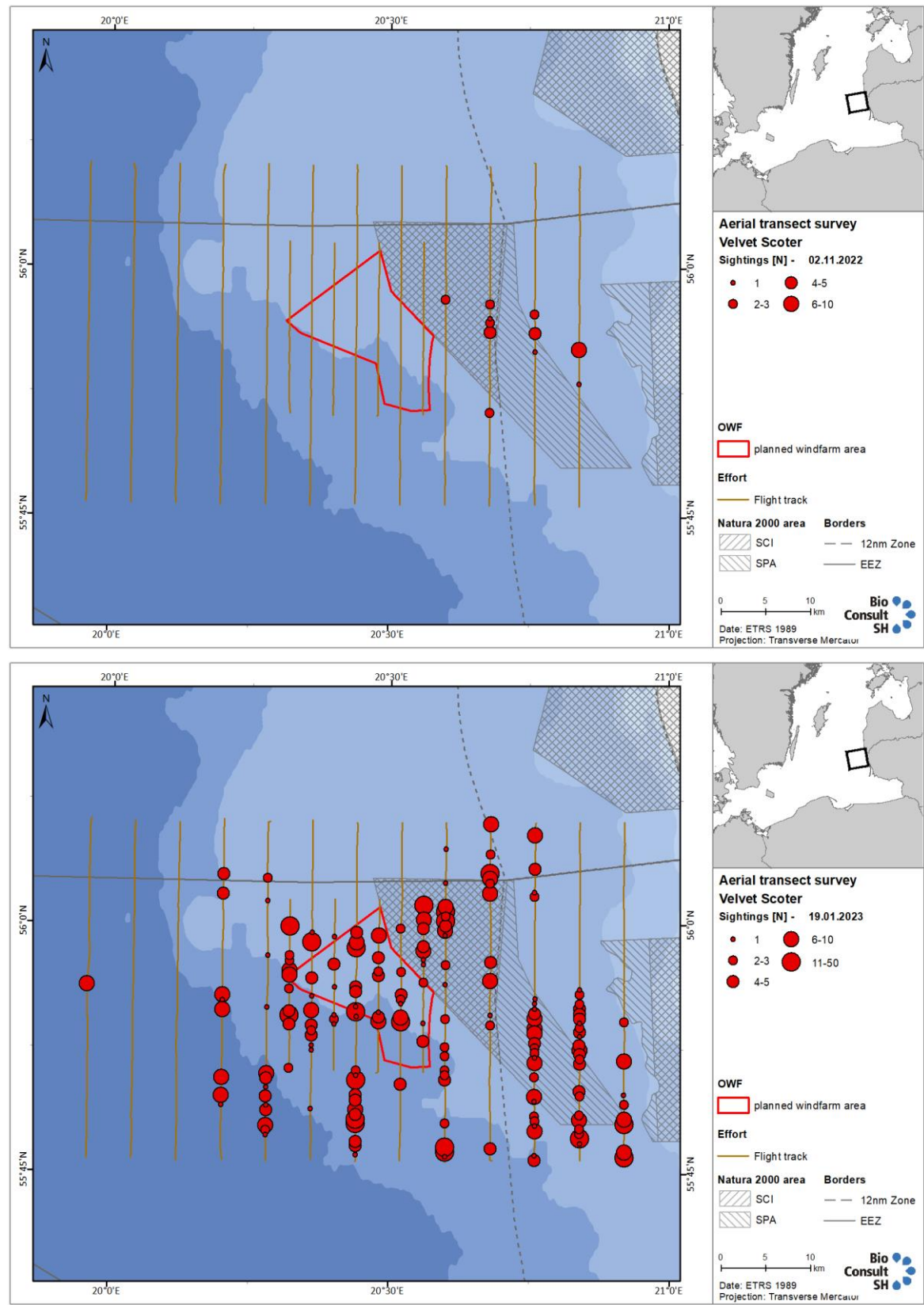
A.2.4 Long-tailed Duck (*Clangula hyemalis*)

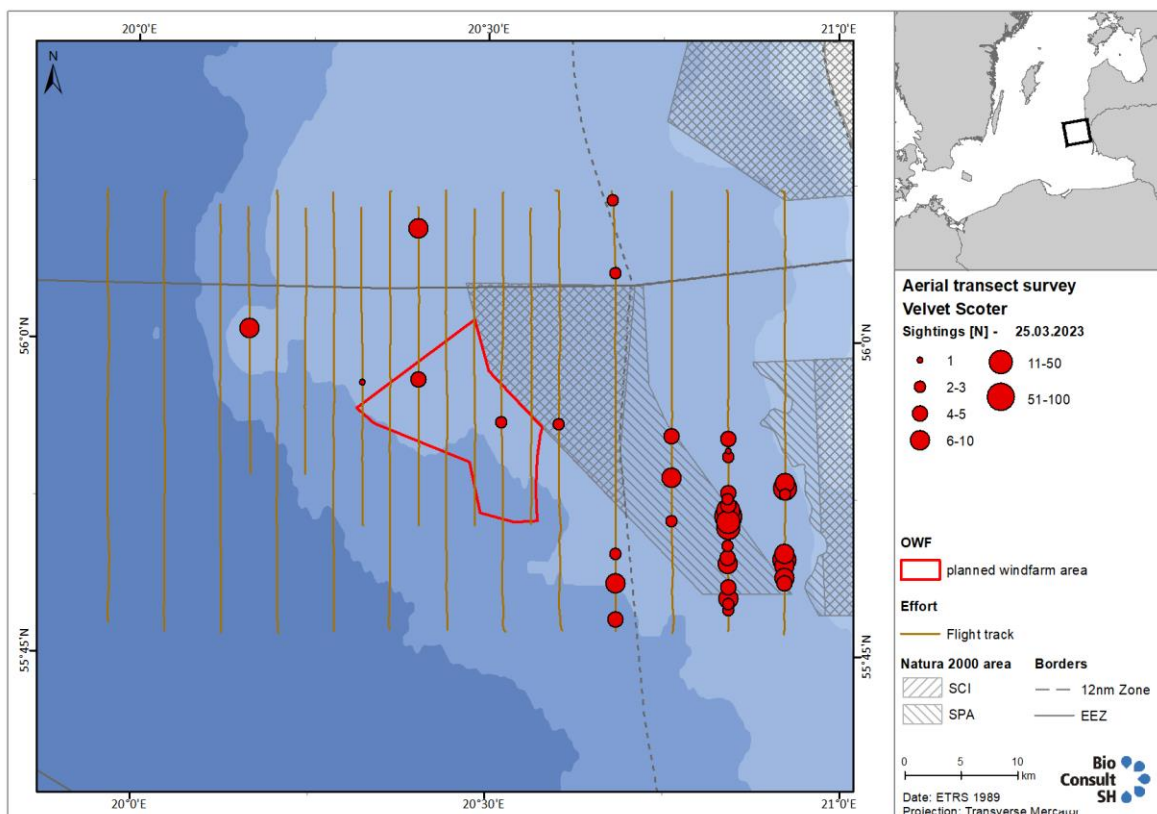
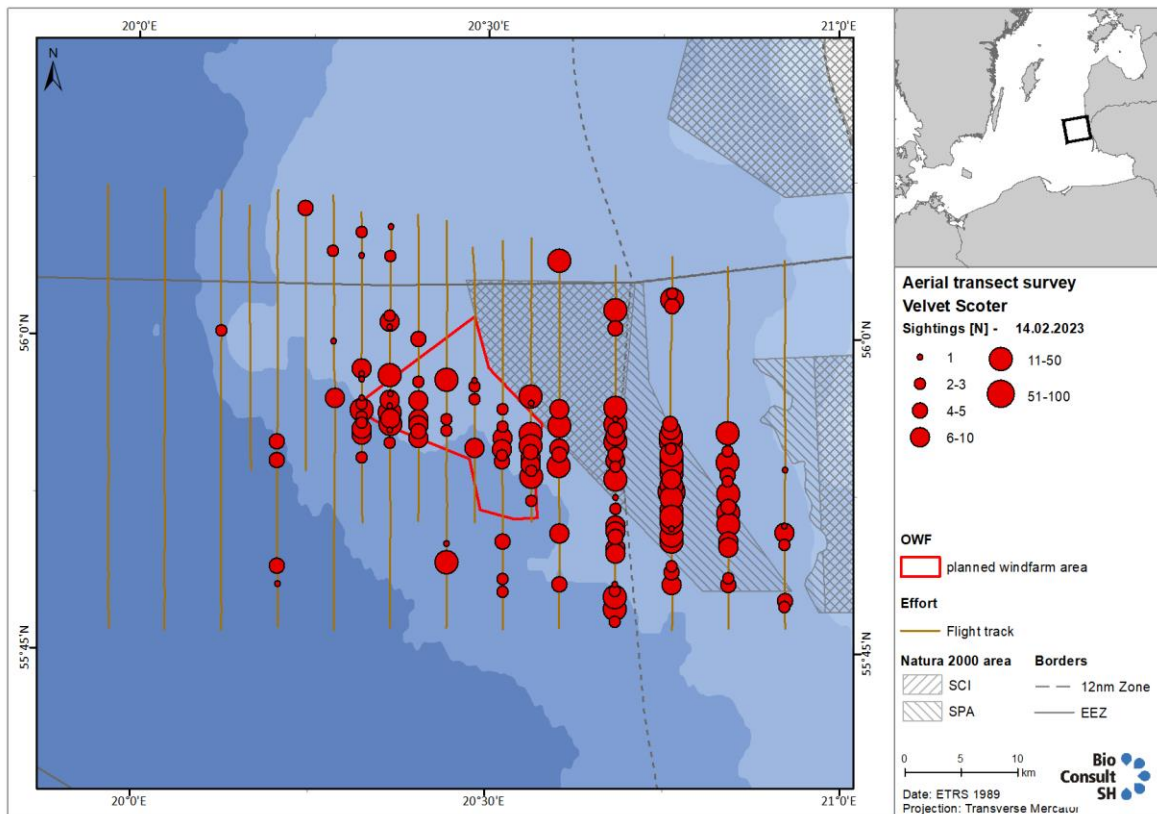


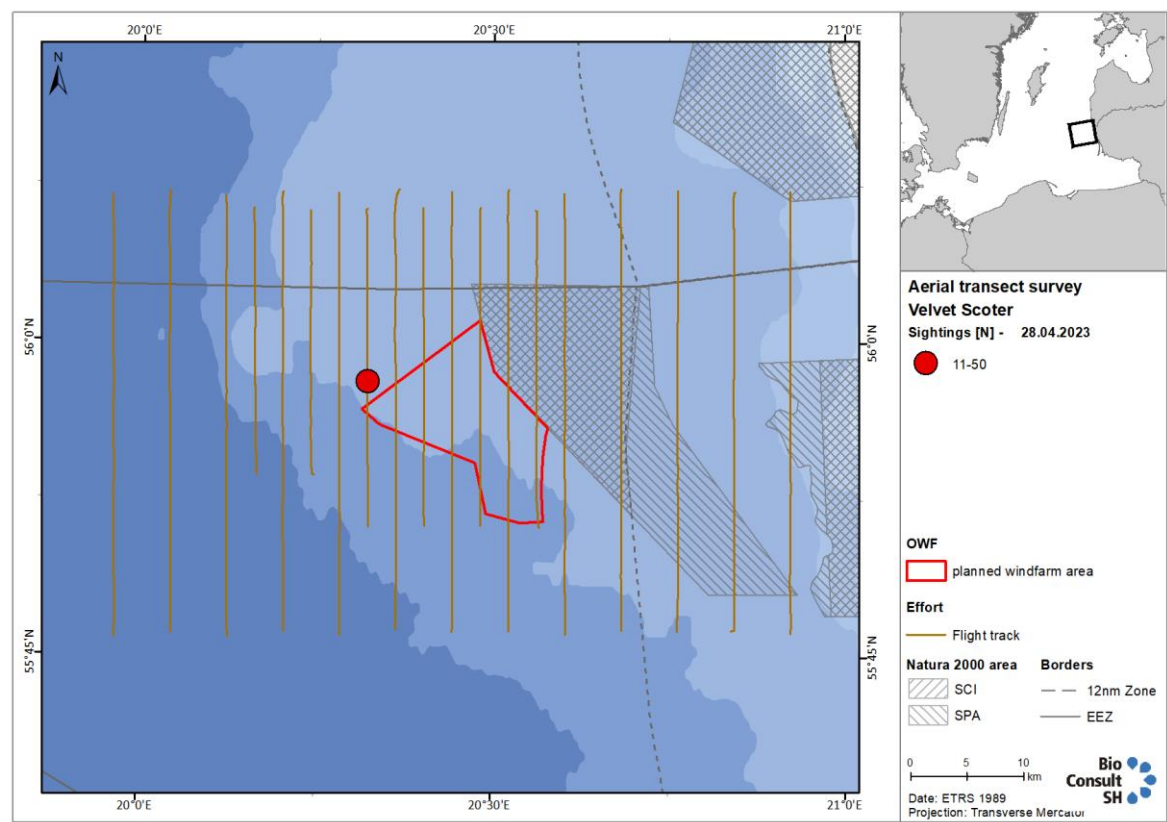




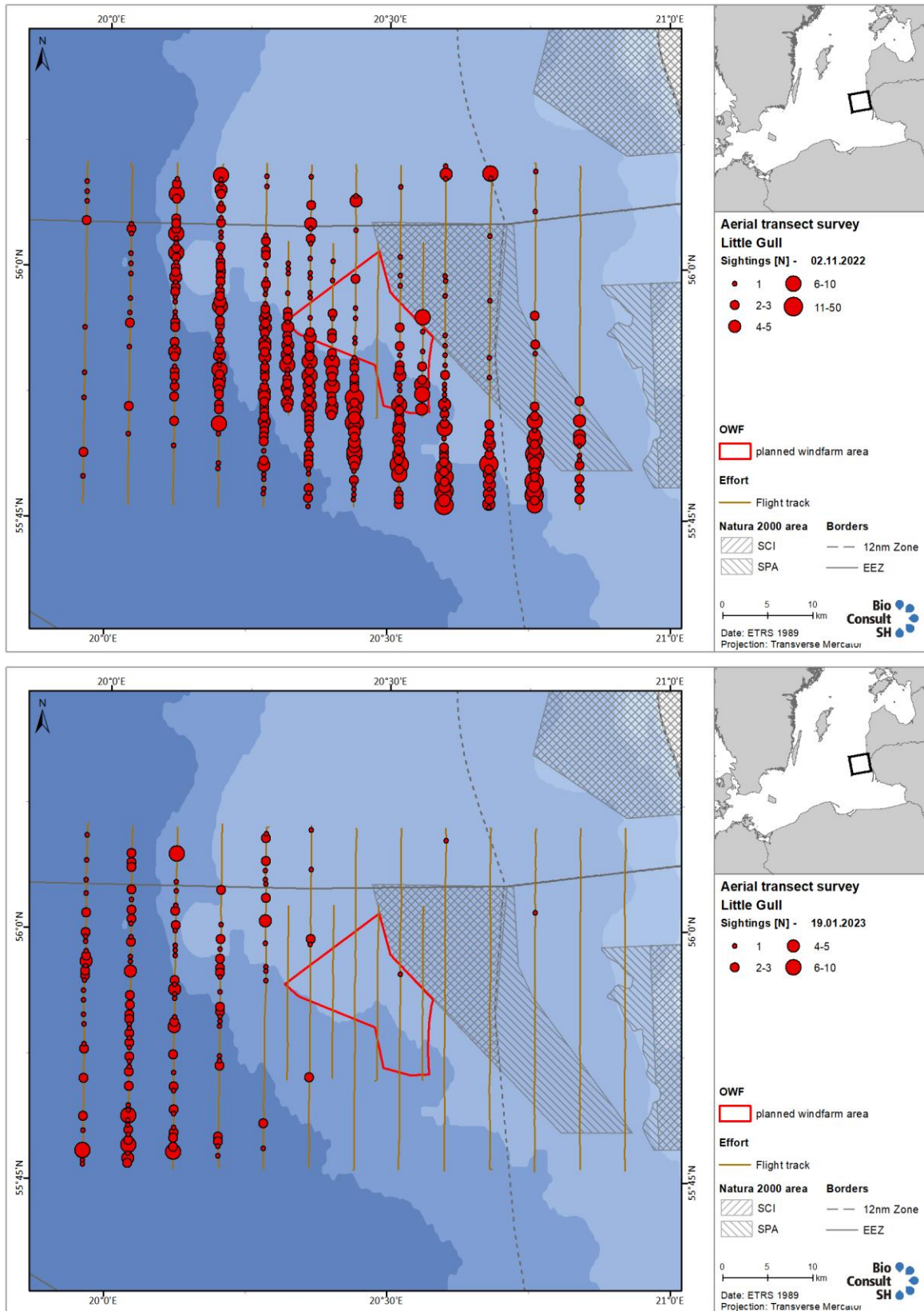
A.2.5 Velvet Scoter (*Melanitta fusca*)

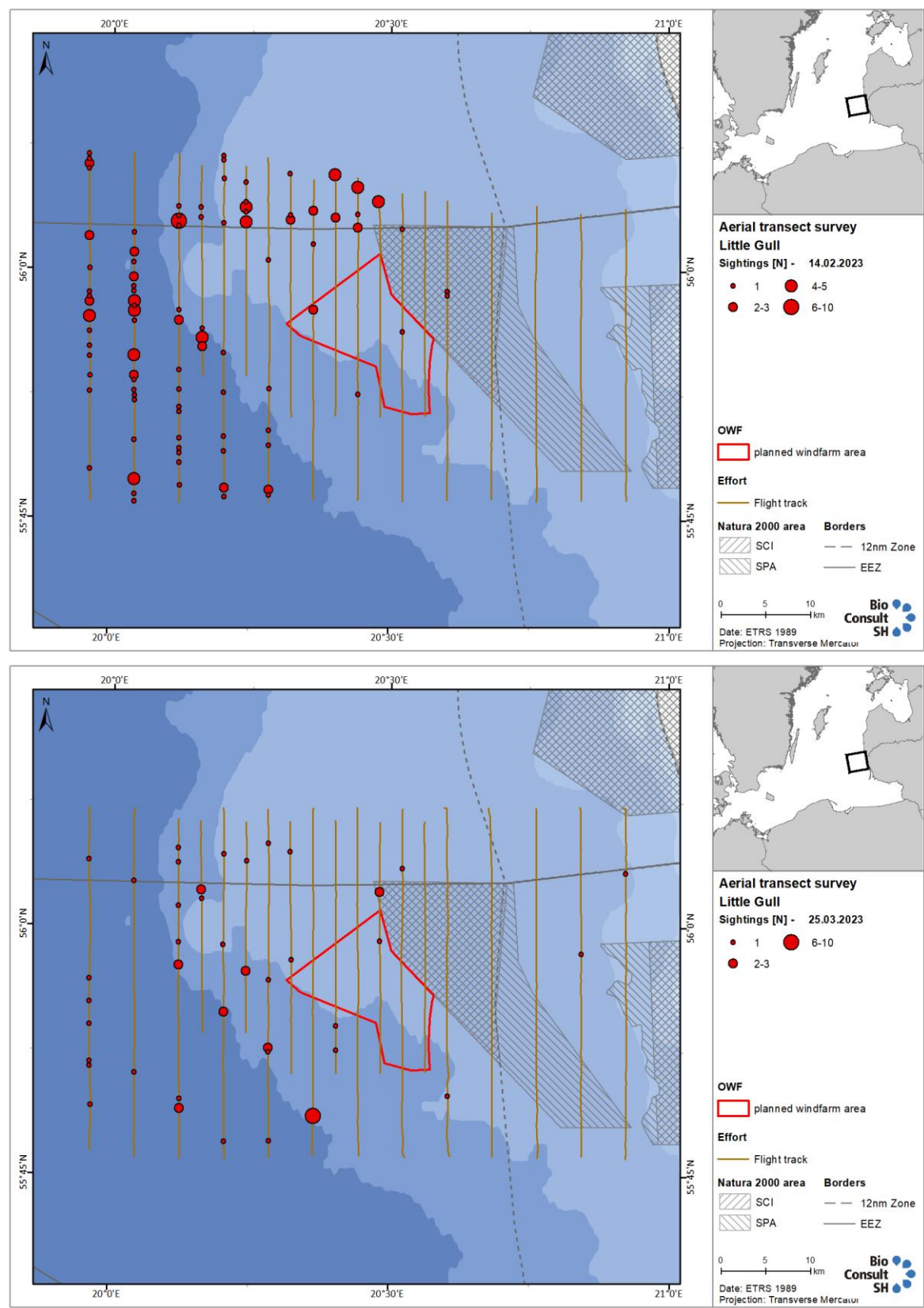


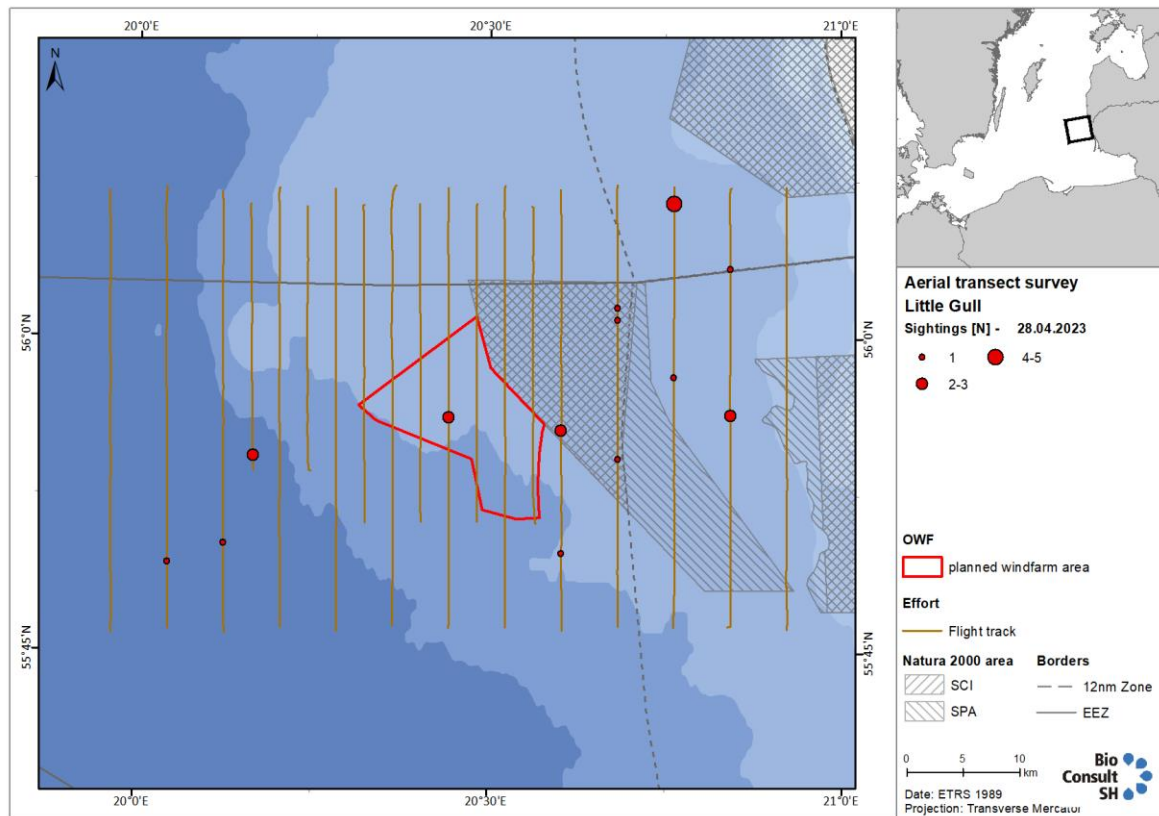




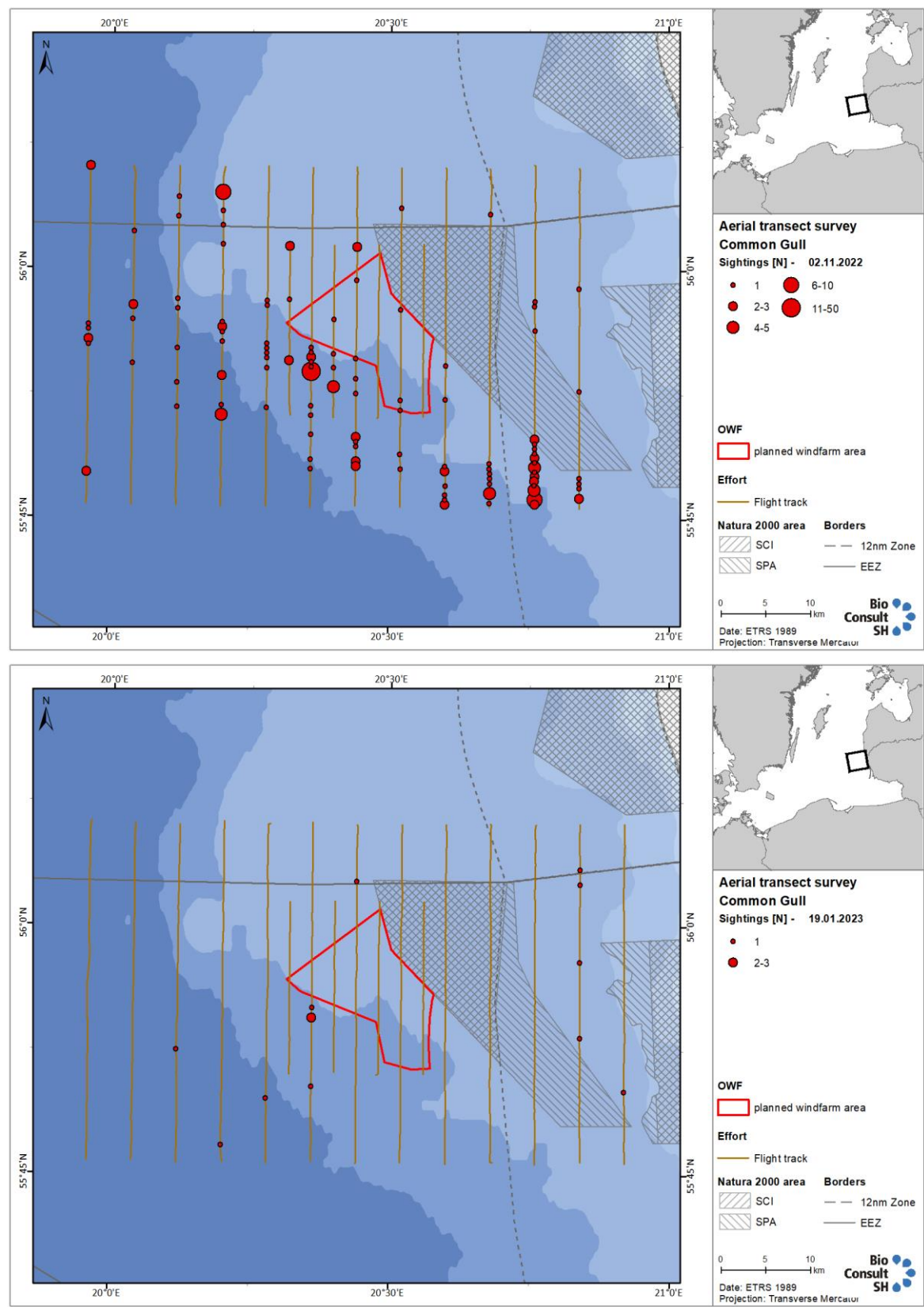
A.2.6 Little Gull (*Hydrocoloeus minutus*)

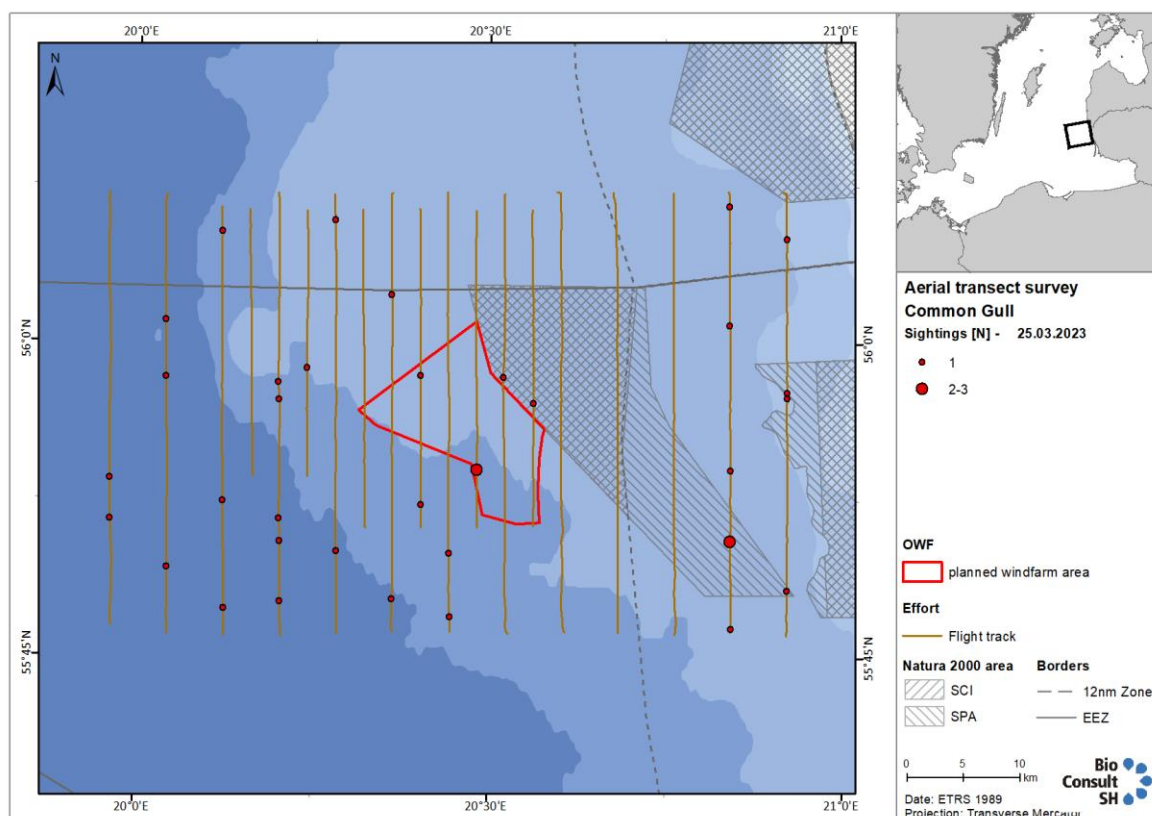
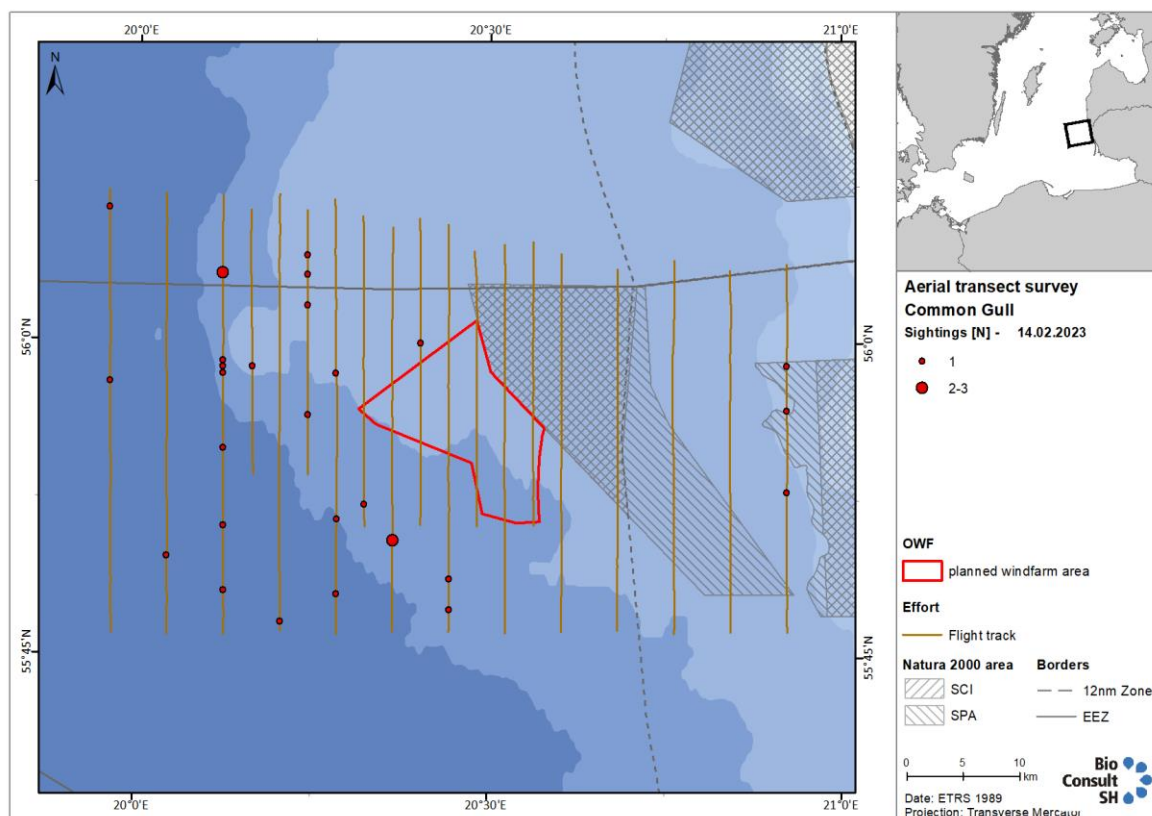


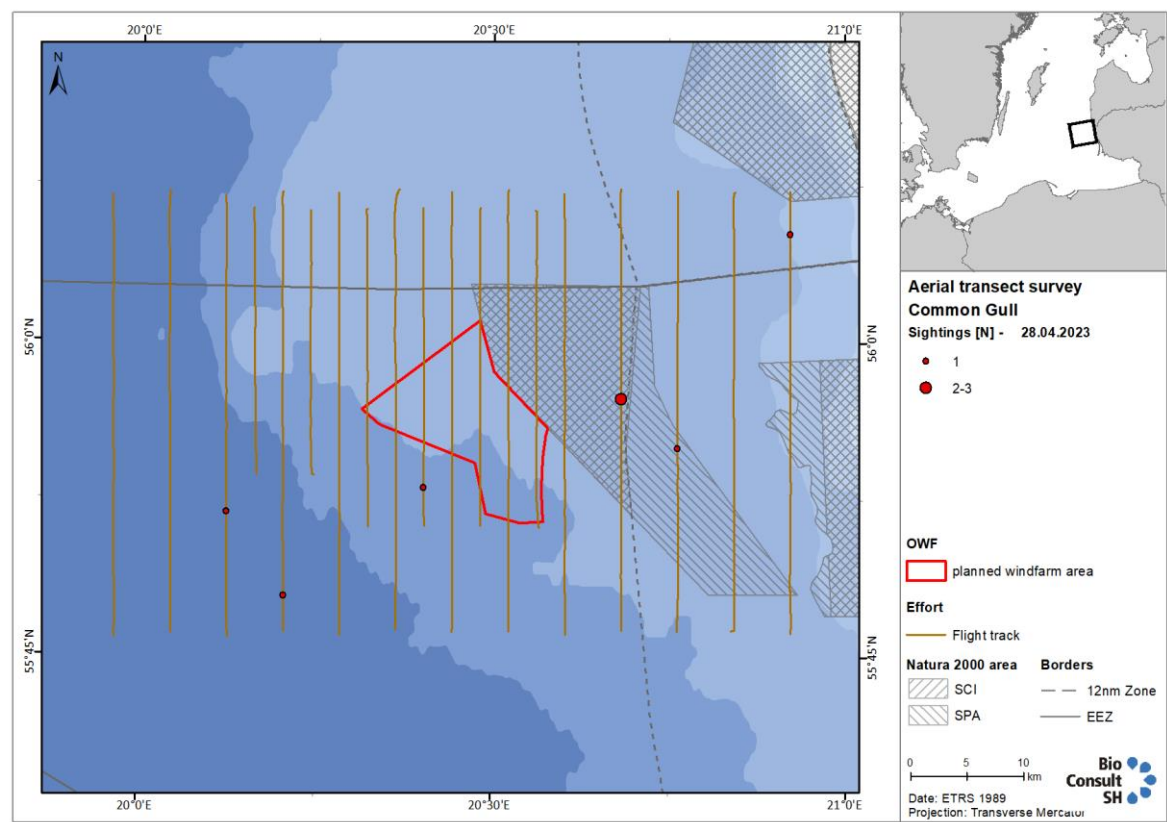




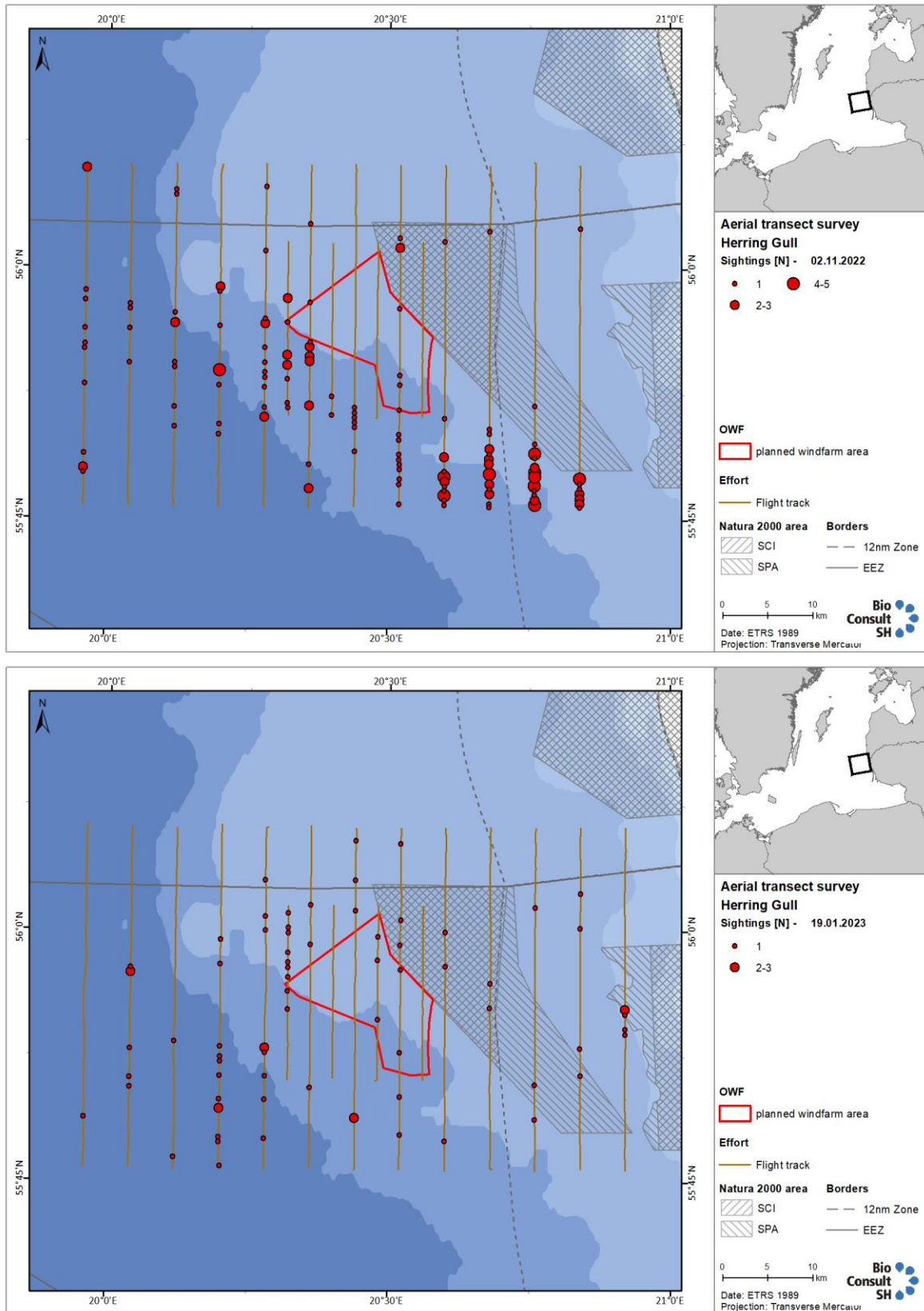
A.2.7 Common Gull (*Larus canus*)

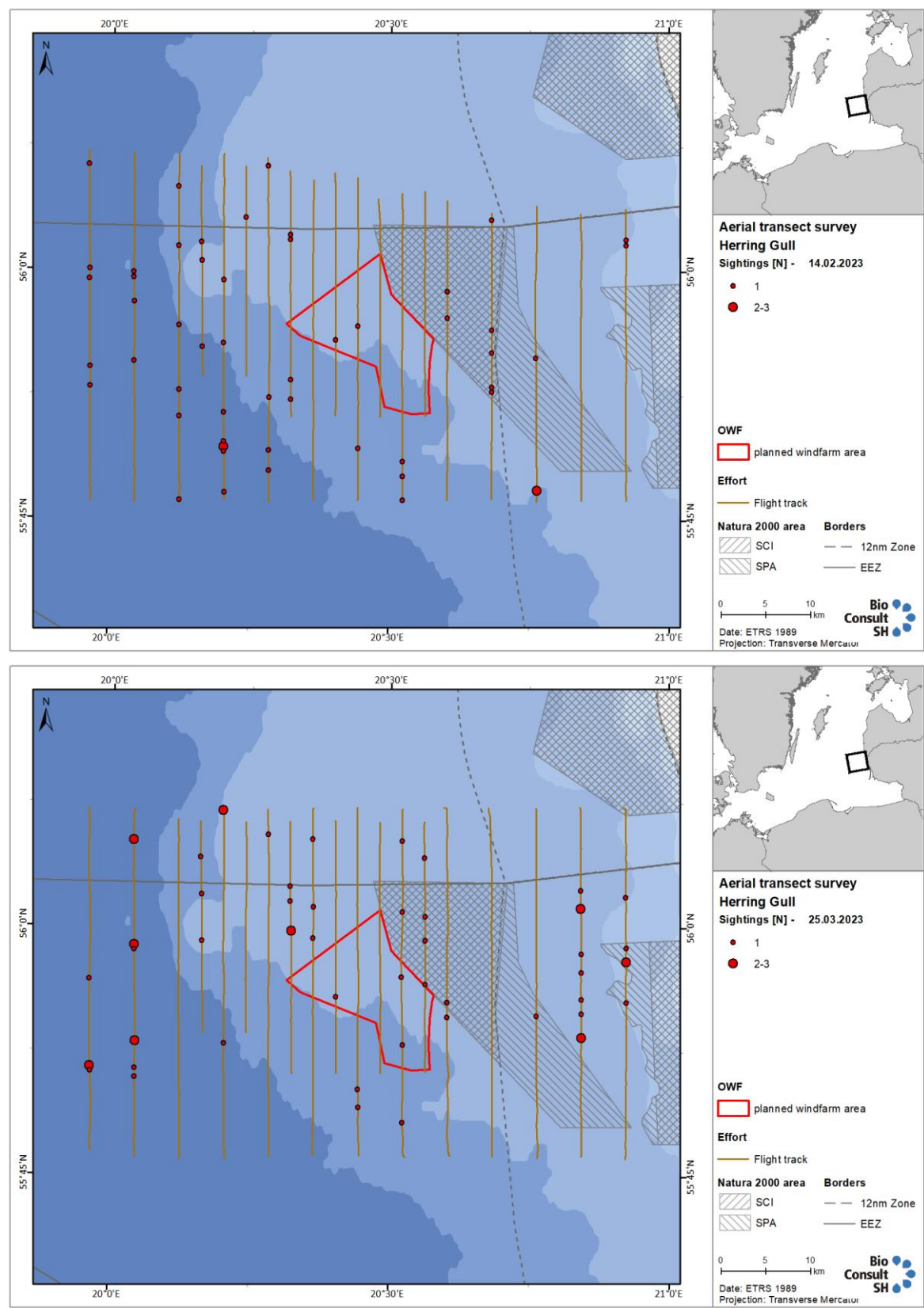


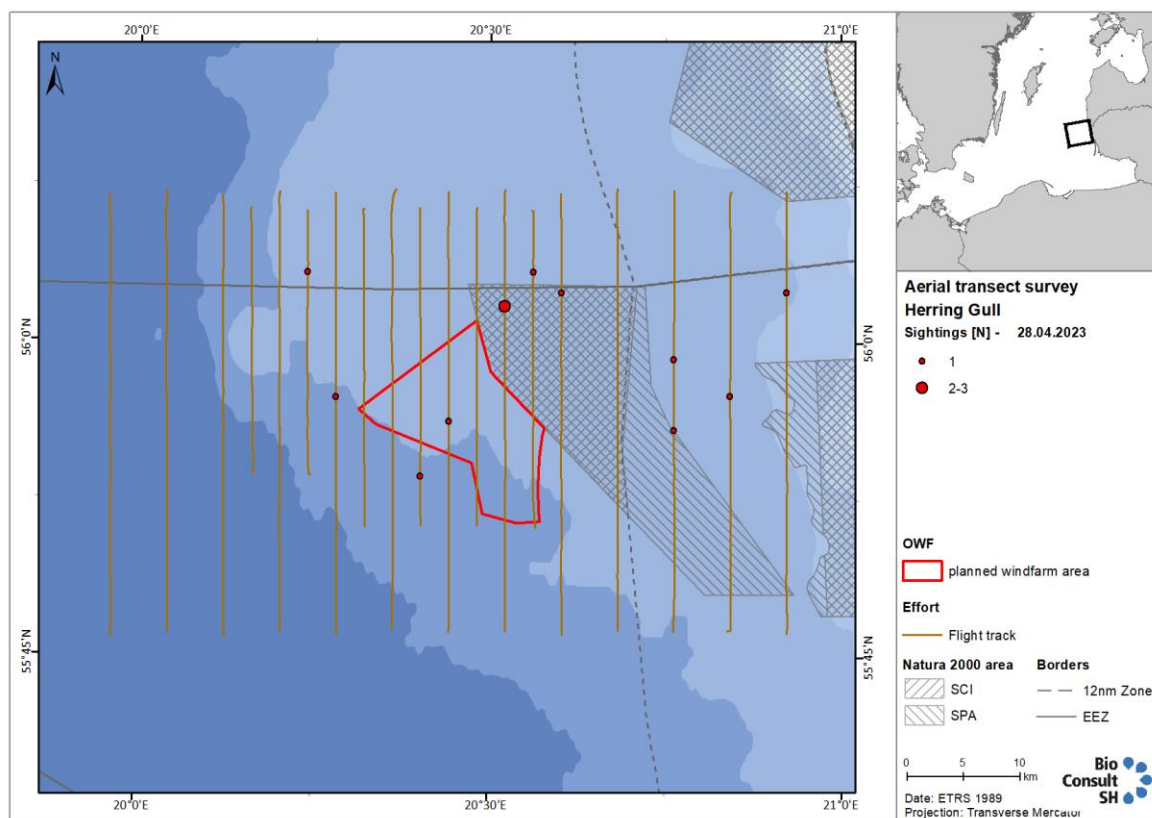




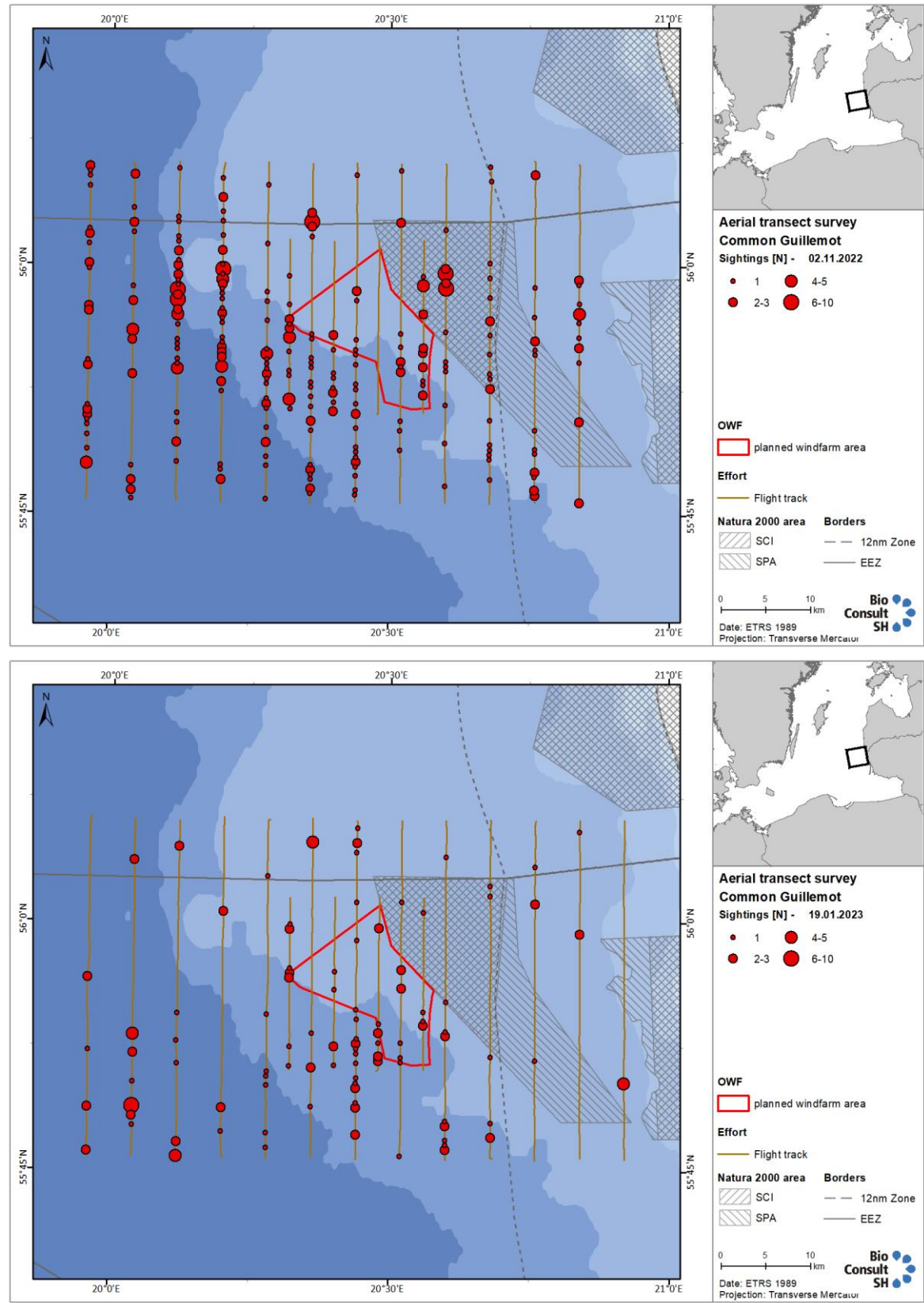
A.2.8 Herring Gull (*Larus argentatus*)

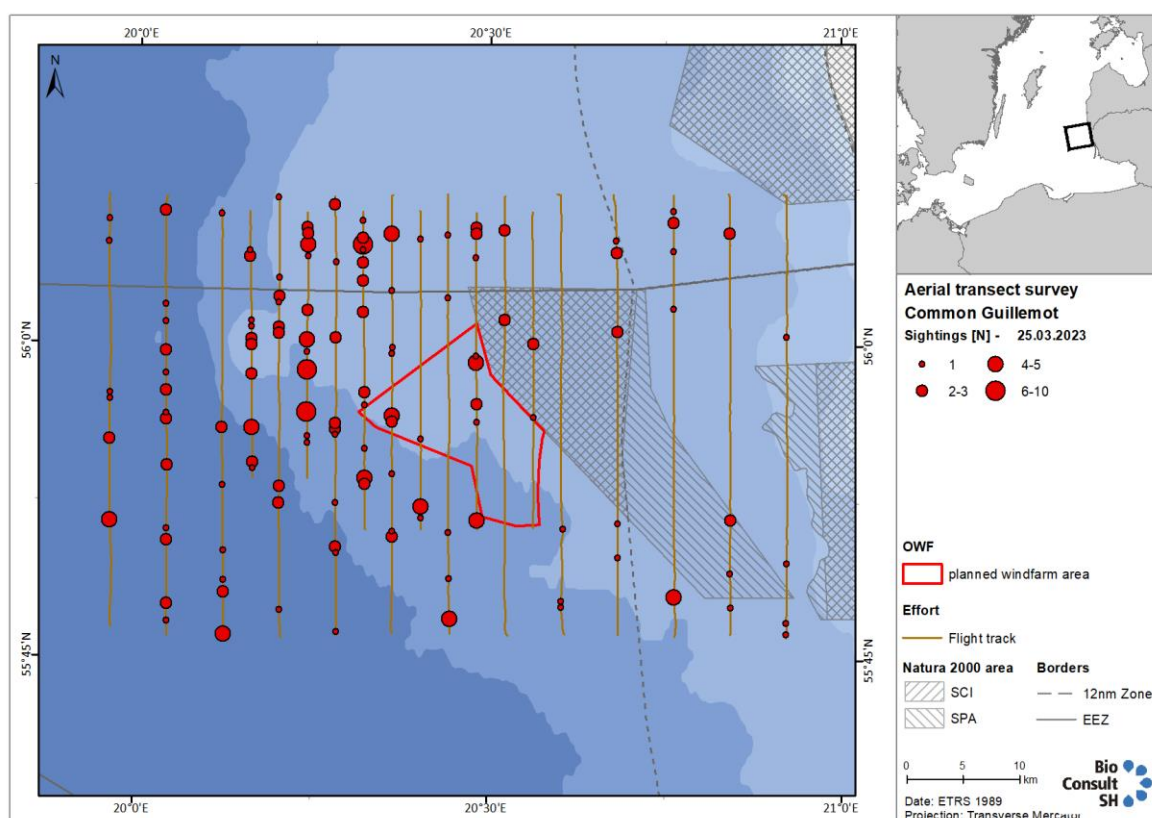
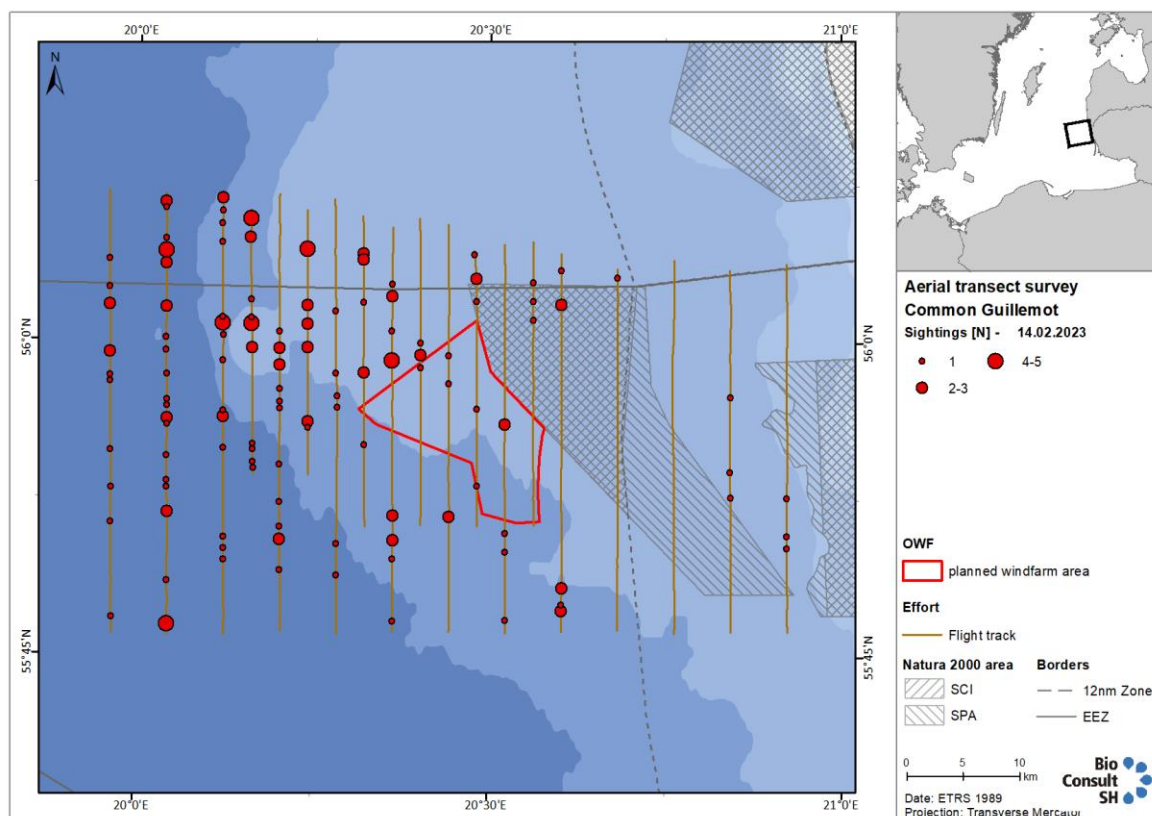


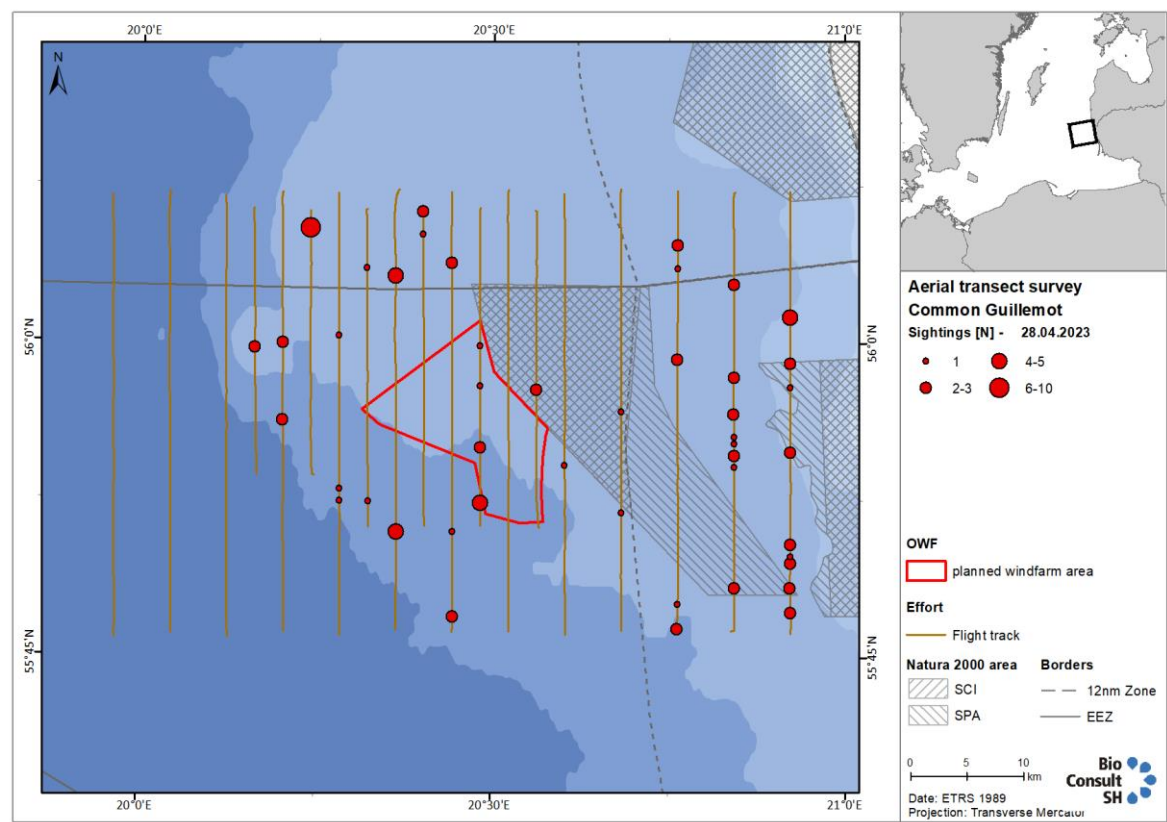




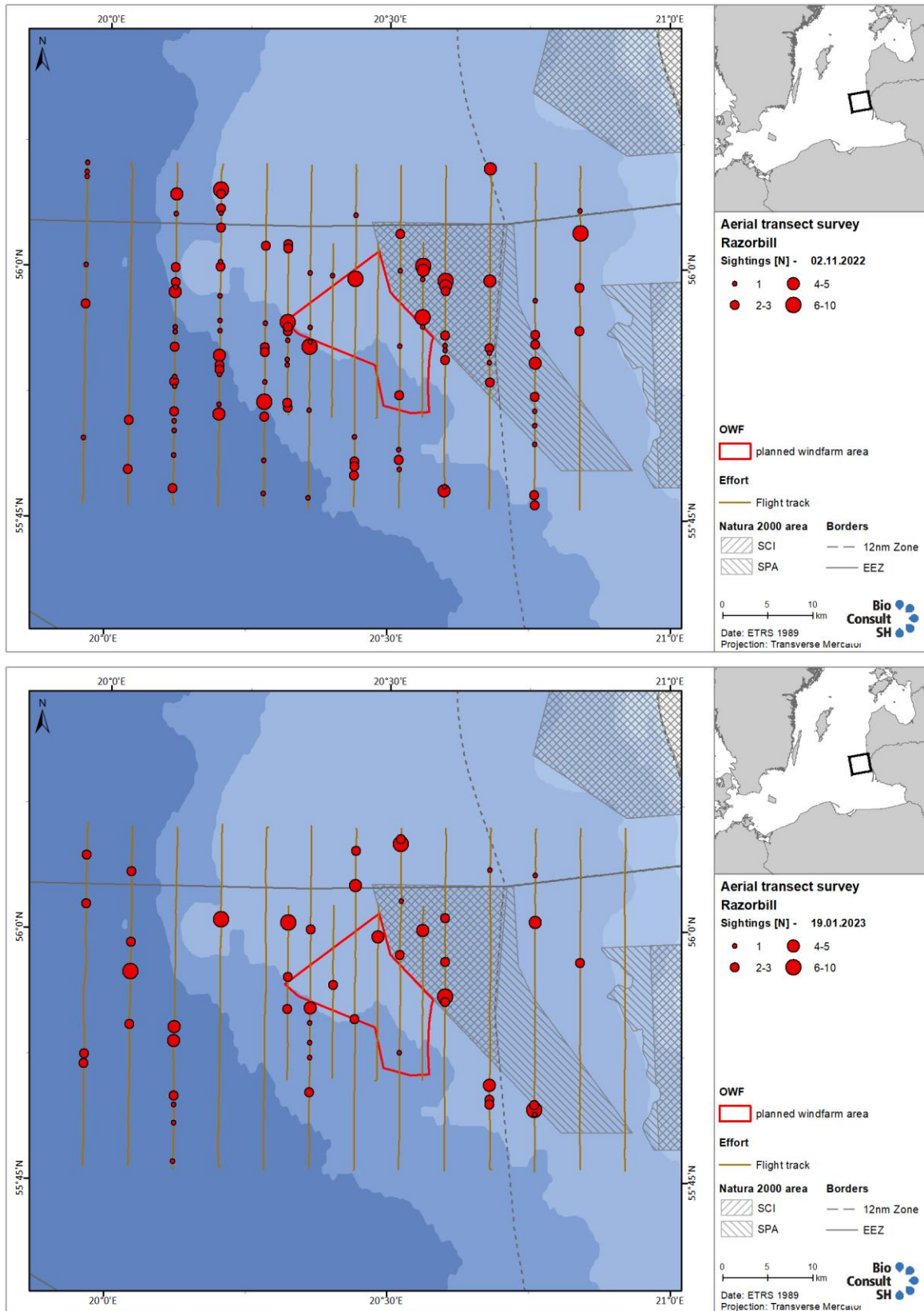
A.2.9 Common Guillemot (*Uria aalge*)

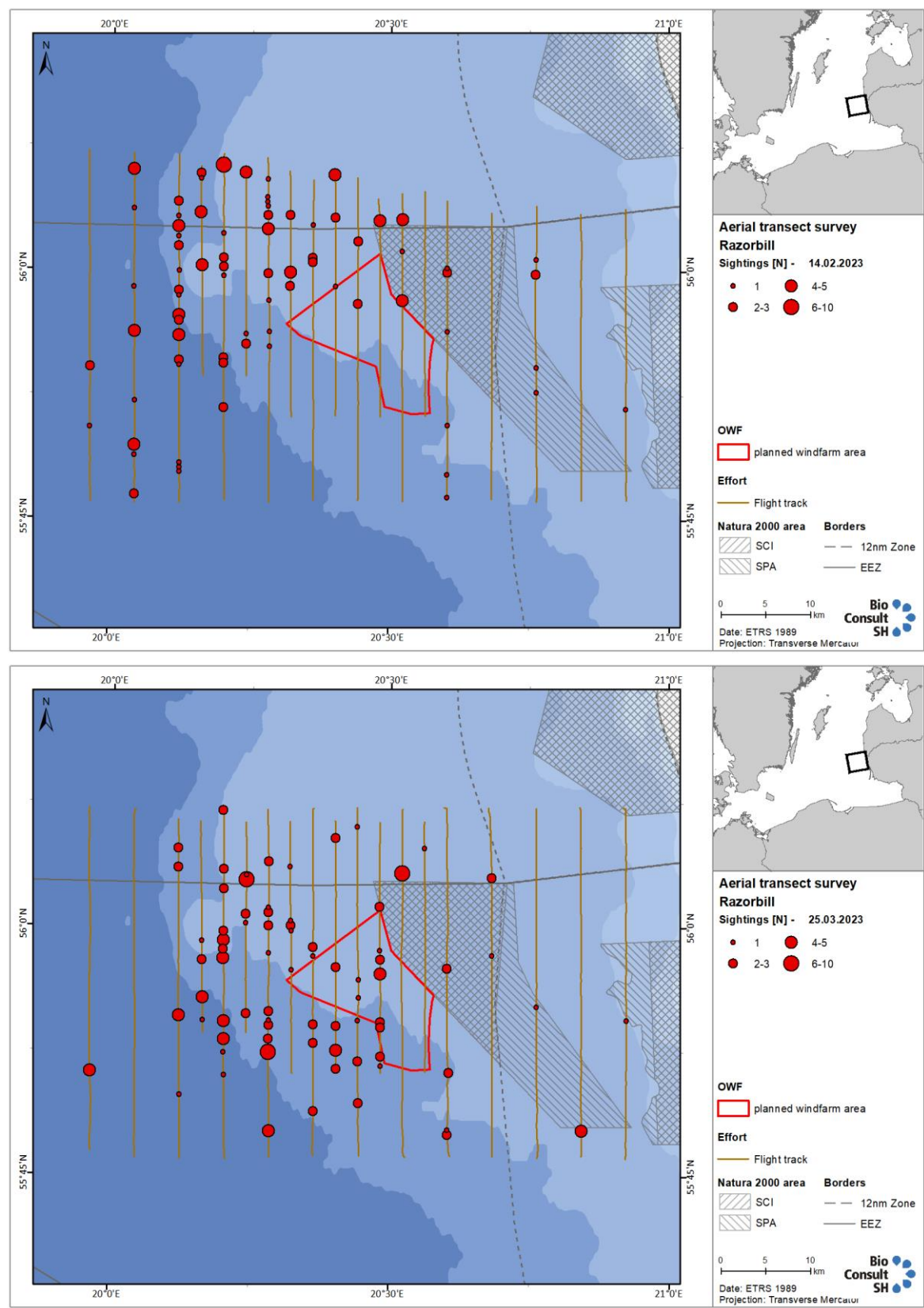


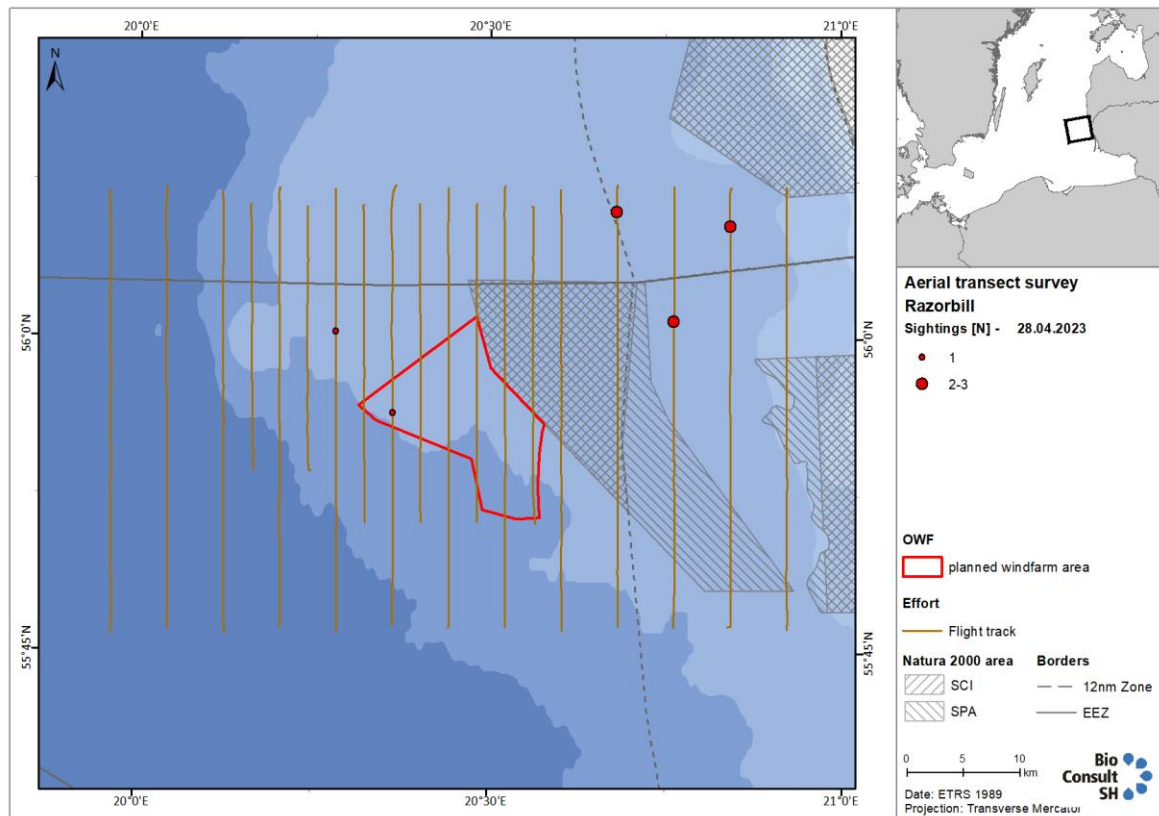




A.2.10 Razorbill (*Alca torda*)

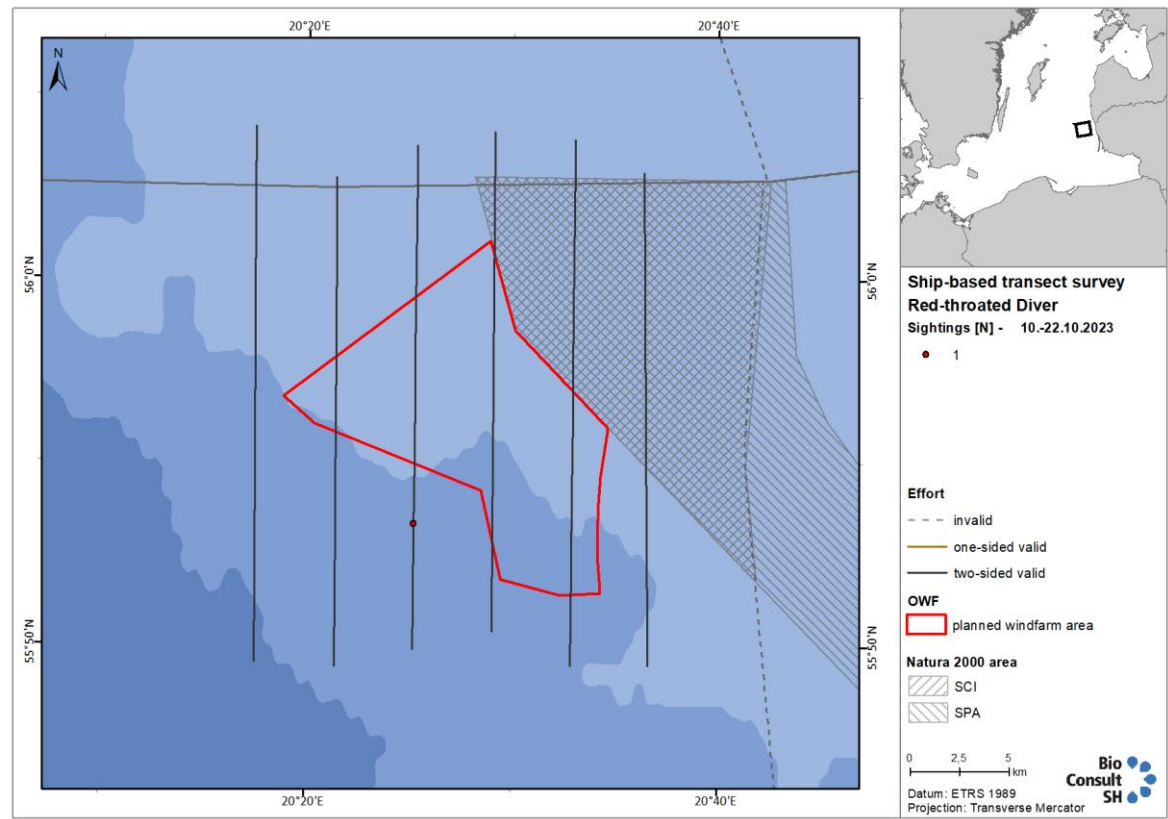




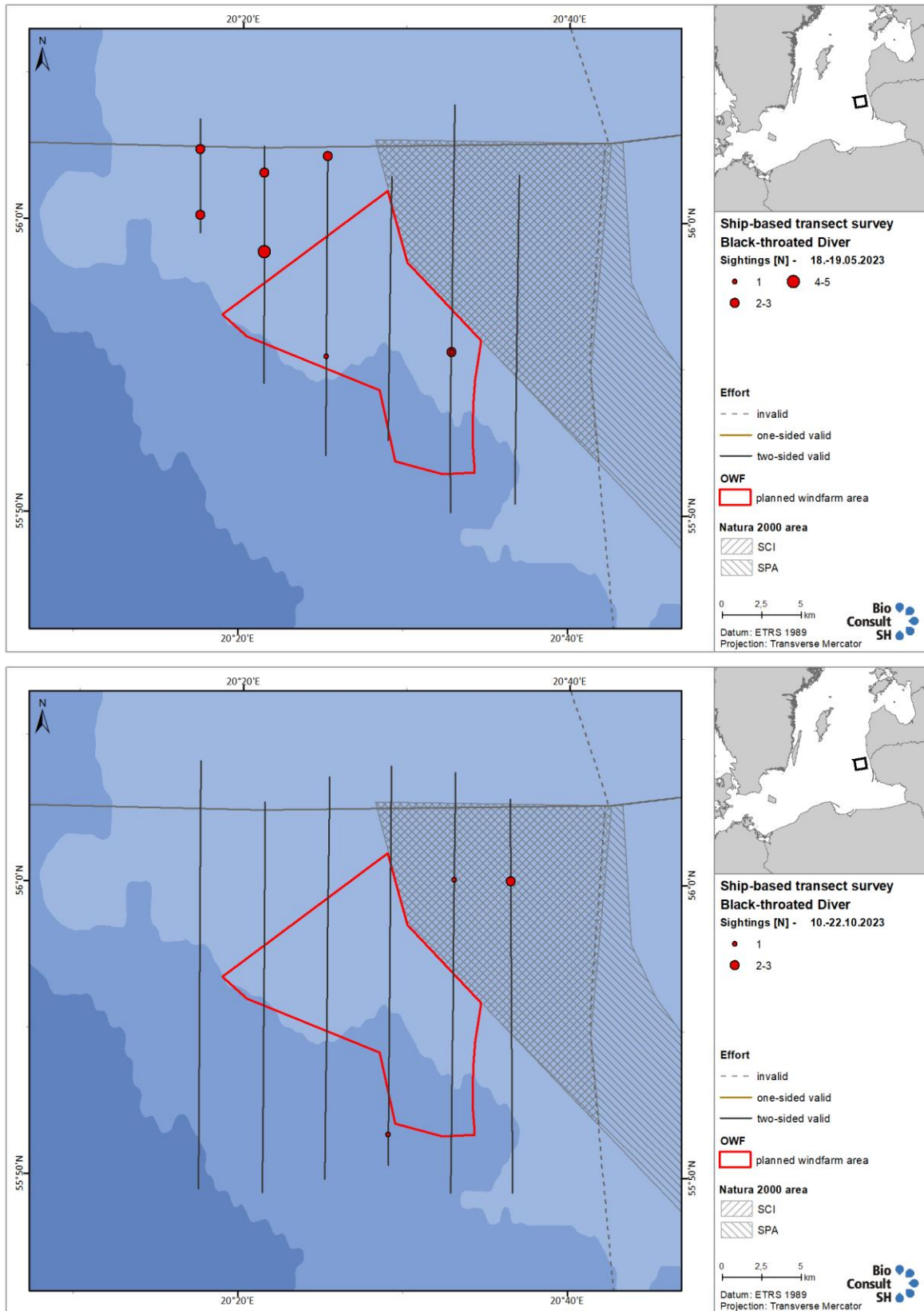


A.3 Species Distribution Maps Ship Surveys

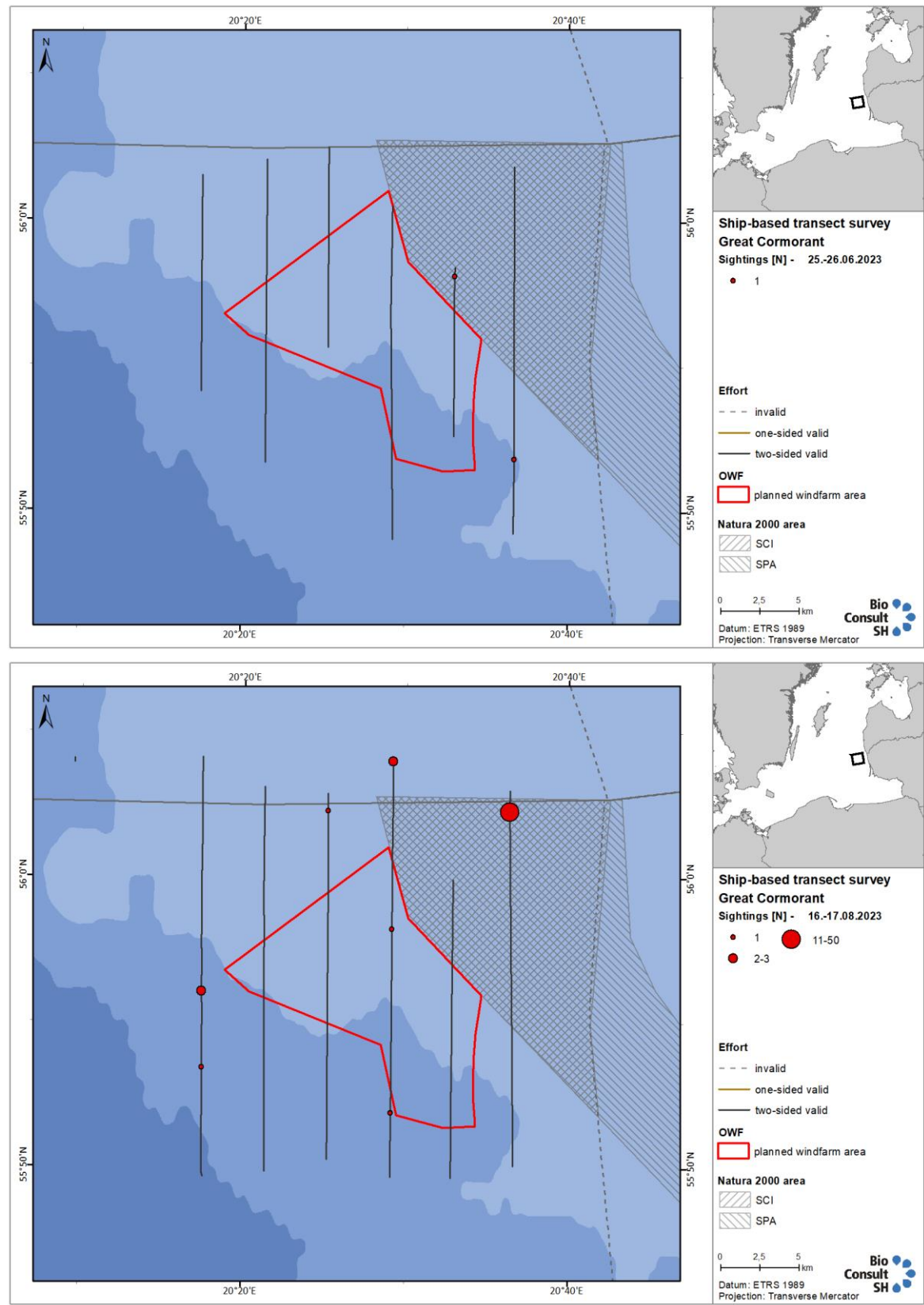
A.3.1 Red-throated Diver (*Gavia stellata*)



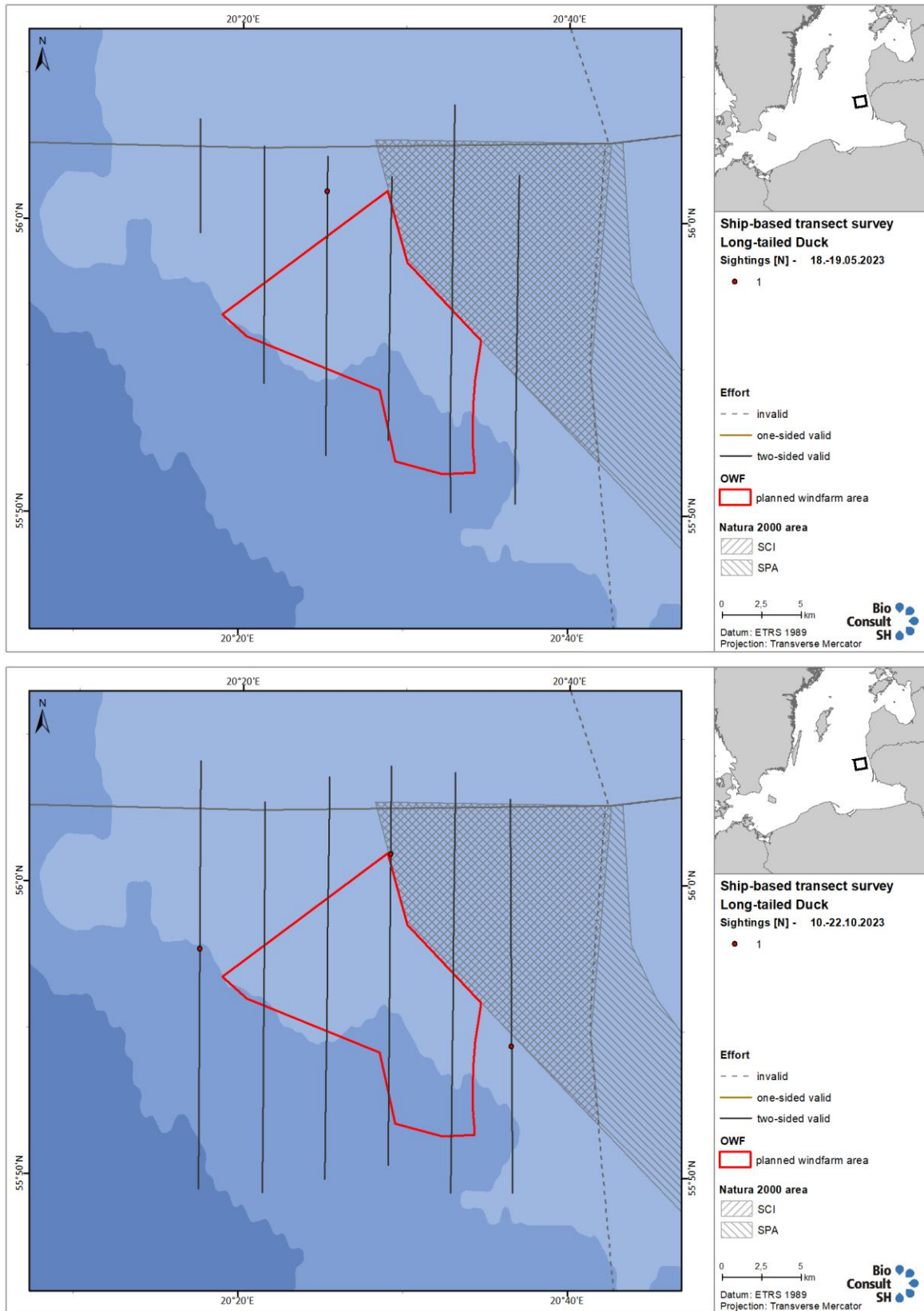
A.3.2 Black-throated Diver (*Gavia arctica*)



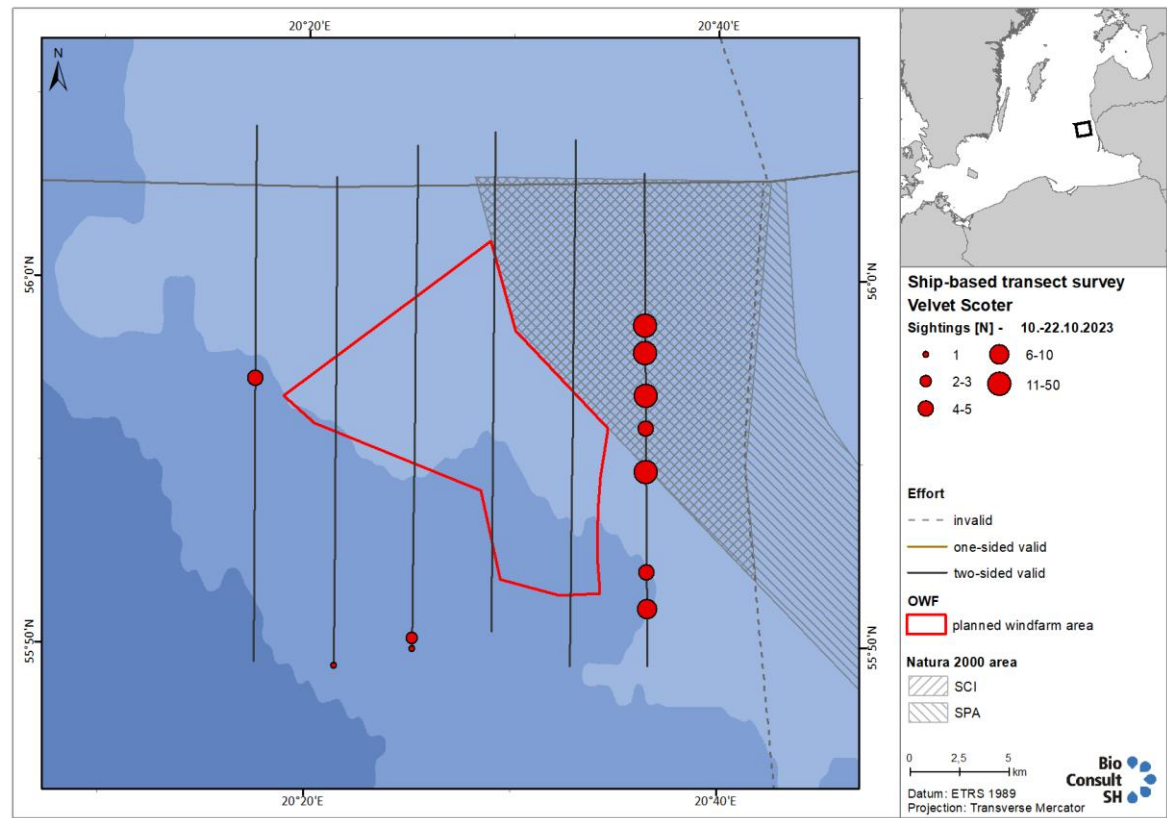
A.3.3 Great Cormorant (*Phalacrocorax carbo*)



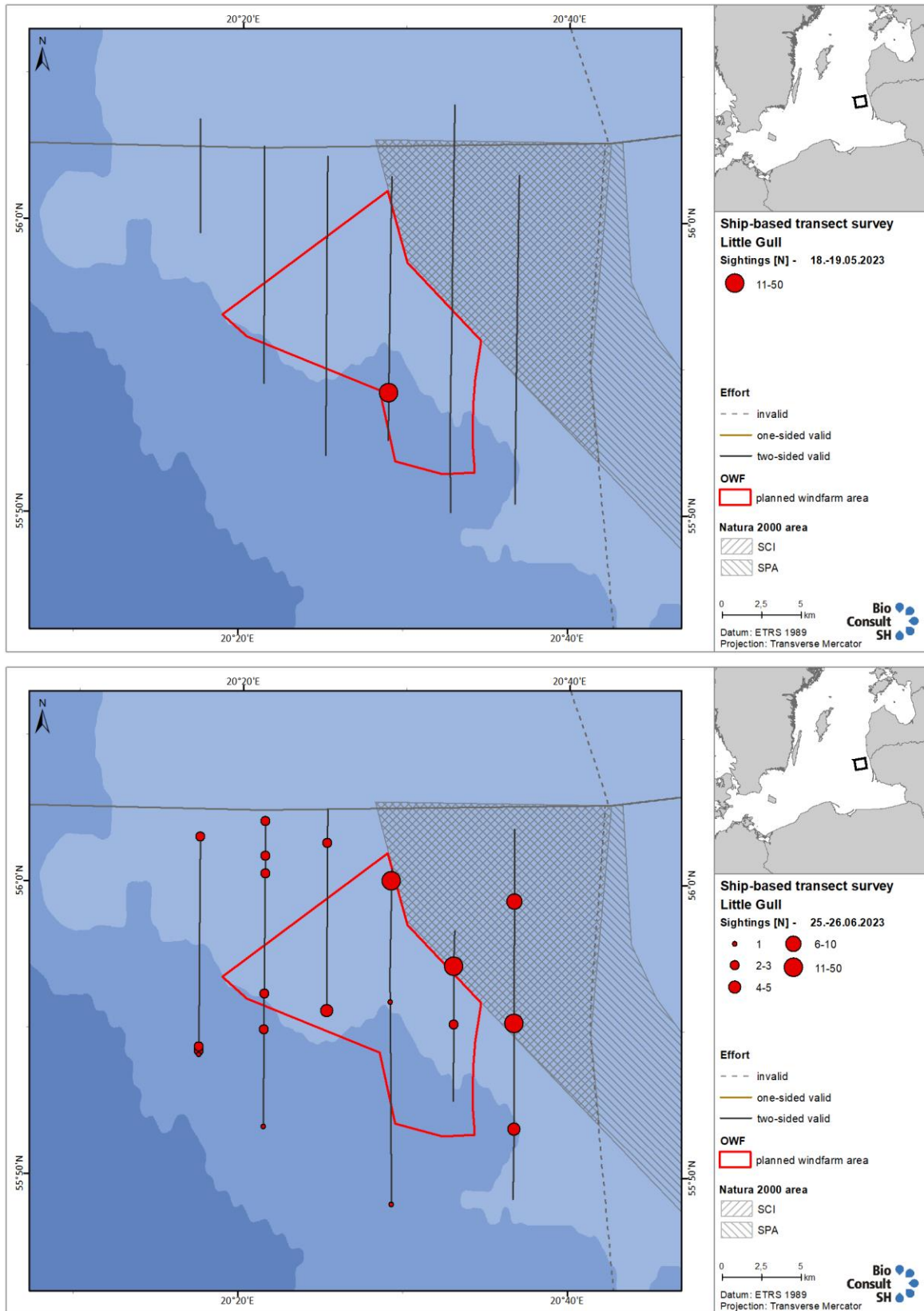
A.3.4 Long-tailed Duck (*Clangula hyemalis*)

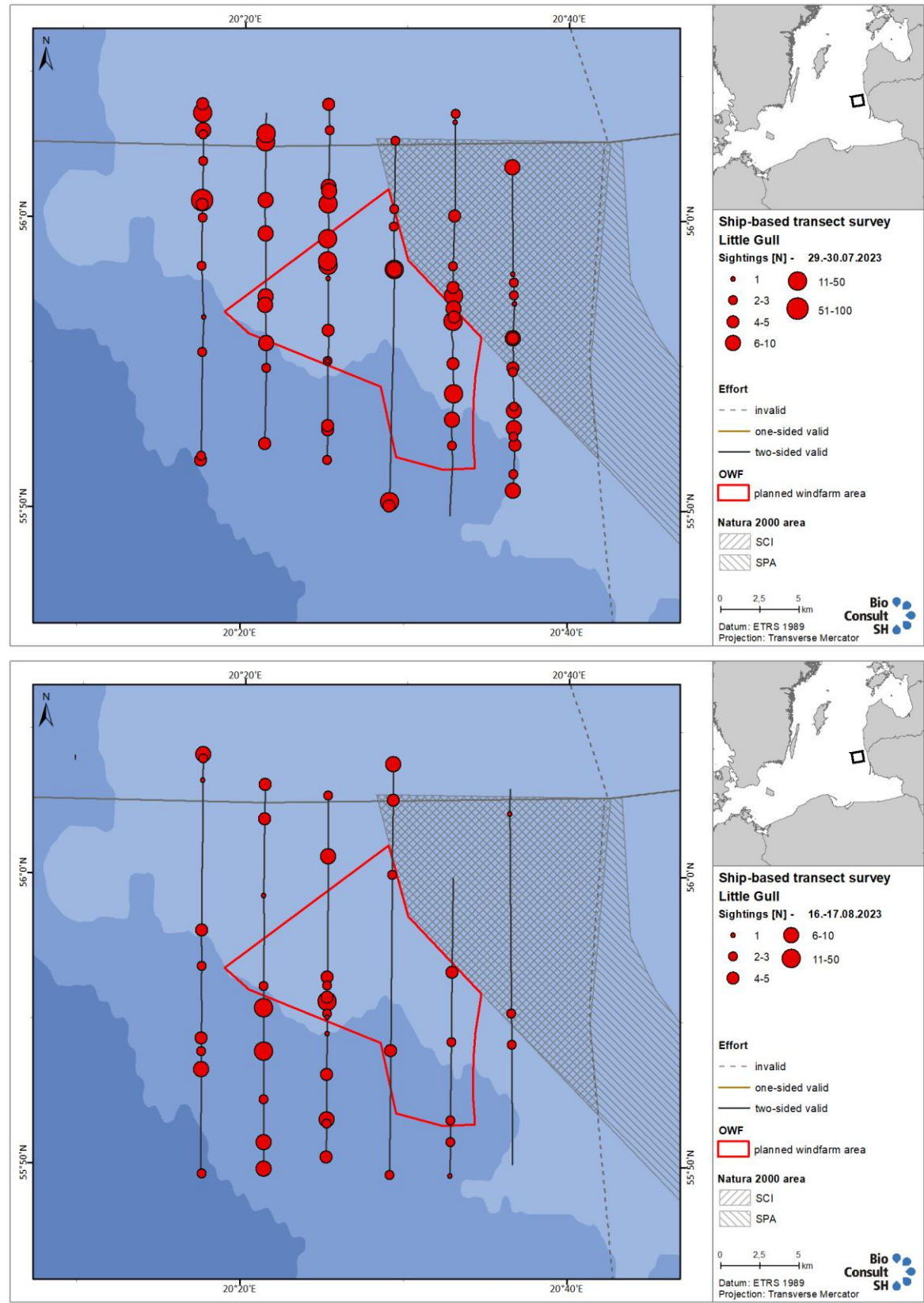


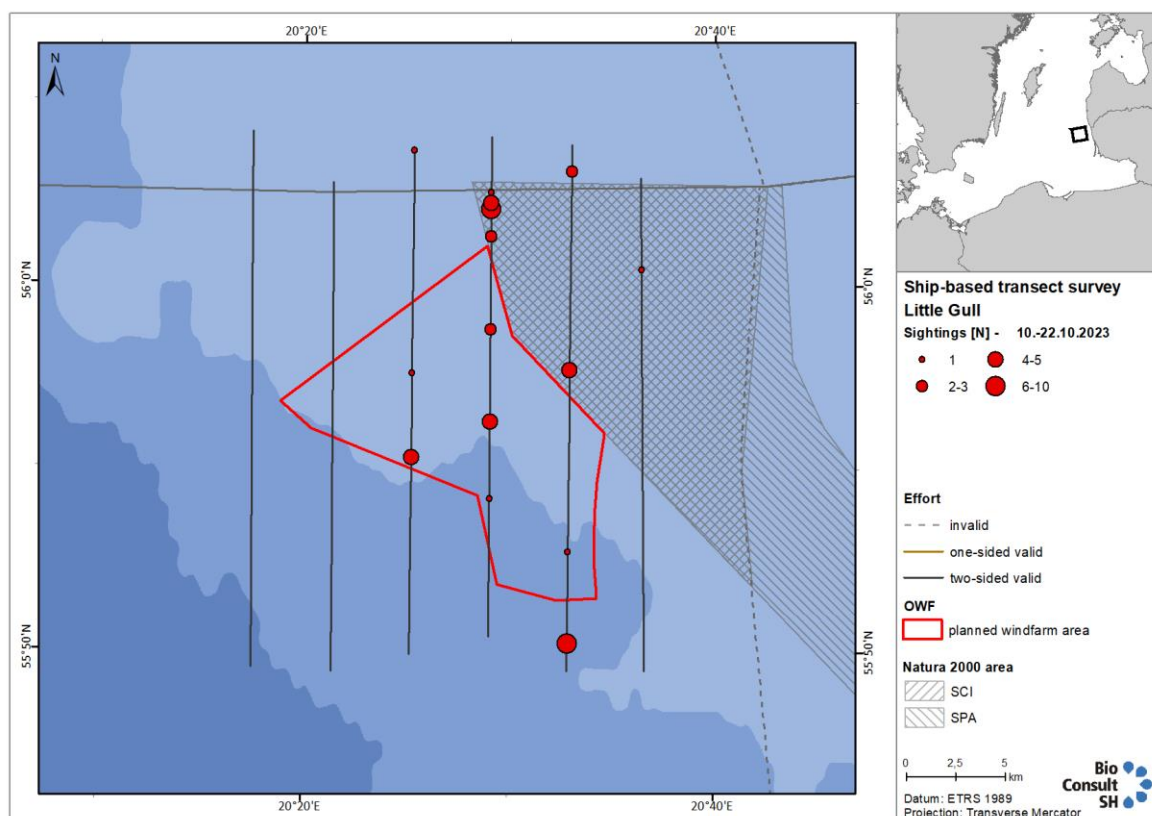
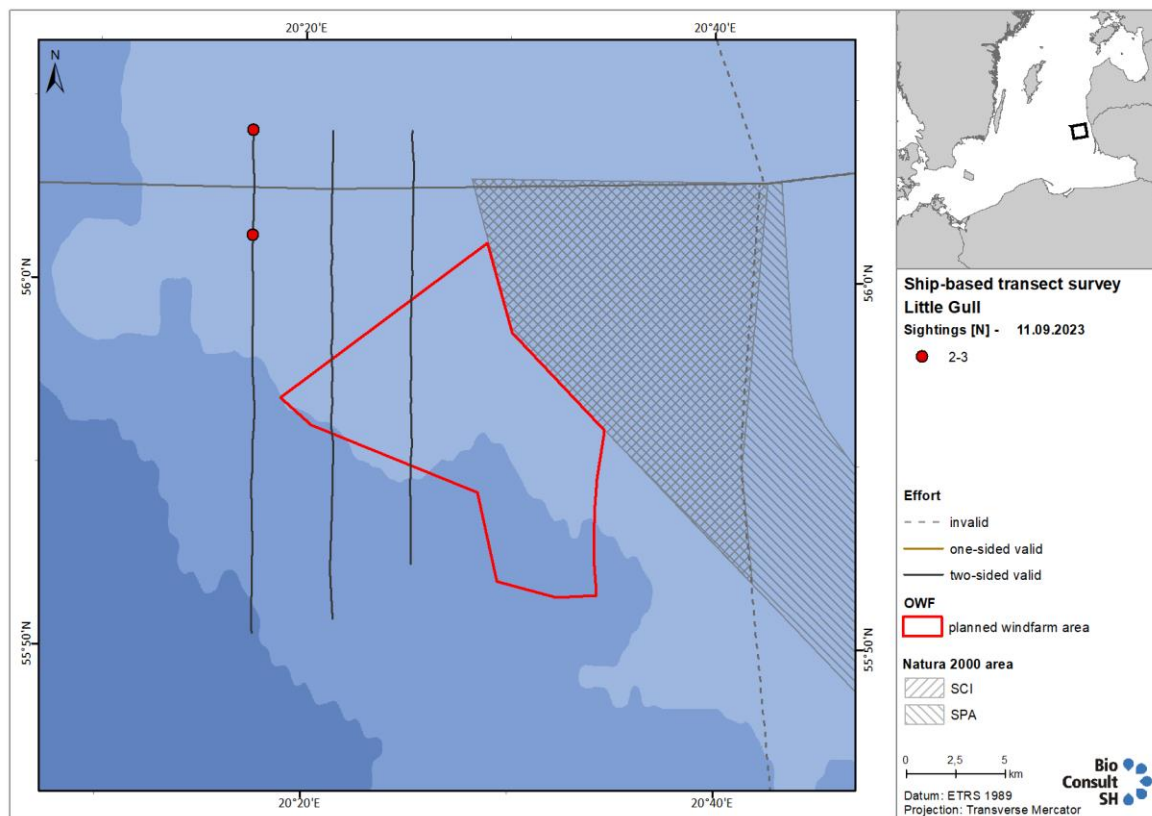
A.3.5 Velvet Scoter (*Melanitta fusca*)



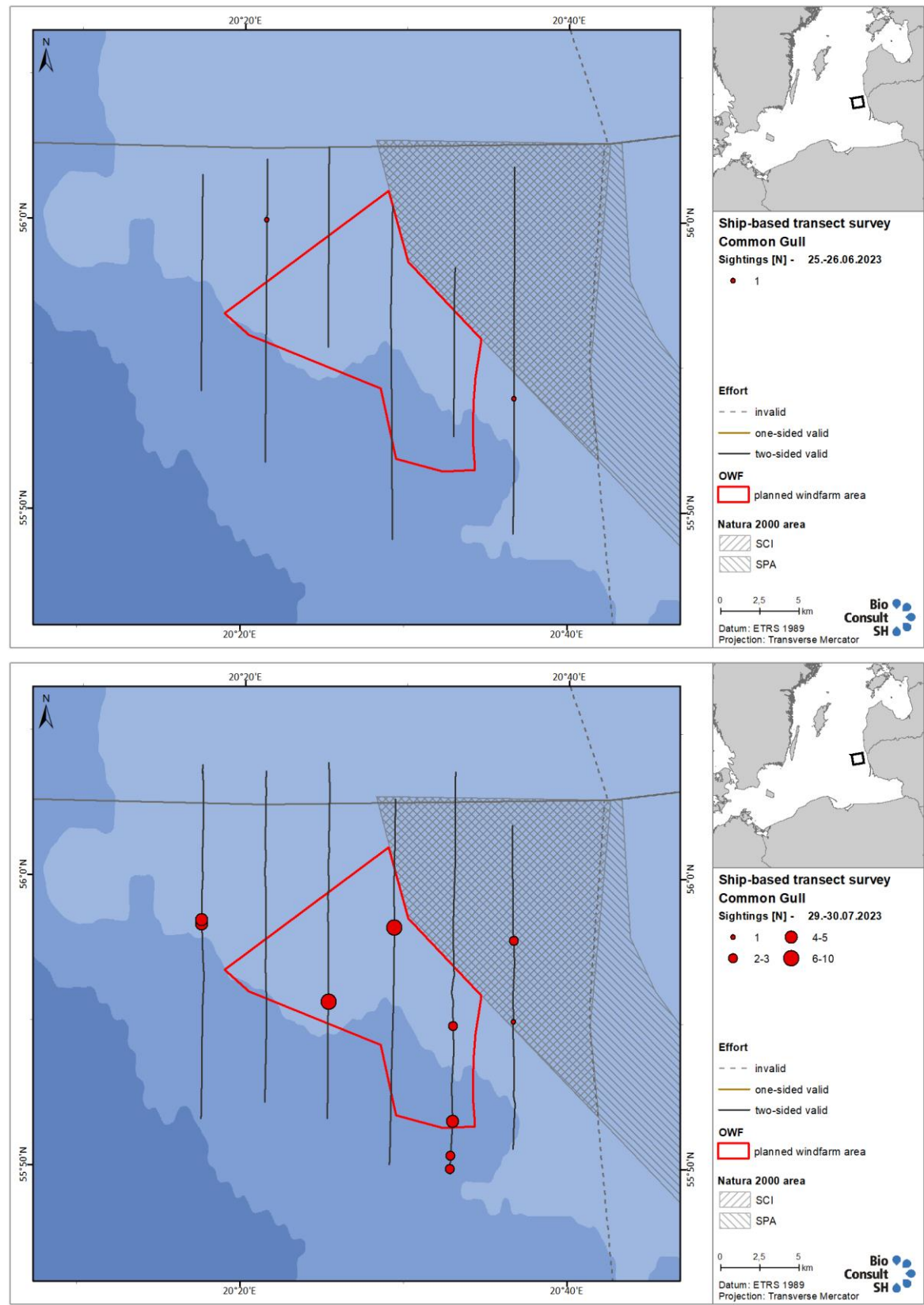
A.3.6 Little Gull (*Hydrocoloeus minutus*)

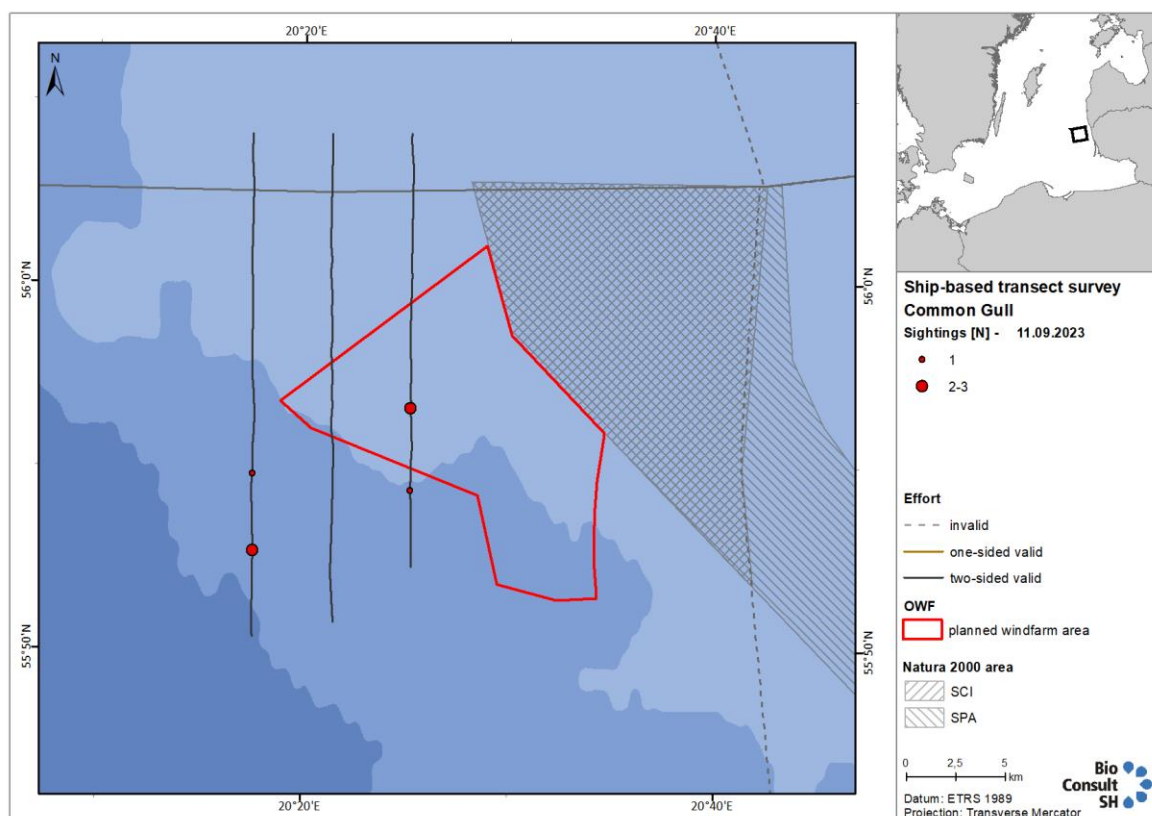
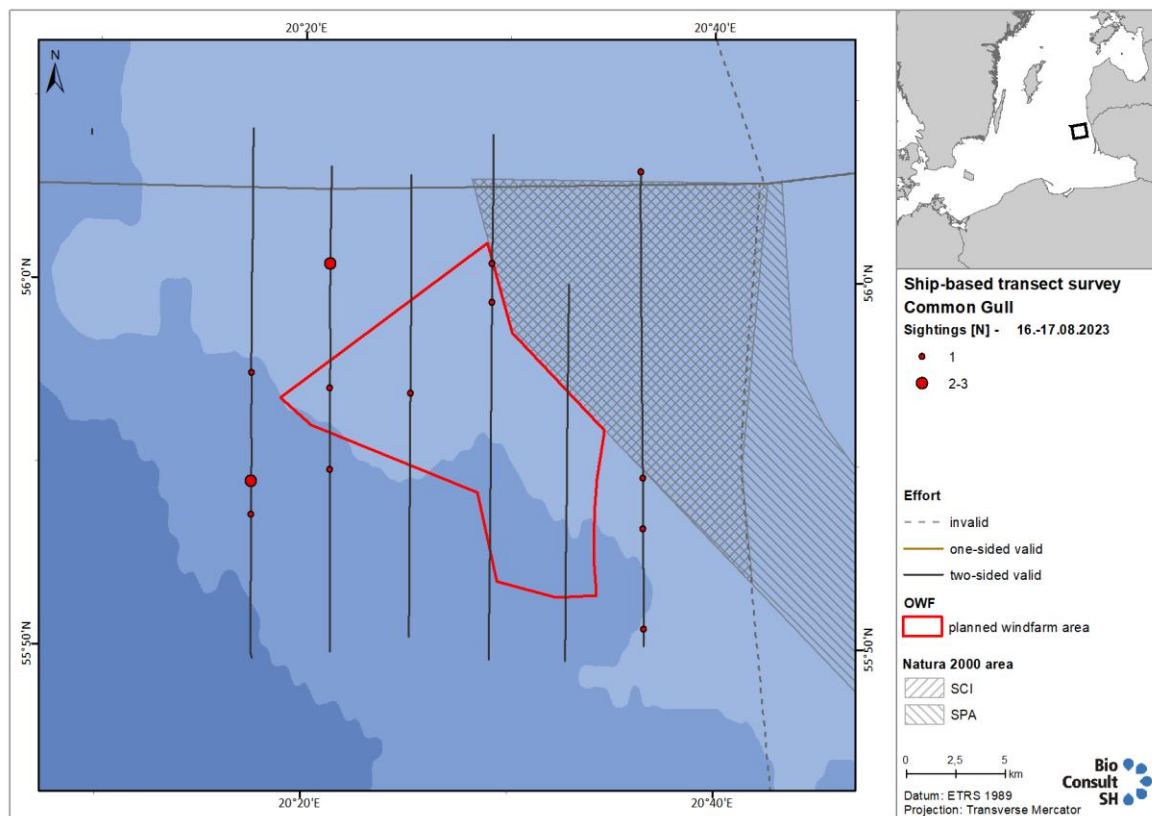


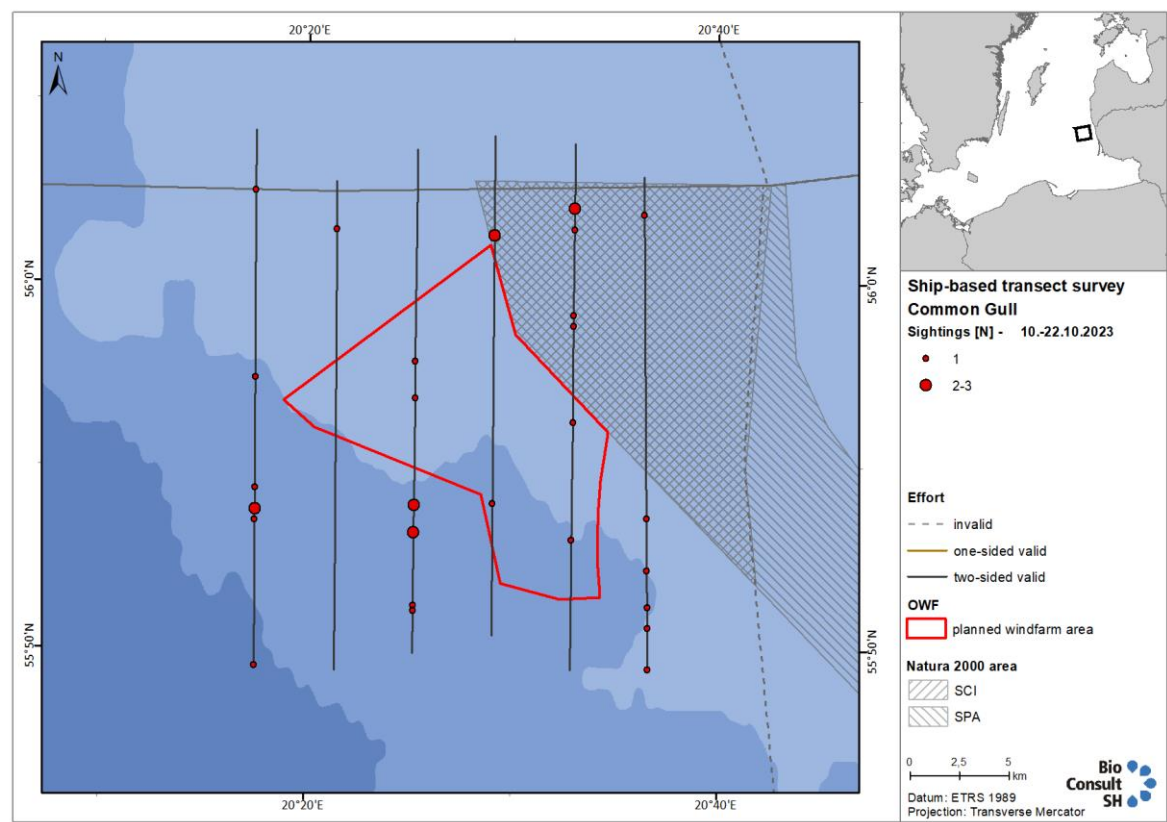




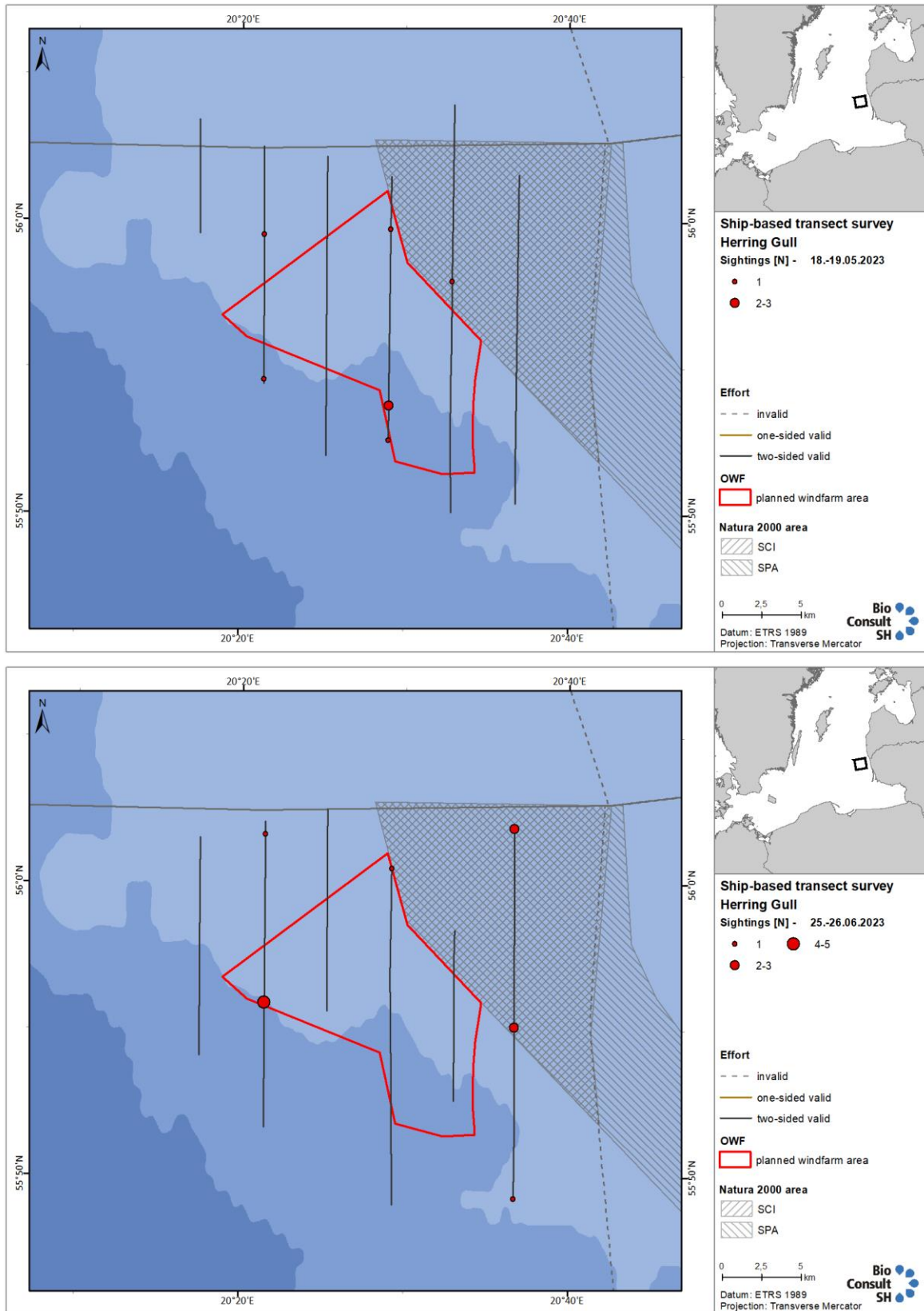
A.3.7 Common Gull (*Larus canus*)

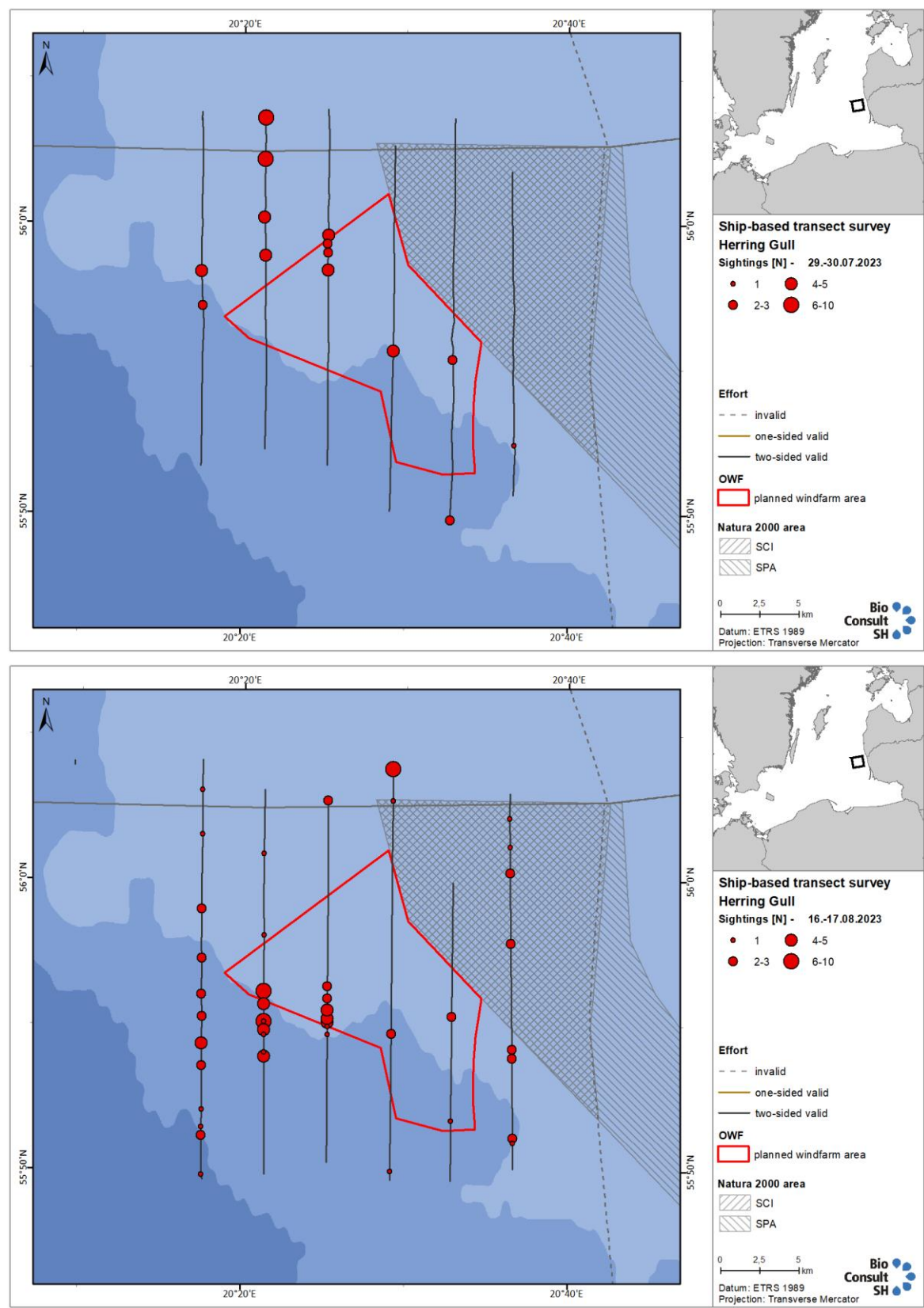


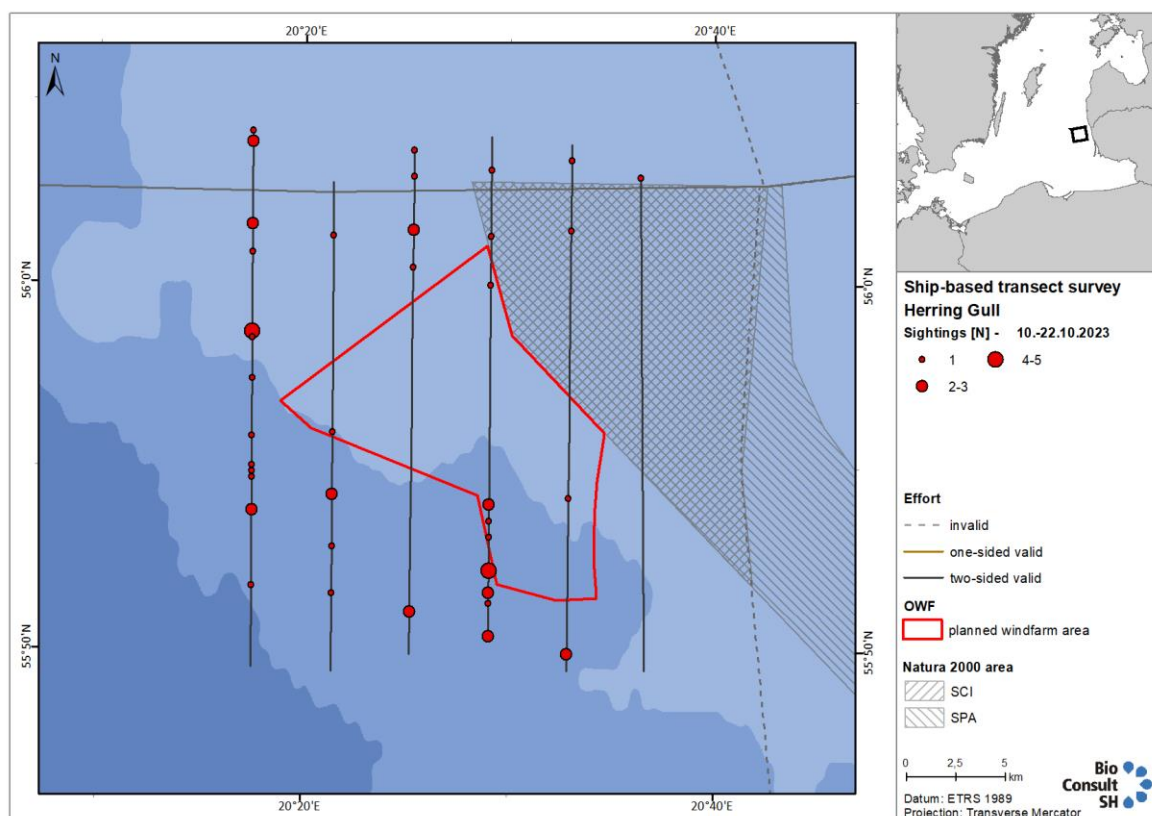
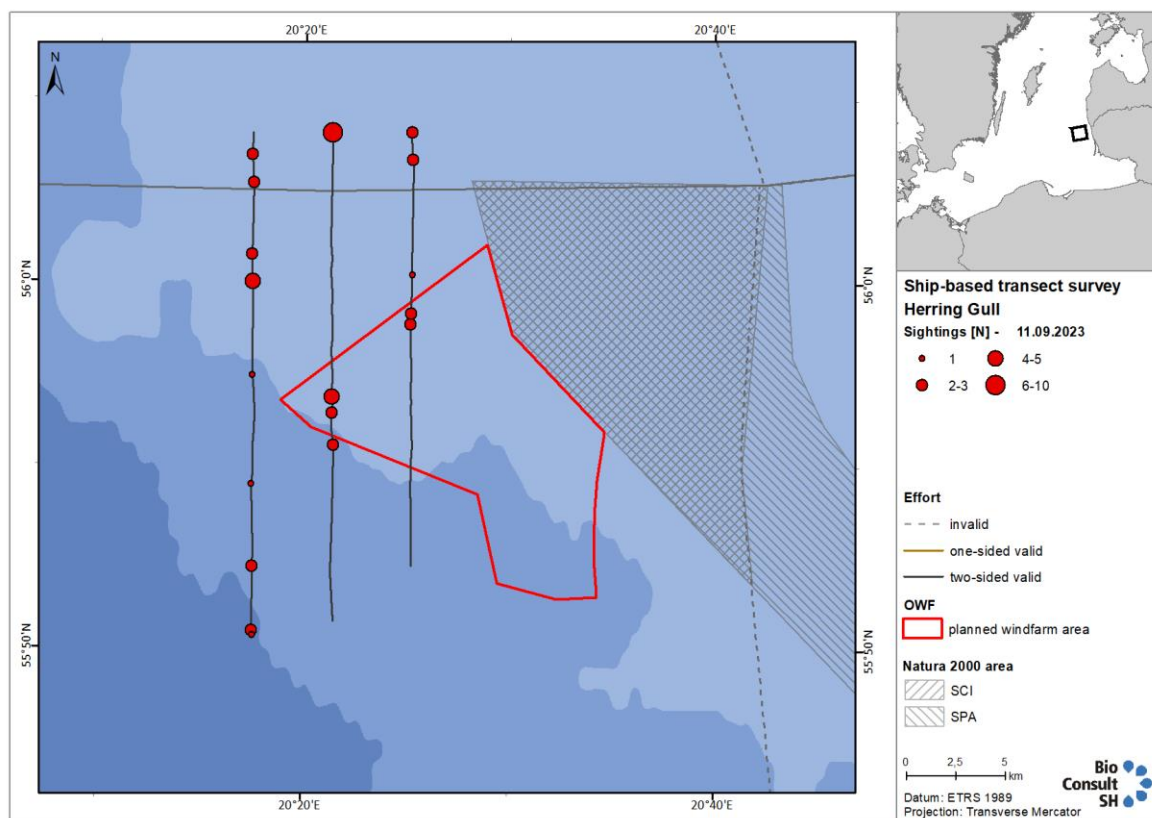




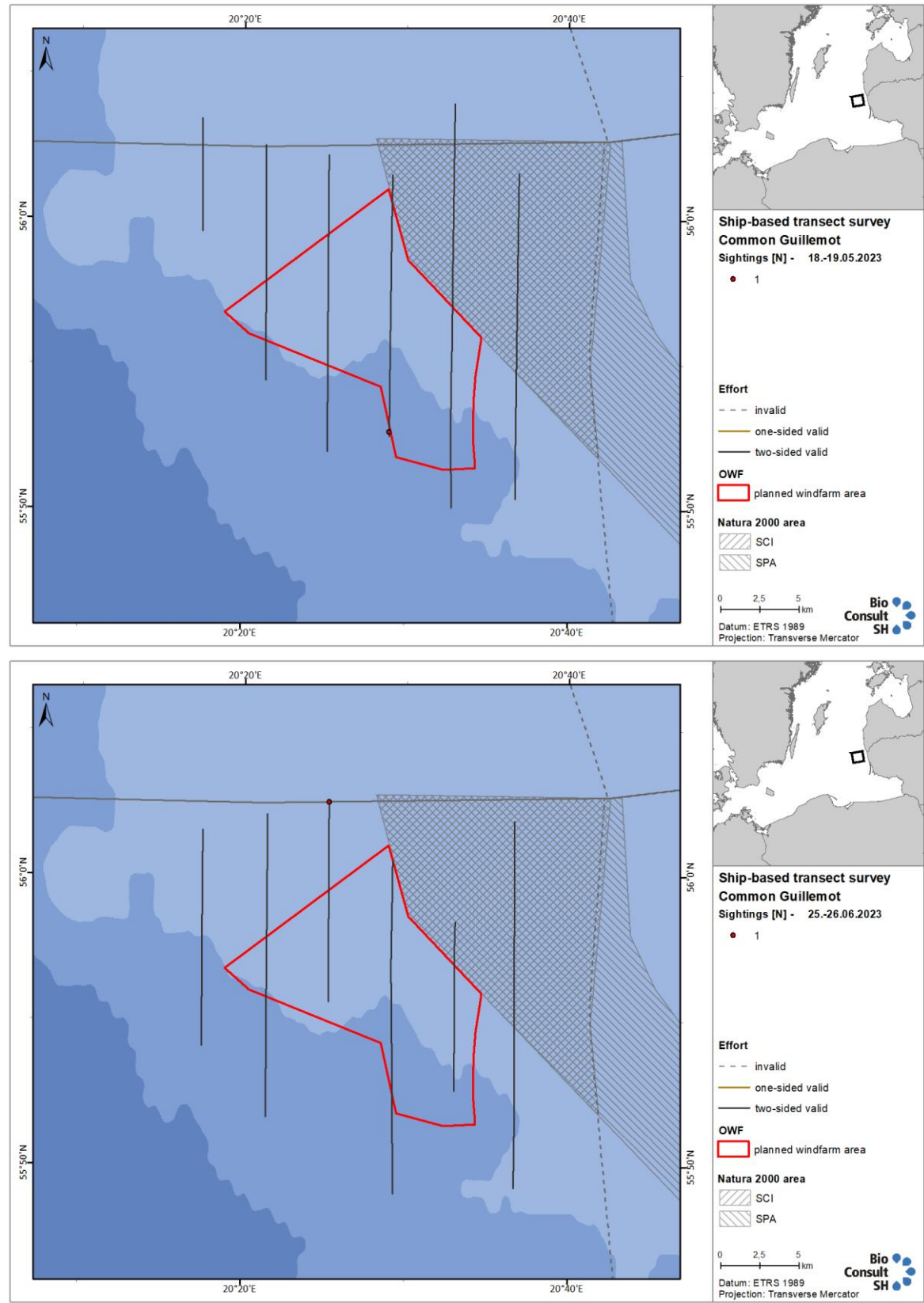
A.3.8 Herring Gull (*Larus argentatus*)

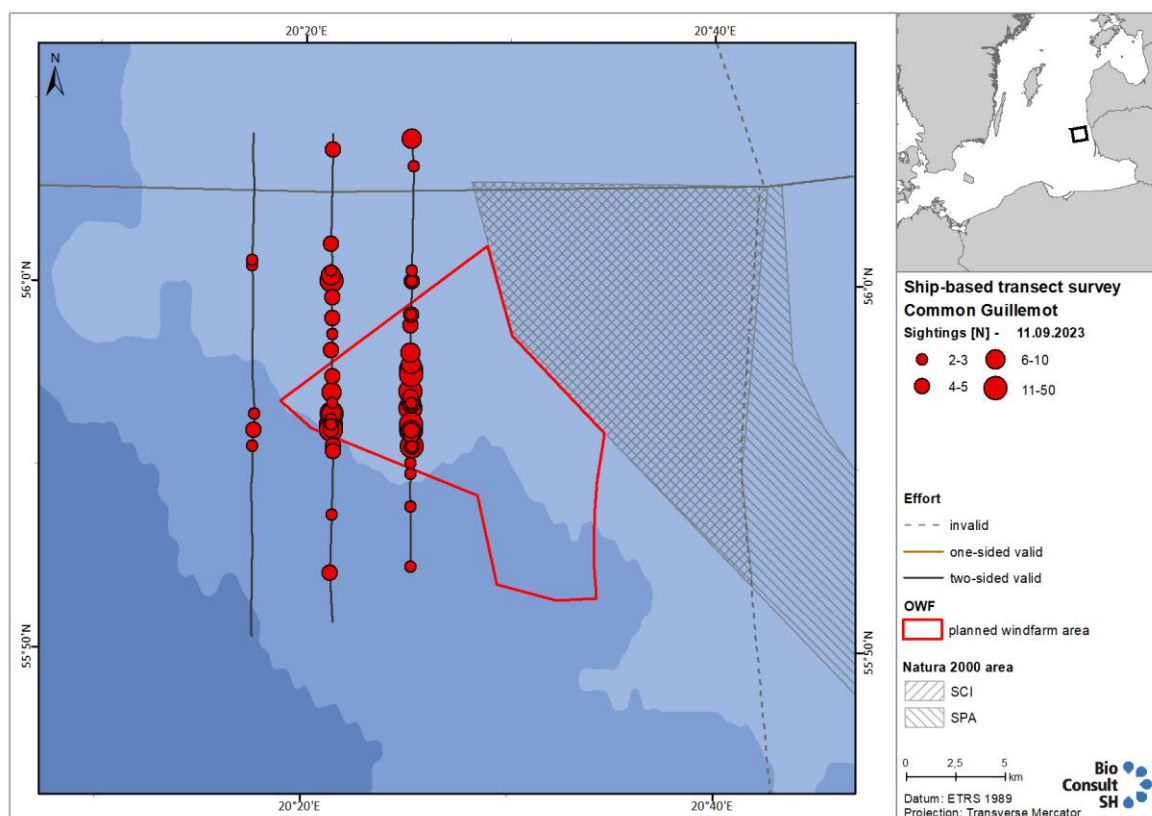
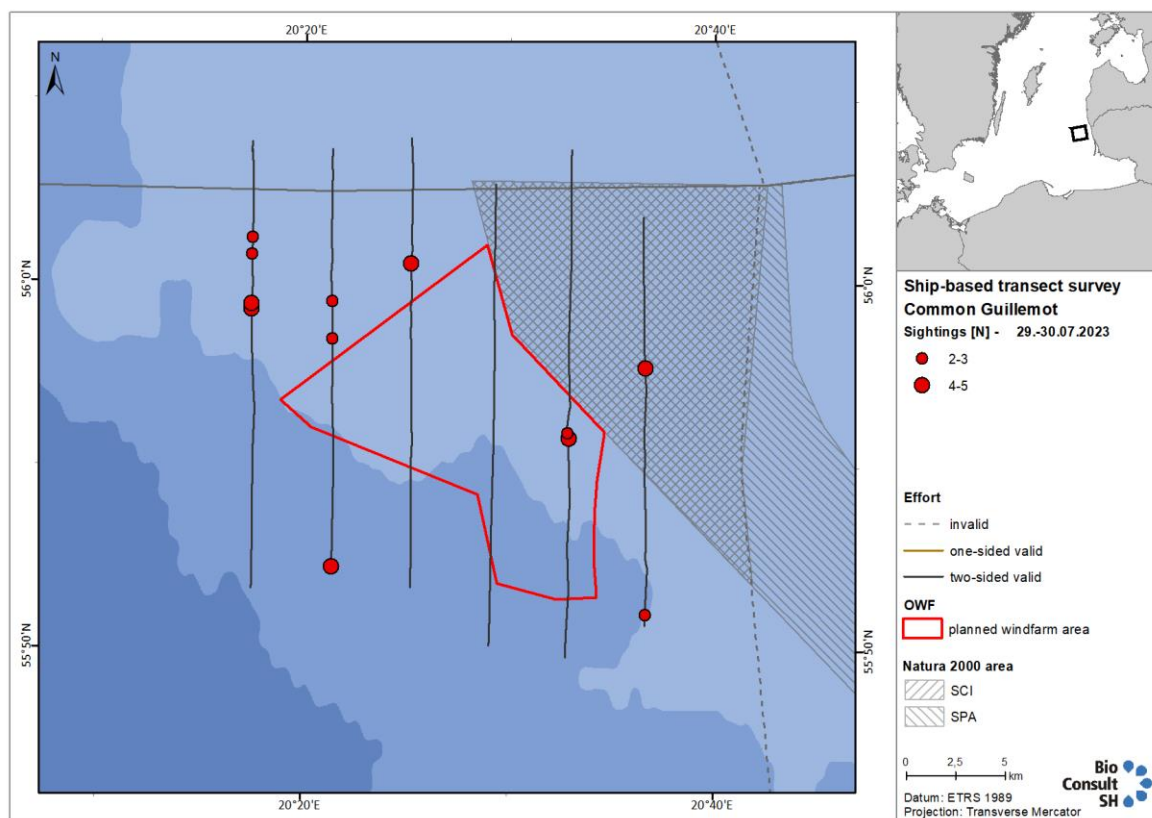


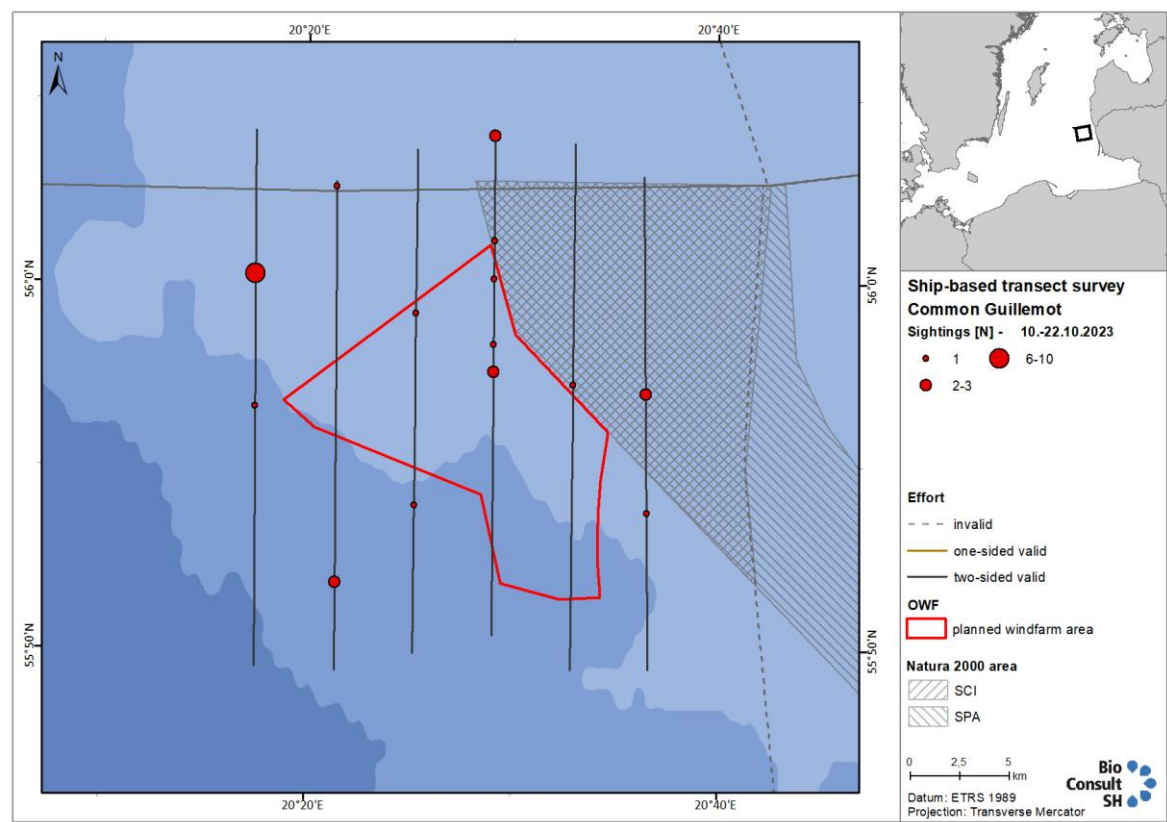




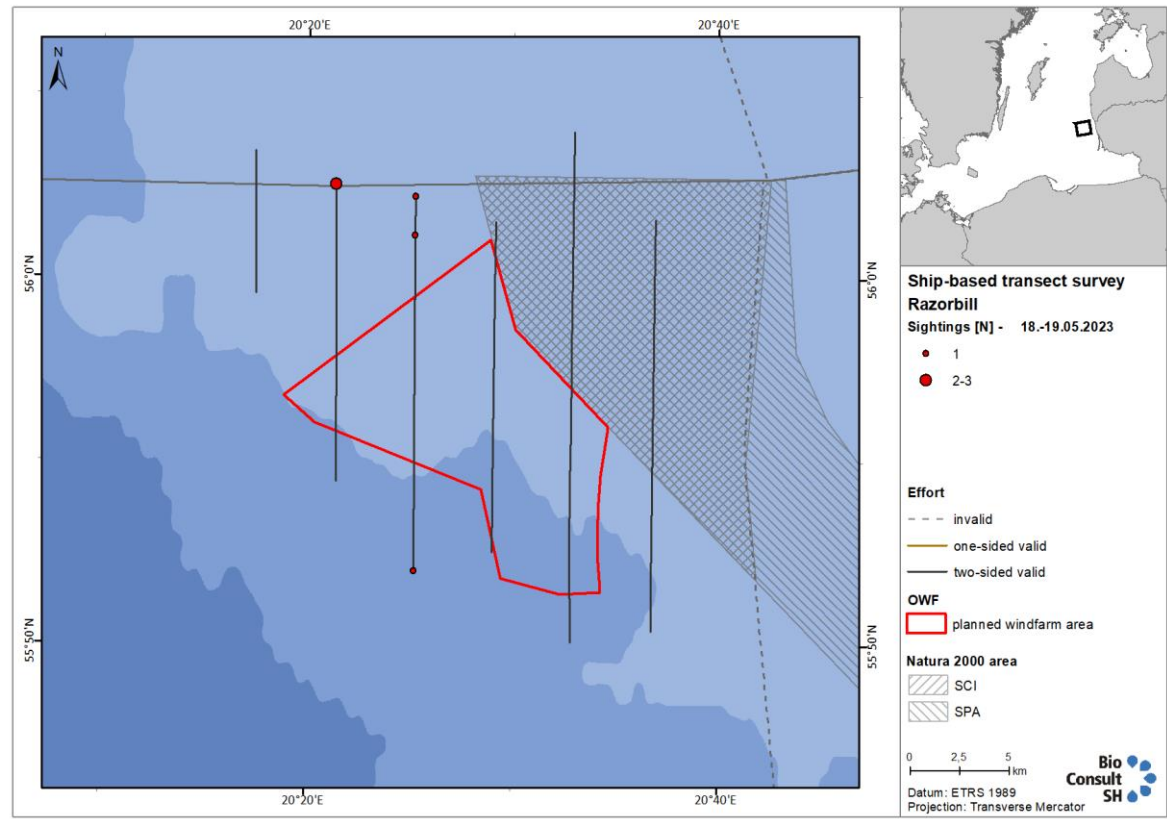
A.3.9 Common Guillemot (*Uria aalge*)







A.3.10 Razorbill (*Alca torda*)



Survey Report

Resting Birds

Report May 2023 – January 2025

Ship-based and Digital aerial surveys



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V 2.0

Husum, June 2025

Prepared for PI Coastal Research and Planning Institute

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QA / Approval	10.06.2025	Version: V2.0
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Client	Public Institution Coastal Research and Planning Institute	

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LIST OF ABBREVIATIONS

AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
CORPI	Public Institution Coastal Research and Planning Institute
CSR	Conservation Status Report
DDT	Dichlorodiphenyltrichloroethane
DNA	Deoxyribonucleic Acid
EEZ	Exclusive Economic Zone
ESAS	European Seabirds at Sea
EU	European Union
EUNIS	European Nature Information System
HELCOM	Baltic Marine Protection Commission (Helsinki Convention)
IUCN	International Union for Conservation of Nature
OWF	Offshore wind farm
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
SCI	Site of Conservation Importance
SPA	Special Protection Area
SPEC	Species of European Conservation Concern
STUK 4	Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment. Version 4.
OWF	Offshore Wind Farm

1 INTRODUCTION

On behalf of the Public Institution Coastal Research and Planning Institute (CORPI), BioConsult SH conducted digital aerial surveys between November 2023 and January 2025, using data collection and analysis methods comparable to German standards (BSH 2013). Additionally, CORPI conducted vessel-based surveys between May to October 2023 and May to October 2024. Both types of surveys were specifically tailored to collect data on resting birds. All collected data was analysed by BioConsult SH.

The goal was to determine the abundance and spatial distribution of resting seabirds in an area within the exclusive economic zone (EEZ) of Lithuania, where the development of an offshore wind farm (OWF) is being planned. This report presents findings from twelve ship-based and nine digital aerial surveys conducted between May 2023 and January 2025, employing consistent spatial coverage and standardized methodology over a period of 21 months.

1.1 Description of the project area

The planned offshore windfarm area is located 37 km west of the coast of Lithuania (Figure 1.1). It borders the Special Protection Area (SPA) “Klaipėdos–Ventspilio plynaukštė” (EEA 2015), which extends to the east of the planned OWF area - Curonian Nord (LT11). Relevant bird species in this SPA are Red-throated Diver (*Gavia stellata*), Long-tailed Duck (*Clangula hyemalis*), Velvet Scoter (*Melanitta fusca*), Common Guillemot (*Uria aalge*) and Razorbill (*Alca torda*).

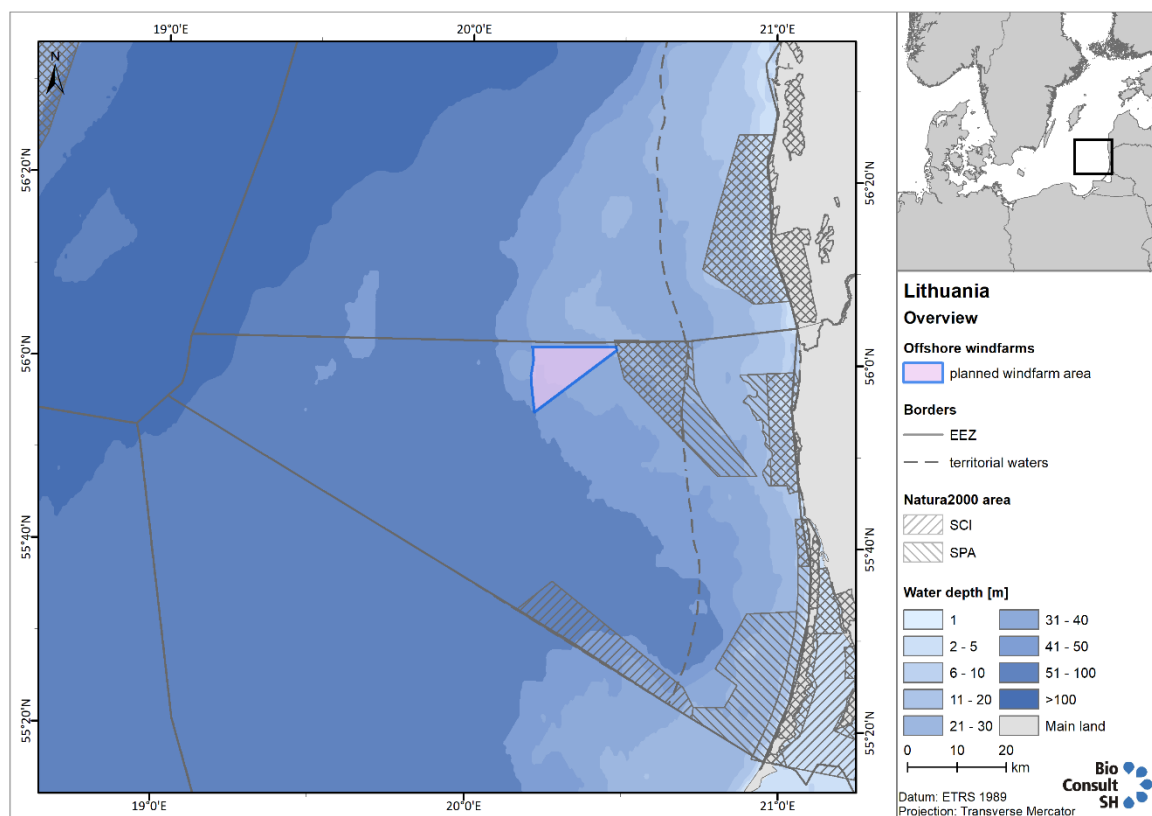


Figure 1.1 Overview of the study area (pink filled area with blue outlines) in Lithuania, including the locations of different protected areas (grey hatched areas).

2 METHODS

This section outlines the methodology employed to assess the presence and species composition of resting birds within the proposed OWF area and its surroundings. To ensure comprehensive data collection throughout the year, a combination of aerial surveys and ship-based surveys was utilized.

These complementary approaches allowed for the thorough monitoring of avian activity across the full seasonal cycle. The subsequent sections provide a concise yet detailed description of each methodology, highlighting their scope and implementation.

2.1 Aerial surveys using digital photographs

2.1.1 Description of the survey transects

This report uses the abundances of resting birds and distributions obtained from a total of nine airplane-based digital surveys conducted between November 2023 and January 2025 (Table 2.1).

The design of the transects was aimed to cover not only the extension of the planned windfarm but also the adjacent surroundings, with a total covered area of 2,345.7 km². The transects, 19 in total, run parallel to each other with north-south orientation and were spaced 5,000 m from each other.

Two designs were implemented to cover the studied area; the first transect design consists of transects 1-13 with a length of 39 km each and spanned over a distance of 60 km, while the second design comprised transects 14-19 of 23.4 km in length each, and were overlaid over the first design but spread across a shorter length (25 km), just over the planned OWF, running equidistantly in between transects 5-11 (Figure 2.1, Table 2.1).

In total, 1,295 km of transects were planned to survey the planned OWF and adjacent area for the analysis of resting birds.

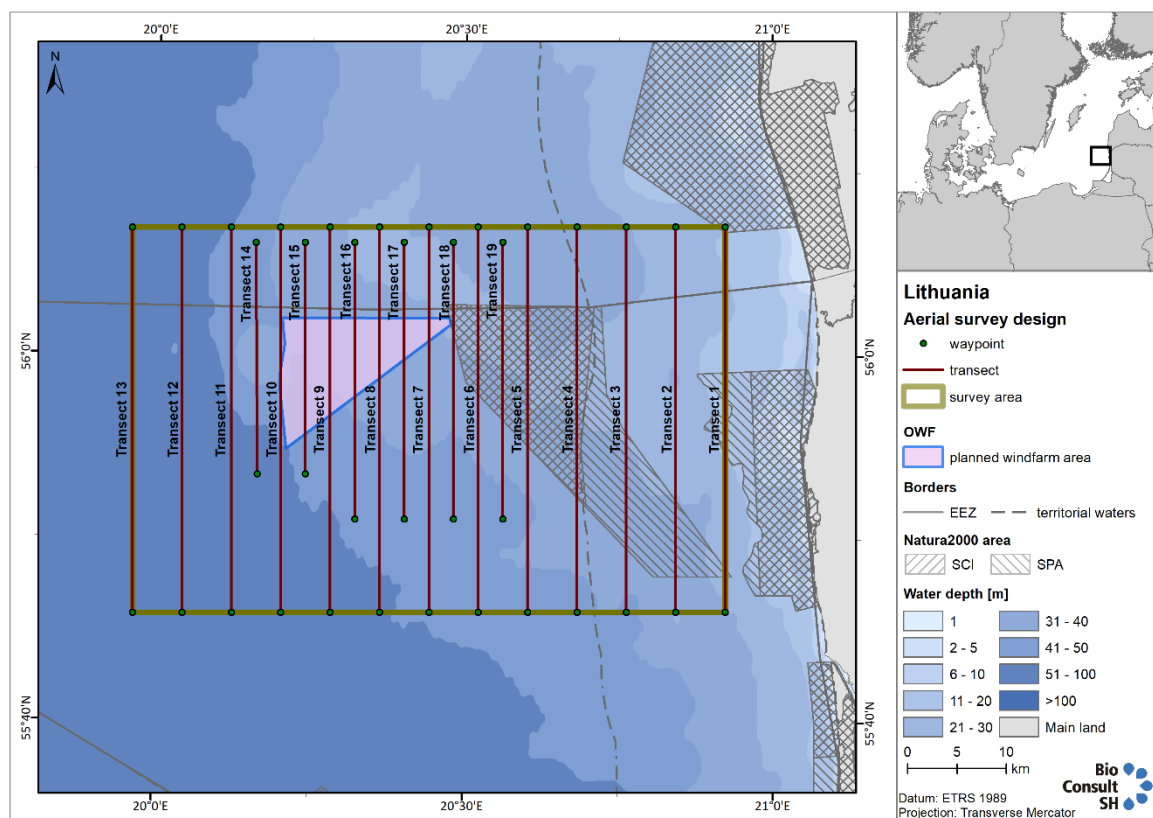


Figure 2.1 Aerial survey transect design for the survey area. The figure includes the planned windfarm area (filled in pink).

Table 2.1 Geographical coordinates of waypoints for aerial survey transects in the study area.

Transect	Waypoint	Latitude	Longitude
1	1	55° 46.042' N	20° 55.399' E
1	2	56° 07.153' N	20° 55.363' E
2	3	55° 46.069' N	20° 50.620' E
2	4	56° 07.094' N	20° 50.535' E
3	5	56° 07.086' N	20° 45.710' E
3	6	55° 46.061' N	20° 45.838' E
4	7	55° 46.051' N	20° 41.057' E
4	8	56° 07.075' N	20° 40.885' E
5	9	56° 07.061' N	20° 36.060' E
5	10	55° 46.037' N	20° 36.275' E
6	11	55° 46.020' N	20° 31.494' E
6	12	56° 07.044' N	20° 31.236' E
7	13	56° 07.024' N	20° 26.411' E

Transect	Waypoint	Latitude	Longitude
7	14	55° 46.000' N	20° 26.713' E
8	15	55° 45.976' N	20° 21.932' E
8	16	56° 06.996' N	20° 21.586' E
9	17	56° 06.974' N	20° 16.762' E
9	18	55° 45.951' N	20° 17.151' E
10	19	55° 45.921' N	20° 12.370' E
10	20	56° 06.944' N	20° 11.937' E
11	21	56° 06.911' N	20° 07.114' E
11	22	55° 45.889' N	20° 07.589' E
12	23	55° 45.853' N	20° 02.809' E
12	24	56° 06.875' N	20° 02.290' E
13	25	56° 06.836' N	19° 57.464' E
13	26	55° 45.815' N	19° 58.026' E
14	27	55° 53.474' N	20° 09.924' E
14	28	56° 06.095' N	20° 09.544' E
15	29	56° 06.127' N	20° 14.366' E
15	30	55° 53.504' N	20° 14.614' E
16	31	55° 53.532' N	20° 19.410' E
16	32	56° 06.155' N	20° 19.216' E
17	33	56° 06.180' N	20° 24.012' E
17	34	55° 53.557' N	20° 24.207' E
18	35	55° 53.579' N	20° 29.003' E
18	36	56° 06.202' N	20° 28.834' E
19	37	55° 53.643' N	20° 33.827' E
19	38	56° 06.266' N	20° 33.811' E

Table 2.2 Overview of the digital aerial surveys carried out in the study area between November 2023 and January 2025. The coverage column represents the percentage of area covered within the planned OWF in relation to the total surveyed area.

Date of the aerial survey	Distance (km)	Effort (km ²)	Coverage (%)
21.11.2023	669.5	363.8	15.5
27.12.2023	351.6	191.1	8.1
18.01.2024	497.2	270.2	11.5
25.02.2024	588.0	319.5	13.6
07.03.2024	584.1	317.4	13.5
15.04.2024	591.0	321.1	13.7
04.11.2024	589.2	325.4	13.9
12.12.2024	571.9	302.2	12.9
07.01.2025	590.6	313.6	13.4
Total	3,283.0	1,783.0	

2.1.2 Data collection

The recording of resting birds was performed using the digital video technology developed by the company HiDef (<https://www.hidfsurveying.co.uk>), explained in detail in WEIB ET AL. (2016), and summarized in the following paragraphs.

A twin-engined, high-wing propeller-driven aircraft (OY-VPB Partenavia P68) was used for the acquisition of digital videos. This aircraft is equipped with four high-resolution video camera systems which take approximately seven images per second and can achieve a resolution of two cm at sea surface. Since the camera system is not directed vertically downwards (depending on the sun position, it can be slightly inclined or even set against the flight direction), interferences arising from solar reflections (glare) can be effectively reduced. The external cameras (indicated by A and D, Figure 2.2) cover a strip of 143 m width while the internal ones cover a width of 129 m each, resulting in 544 m effectively covered.

There is, however, about a 20 m distance between each strip to avoid double counting of individuals detected by the cameras. Thus, the total recorded strip of 544 m is distributed over a width of 604 m (see Figure 2.2).

The aircraft flew at a mean speed of approx. 220 km/h (120 knots) at an altitude of more than 500 m. A GPS device (Garmin GPSMap 296) records the position every second which permits to geographically assign a location to the images and the birds registered on them. The collected data were stored on mobile hard disks for subsequent review and analysis.

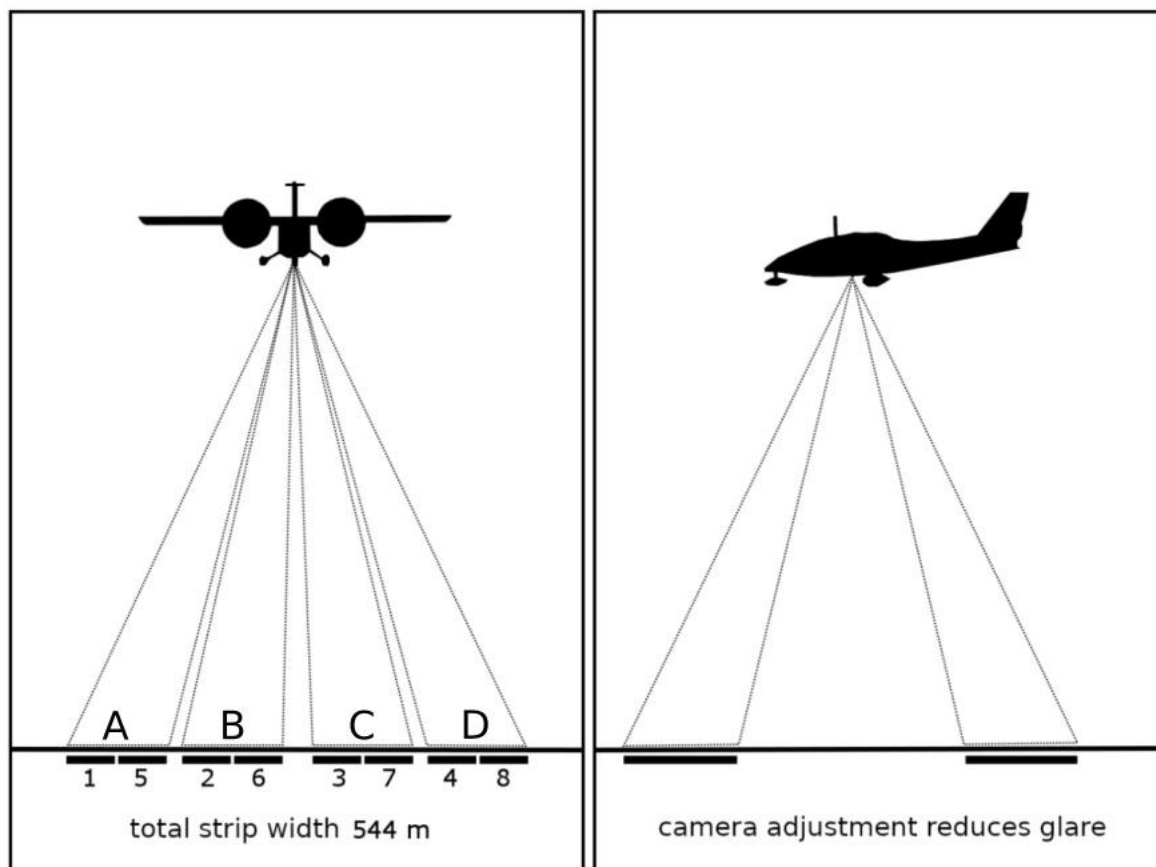


Figure 2.2 The HiDef Camera-System. The four cameras (A to D) cover an effective strip width of 544 m of the sea surface at a flight altitude of more than 500 m (left: frontal view; right: side view). The numbering indicates the camera images as they are used in the evaluation (the images from each camera are divided into two halves).

2.1.3 Data processing

To facilitate the detection of objects, the video sequences taken from each camera were split into two halves so that each half of the picture fitted the width of a large monitor. The video files were then processed, using an image capture and management software (*StreamPix*) for analysis. First, the images were examined and all the detected objects (birds, mammals, ships, etc.) were marked and pre-sorted for subsequent identification. To guarantee a consistently high quality, 20 % of each film was randomly selected and processed again by another reviewer. If both reviewers agreed over 90 % of the cases in that film, any discrepancy was rechecked, and the film approved for the next analysis step. If not, the film was reanalysed. Sections of the footage that could not be assessed due to backlight or the presence of clouds were not considered for further analysis.

The next step involved the identification of the previously marked objects (birds). This was done by experienced observers. Often birds can be identified on the images to species level. Because of the strong similarities between some species (e.g., common guillemot and razorbill, common and Arctic tern, and red-throated and black-throated diver), it is not always possible to identify the individuals to species level.

However, it is usually possible to identify individuals as belonging to a species group formed by two (or few) closely related species. In addition to the identification, other information such as position,

age, behaviour (swimming or flying) and flight direction were determined whenever possible. Environmental parameters (air turbidity, sea state, solar reflection, and water turbidity) were recorded every 500 images (approximately 4 km). In a second step for quality control, 20 % of the objects identified were re-assessed by a second reviewer. All discrepancies between the first and second identification process were checked again by a third expert. If there was an agreement by at least 90 %, the data collected was released for further analysis. If an agreement was lower than 90 %, systematic errors (e.g., problems in determining specific species groups) were corrected and all objects viewed in the film concerned were re-identified.

2.1.4 Data analysis

All detected resting birds were either assigned a species or species group category (see below). Among these, relevant species/species groups were defined based on the frequency of occurrence in the survey area and the importance of the area as habitat for species according to reference literature. A list of all recorded species and their abundances is provided in the appendix A.1.

The individuals not identified to species level in the aerial surveys were initially grouped into a larger taxonomic group of very similar species. Examples of these are common guillemot/razorbill and unidentified divers (red-throated and black-throated diver). These “two species” species groups include a large proportion of the resting birds not identified to species level. Other resting birds, that could not be assigned to any of the previously mentioned species or to another two-species group, are in most cases identified to family level.

2.1.5 Calculation of densities

Densities (ind./km²) were calculated for all relevant resting bird species and species groups. To calculate densities the number of detected individuals of each species/taxon in each survey is divided by the area covered by the transects (“effort”). As the effect of the aircraft on any flight behaviour of the birds is negligible, no correction factors are applied to the abundances of species from aerial surveys. Therefore, it is assumed that all individuals are captured by the images.

The spatial distribution was determined for all surveys together or seasonally according to the species-specific classification by Garthe et al. (GARTHE ET AL. 2007) and displayed using grid density maps. In short, a grid was laid over the survey area with its grid cells aligned with the EEA grid (EEA 2019). The individual cells consist of rectangles with edge lengths of 5 km. In total, a grid of 104 cells was created for the survey area. Also, distribution maps for individual surveys were produced and can be found in the appendixes A.2.

2.2 Ship-based surveys

This report uses seabird abundances and distributions obtained from a total of twelve ship-based surveys conducted between May to October 2023 and May to October 2024. The transect design aimed to cover the planned OWF area – Curonian Nord (LT11) and its surroundings as part of the baseline monitoring prior to construction. The total transect design was subdivided into eight sub transects with an average length of 21.26 ± 0.01 km (Table 2.3). The total transect designed length was 170.1 km. From those, four sub-transects (3 to 6) were overlapping the OWF planned area, whereas the remaining ones (1-2 and 7-8) were focused on the west and east side ends of the OWF area (Figure 2.3). A depth gradient is located westwards of the OWF and was potentially interesting to investigate it in terms of presence of resting birds and likely foraging areas during the breeding season as well as the presence of the Special Protection Area (SPA) eastwards, especially for wintering birds.

The transects run parallel to each other and were spaced by 4 km. The area covered by the transect design was 616.5 km², of which 120.5 km² (19.6 %) were within the limits of the planned OWF. The total length of the designed transect surveys was 170.1 km, which represents a total planned surveyed area within transect of 102.1 km², of which 31.9 km were inside the planned OWF (covering a total area within transect inside the OWF of 19.1 km²).

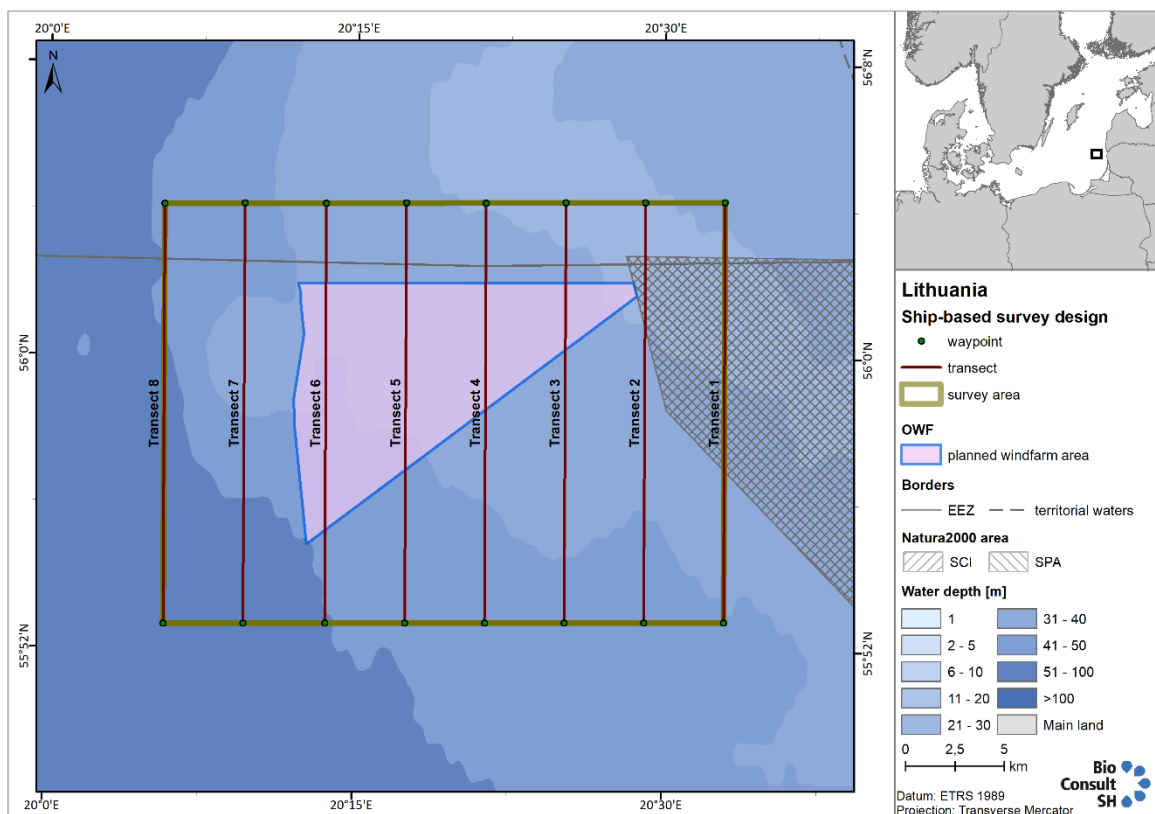


Figure 2.3 Transect design for ship-based resting bird monitoring from May to October 2023 and 2024. The total study area covers 616.5 km².

Table 2.3 *Geographical coordinates of aerial survey waypoints and transects in the study area during aerial surveys.*

Transect	Waypoint	Latitude	Longitude
1	1	56° 04.2843' N	20° 32.9420'E
	2	55° 52.8193' N	20° 32.9924'E
2	3	56° 04.2668' N	20° 29.0629'E
	4	55° 52.8041' N	20° 29.1181'E
3	5	56° 04.2461' N	20° 25.1724'E
	6	55° 52.7869' N	20° 25.2549'E
4	7	56° 04.2253' N	20° 21.2778'E
	8	55° 52.7677' N	20° 21.3807'E
5	9	56° 04.2078' N	20° 17.4014'E
	10	55° 52.7464' N	20° 17.5095'E
6	11	56° 04.1767' N	20° 13.4851'E
	12	55° 52.7230' N	20° 13.6225'E
7	13	56° 04.1582' N	20° 09.5104'E
	14	55° 52.6971' N	20° 09.6572'E
8	15	56° 04.1229' N	20° 05.5943'E
	16	55° 52.6696' N	20° 05.7705'E

Unfavourable sea state conditions or poor visibility could hamper the validity of observations collected during the digital aerial surveys. Therefore, ship-based transects were performed under optimal conditions in which sea state was equal or lower than 4 (wave height lower than 2.5 m) or visibility was greater than 2 km. If during a transect, weather and sea state conditions suddenly changed, these sections were omitted from the analysis. However, during the surveys conducted between May to October 2023 and May to October 2024, all sections were recorded according to the minimum weather criteria established. The transect distance recorded and the degree of coverage of the survey area per sailing are shown in Table 2.4.

Table 2.4 Overview of the six ship-based surveys carried out in the study area between May and October 2023 and 2024, including percentage of coverage of the transects within the planned OWF.

Survey	Distance covered [km]	Ship	Effort [km ²]	Within OWF [km]	% Coverage
18.05.2023	266.7	Lilian	80.01	133.35	12.98
25.06.2023	231.77	Lilian	69.53	115.89	11.28
29.07.2023	311.23	Lilian	93.37	155.62	15.15
16.08.2023	312.71	Lilian	93.81	156.35	15.22
11.09.2023	236.5	Lilian	70.95	118.25	11.51
10.10.2023	326.8	Lilian	98.04	163.4	15.90
01.05.2024	294.88	Baltic Navigator	88.46	147.44	14.35
22.06.2024	229.39	Hel-125	68.82	114.69	11.16
15.07.2024	287.12	Kihu	86.14	143.56	13.97
14.08.2024	286.28	Kihu	85.88	143.14	13.93
17.09.2024	307.84	Kihu	92.35	153.92	14.98
16.-17.10.2024	293.92	Kihu	88.18	146.96	14.30

2.2.1 Detection methodology

The surveys were performed closely on the basis of the methodology used in the European Seabird-at-Sea programme (ESAS; GARTHE & HÜPPOP 1996, 2000) and the German BSH guidelines of StUK4 (BSH 2013). The censuses were conducted on board of the vessels Lilian, Baltic Navigator, Hel-125 and Kihu (with overall lengths of 27, 26, 26 and 27 m, respectively).

The vessels sailed at speeds of 7.5 to 9.2 knots (average speed within transect was 8.6 ± 0.1 knots) following the predefined transect lines. Two observers located on the port and starboard side recorded all swimming and flying birds in a 300 m wide transect parallel to the keel line of the ship. The boundary of the transect area to the stern of the ship was formed by a line perpendicular to the keel from the viewpoint of the observers (Figure 2.4).

In addition to the species affiliation, further information such as age, sex, moulting condition, behaviour, association with other species or ships, flight altitude and flight direction of the birds observed were determined when possible. In addition, the distance to the keel line was estimated for all swimming individuals or assigned to a distance category from A to E; flying birds were always assigned the code F.

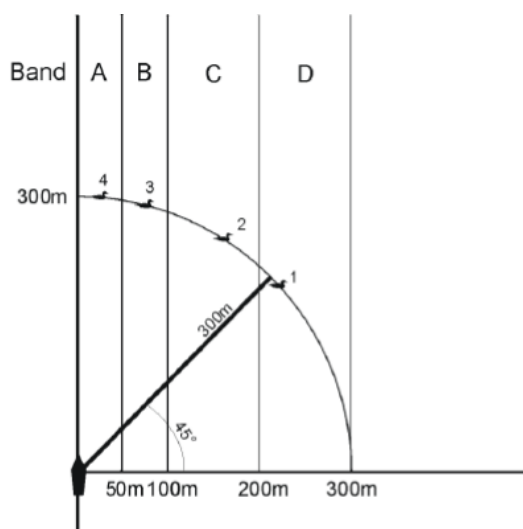


Figure 2.4 Schematic view of bands, following ESAS Code (A-D) and relative position to the vessel for resting birds.

For flying birds, the so-called snapshot method was used. In this case, birds are considered to be “within the transect” only if they are flying over the section to either side of the ship at the moment of the snapshot. The section of the transect that is deemed valid for snapshot acquisition is determined by the width of the transect (300 m perpendicular to the direction of travel) and the distance between the front and the rear ends of the route that is travelled within a defined time unit. At ten knots, this is approx. 300 m in one minute. At ship speeds between eight and twelve knots, snapshots are performed every full minute in accordance with StUK4 (BSH 2013). The distance to the front of the snapshot site is then approx. 250 m at eight knots and about 370 m at twelve knots.

Thus, a transect area of 300 m (to the side) x 300 m (to the front) is usually recorded on both sides of the ship. All flying birds outside this site and those that are not flying within the 300 m for the full minute are treated as outside of the transect. This method of data collection for flying birds prevents frequent and particularly fast flying birds from being overestimated in terms of quantity or being counted multiple times (GARTHE & HÜPPOP 1996).

Some species/species groups are characterized by the fact that they sometimes take flight while still far ahead of the ship (up to over 1 km) and are therefore often missed by the naked eye. For example, divers, common scoters, and grebes have large flight distances (BELLEBAUM ET AL. 2006; SCHWEMMER ET AL. 2011; FLIESSBACH ET AL. 2019).

In order to collect data on these species nevertheless, an area within the range 500 to 2,500 m (in the direction of travel) was scanned with binoculars by one person of the observation team from the bow of the ship (the “bow observer”). As the distance from the observer increases, the error in distance estimation also increases, and therefore it is often not possible to make the precise distance estimations perpendicular to the keel line (see above) that are required. The birds that take flight while far ahead of the ship were classified as either “inside” or “outside” the transect area, because the actual densities of individuals might otherwise be significantly underestimated.

However, even with continuous observation with binoculars, many divers and scoters would only be spotted in flight ahead of the ship. In such cases it is not certain whether the birds flew because of disturbance by the ship or if they were in fact flying across the survey area.

In addition to the data collection of the birds within the transect, birds that were spatially and/or temporally outside the transect were also recorded. In this way, less common species that might otherwise not be recorded can also be considered. However, the results of these censuses are not included in the calculations of monthly and seasonal densities, but they are included in the list of species in the appendix A.1.

2.2.2 Assessment methodology

The number of swimming individuals recorded in the ship-based transect surveys was corrected for data collection errors (see Table 2.5). For the most frequent resting bird species and species groups densities (ind./km²) were calculated. For this purpose, the number of all birds counted within the transect per species/species group (considering the correction factors for swimming/diving birds, see below) was divided by the respective total area for the respective survey.

To show the spatial distribution of resting birds, the survey area was covered with a grid of 48 cells with a 4 x 4 km side length. The appendix additionally contains pinpoint maps of sightings (A.3).

2.2.3 Correction factors

Because swimming birds are more easily overlooked by the observer with increasing distance, the individual numbers recorded are adjusted with a correction factor (GARTHE ET AL. 2007, 2009). Only the numbers of swimming and diving individuals are corrected (GARTHE ET AL. 2007) and not those of flying birds. The factors used for correcting the population densities are shown in Table 2.5.

Table 2.5 Correction factors for swimming/diving birds according to values from the literature (GARTHE ET AL. 2007, 2009) as well as the correction factors used for the calculation of the densities. For Long-tailed Duck, no correction factor was applied.

Correction factors	Correction factors used for the calculations
Divers	1.7
Little Gull	1.7
Common Gull	1.7
Lesser black-backed Gull	1.6
Herring Gull	1.7
Common Guillemot	2.1
Razorbill	2.0

3 RESULTS

3.1 Species composition and abundance

As described in the methods, the digital aerial surveys took place between November 2023 to April 2024 and November 2024 to January 2025 while ship-based surveys covered the period from May to October 2023 and May to October 2024. The number of resting birds recorded by these two methodologies are summarised in Table 3.2 and Table 3.2. Additionally, within the annexe's supplementary material is added with all recorded species during the aerial (Table A 1 and Table A 2) and the ship-based surveys Table A 3 and Table A 4). Furthermore, in the annexe's A.2 and A.3, distribution maps are provided with the location of the observations for those relevant species reflected in this report.

Table 3.1 Bird counts and percentages of all resting bird species during the ship and aerial based transect surveys in the survey area between May 2023 and April 2024. Percentages lower than 0.1 % are represented as <0.1 %. Number of individuals include only those counted within the transect area. In the result section, species that represent at least 0.5 % of abundance are further described.

Species	Scientific name	Lithuanian	Ship-based surveys		Aerial surveys	
			N° ind.	%	N° ind.	%
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	1	<0.1	559	9.0
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras	88	4.4	11	0.2
Unidentified diver	-	-	-	-	59	0.9
Unidentified grebe	-	-	-	-	4	<0.1
Great Cormorant	<i>Phalacrocorax carbo</i>	Didysis kormoranas	21	1.1	7	0.1
Common Eider	<i>Somateria mollissima</i>	Paprastoji gaga	-	-	5	0.1
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledinė antis	11	0.6	640	9.7
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis	-	-	33	0.5
Common Scoter / Velvet Scoter	-	-	-	-	201	3.0
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegūlė	5	0.3	2,073	31.3
Arctic Skua	<i>Stercorarius parasiticus</i>	Smailiauodegis plėšikas	1	<0.1	-	-
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	787	39.2	514	7.8
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Rudagalvis kiras	-	-	2	<0.1
Common Gull	<i>Larus canus</i>	Paprastasis kiras	122	6.1	93	1.4
Lesser Black-backed Gull	<i>Larus fuscus</i>	Silkinis kiras	5	0.3	13	0.2
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras	445	22.2	317	4.8
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras	2	0.1	10	0.2
Common Gull / Herring Gull	-	-	-	-	-	-

Species	Scientific name	Lithuanian	Ship-based surveys		Aerial surveys	
			N° ind.	%	N° ind.	%
Lesser Black-backed Gull / Great Black-backed Gull	-	-	-	-	1	<0.1
Unidentified gull	-	-	-	-	18	0.3
Unidentified large gull	-	-	-	-	23	0.4
Unidentified small gull	-	-	-	-	25	0.4
Sandwich Tern	<i>Thalasseus sandvicensis</i>	Margasnapė žuvedra	1	<0.1	-	-
Common Tern	<i>Sterna hirundo</i>	Upinė žuvedra	2	0.1	-	-
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narūnėlis	469	23.3	736	11.1
Razorbill	<i>Alca torda</i>	Alka	48	2.4	520	7.9
Common Guillemot / Razorbill	-	-	-	-	664	10.0
Unidentified auk	-	-	-	-	6	0.1
Total			2,009	-	6,625	-

Table 3.2 Bird counts and percentages of all resting bird species during the ship and aerial based transect surveys in the survey area between and May 2024 to January 2025. Percentages lower than 0.1 % are represented as <0.1 %. Number of individuals include only those counted within the transect area. In the results section, species that represent at least 0.5 % of abundance are further described.

Species	Scientific name	Lithuanian	Ship-based surveys		Aerial surveys	
			N° ind.	%	N° ind.	%
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	8	0.5	178	3.1
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras	79	4.1	12	0.2
Unidentified diver	-	-	-	-	35	0.6
Unidentified grebe	-	-	-	-	2	<0.1
Great Cormorant	<i>Phalacrocorax carbo</i>	Didysis kormoranas	51	3.0	-	-
Common Eider	<i>Somateria mollissima</i>	Paprastoji gaga	1	0.1	-	-
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledinė antis	2	0.1	381	6.7
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis	13	0.8	4	0.1
Common Scoter / Velvet Scoter	-	-	-	-	46	0.8
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegulė	32	1.9	2,559	45.0
Arctic Skua	<i>Stercorarius parasiticus</i>	Smailiauodegis plėšikas	7	0.4	-	-
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	577	33.6	578	10.2
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Rudagalvis kiras	6	0.3	-	-
Common Gull	<i>Larus canus</i>	Paprastasis kiras	107	6.2	66	1.2

Species	Scientific name	Lithuanian	Ship-based surveys		Aerial surveys	
			N° ind.	%	N° ind.	%
Lesser Black-backed Gull	<i>Larus fuscus</i>	Silkinis kiras	51	3.00	-	-
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras	306	17.8	301	5.3
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras	2	0.1	7	0.1
Common Gull / Herring Gull	-	-	-	-	-	-
Lesser Black-backed Gull / Great Black-backed Gull	-	-	-	-	-	-
Unidentified gull	-	-	-	-	1	<0.1
Unidentified large gull	-	-	-	-	6	0.1
Unidentified small gull	-	-	-	-	17	0.3
Sandwich Tern	<i>Thalasseus sandvicensis</i>	Margasnape žuvedra	1	0.1	-	-
Common Tern	<i>Sterna hirundo</i>	Upinė žuvedra	1	0.1	-	-
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narūnėlis	430	25.0	880	15.5
Razorbill	<i>Alca torda</i>	Alka	44	2.6	249	4.4
Common Guillemot / Razorbill	-	-	-	-	332	5.8
Unidentified auk	-	-	-	-	-	-
Total			1,718	-	5,682	

The following tables (Table 3.3, Table 3.4 and Table 3.5) show the density of the most common species and groups in each of the months surveyed by aerial and ship-based survey methodologies.

Table 3.3 Monthly mean densities (ind./km²) of selected species/species groups recorded in the survey area during digital aerial surveys from November 2023 to April 2024 and November 2024 to January 2025. Densities lower than 0.01 ind./km² are represented as <0.01 ind./km² and no sightings are represented by 0. Highlighted in bold are the highest monthly density registered per species and species-group.

Survey Method	Digital aerial surveys									
Species/Species-group	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	Nov-24	Dec-24	Jan-25	Max
Red-throated Diver	0.04	0.11	0.10	0.47	1.06	0.16	0.38	<0.01	0.12	1.06
Black-throated Diver	0	0.01	0	<0.01	<0.01	0.02	0.03	0	0	0.03
Great Crested Grebe	0	0.03	0	<0.01	0	0.01	0	0	<0.01	0.03
Great Cormorant	0	0	0	<0.01	0.02	<0.01	0	0	0	0.02
Long-tailed Duck	0.33	0.16	0.40	0.33	0.62	0.24	0.06	0.61	1.04	1.04
Common Scoter	0	0.01	0	0	0	0.10	0.01	0	0	0.10
Velvet Scoter	0.18	0.77	2.08	2.30	1.77	<0.01	0.37	3.27	7.16	7.16
Little Gull	0.37	0.93	0.12	0.03	0.16	0.36	0.91	0.37	0.35	0.93
Black-headed Gull	0.01	0	0	0	0	0	0	0	0	0.01
Common Gull	0.11	0.12	0.01	0.02	0.04	0.03	0.09	0.17	0.05	0.17
Lesser Black-backed Gull	0	0	0	0	0	0.04	0	0	0	0.04
Herring Gull	0.27	0.36	0.12	0.09	0.22	0.07	0.43	1.05	0.29	1.05
Great Black-backed Gull	0	0.02	0.00	0	0.01	0.01	<0.01	0	0.01	0.02
Common Guillemot	0.46	0.45	0.18	0.51	0.38	0.47	2.00	0.32	0.50	2.00
Razorbill	0.23	0.22	0.03	0.41	0.70	0.10	0.22	0.31	0.42	0.70
Divers	0.06	0.13	0.11	0.48	1.21	0.19	0.51	0	0.12	1.21
Cormorants	0	0	0	<0.01	0.02	<0.01	0	0	0	0.02
Grebes	0.01	0.03	0	0.01	0	0.01	<0.01	0	<0.01	0.03
Sea ducks	0.55	1.04	2.80	2.79	2.40	0.34	0.43	3.89	8.19	8.19
Gulls	0.39	0.52	0.13	0.13	0.27	0.16	0.57	1.32	0.35	1.32
Auks	1.09	0.99	0.51	1.28	1.76	0.75	2.76	0.81	1.24	2.76
No. of surveys	1	1	1	1	1	1	1	1	1	

Table 3.4 Monthly mean densities (ind./km²) of selected species/species groups recorded in the survey area during the ship-based transect surveys between May and October 2023. Densities lower than 0.01 ind./km² are represented as <0.01 ind./km² and no sightings are represented by 0. Highlighted in bold the highest monthly density registered per species and species-group

Survey method	Ship-based transect surveys						
Species / Species-group	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Max. (ind./km ²)
Red-throated Diver	0	0	0	0	0	0.01	0.01
Black-throated Diver	1.28	0	0	0	0	0.06	1.28
Great Crested Grebe	0.01	0	0	0	0	0	0.01
Great Cormorant		0.01	0	0.07	0	0.14	0.14
Long-tailed Duck	0.01	0	0	0	0	0.10	0.01
Common Scoter	0	0	0	0	0	0	0
Velvet Scoter	0	0	0	0	0	0.05	0.05
Little Gull	0.15	2.00	5.51	5.88	0.05	0.37	0.15
Black-headed Gull	0	0	0	0	0	0	0
Common Gull	0.18	0.07	0.25	0.22	0.08	0.67	0.18
Lesser Black-backed Gull	0	0.01	0	0.03	0.02	0	0.03
Herring Gull	1.64	0.14	0.47	1.98	0.51	1.60	1.98
Great Black-backed Gull	0	0	0	0.04	0	0	0.04
Sandwich Tern	0	0	0	0	0.01	0	0.01
Common Tern	0	0	0	0.02	0	0	0.02
Common Guillemot	0	0.06	0.72	0.83	9.09	0.75	9.09
Razorbill	0.09	0.01	0	0	0	0.41	0.41
Divers	1.28	0	0	0	0	0.07	1.28
Grebes	0.01	0	0	0	0	0	0.01
Cormorants	0	0.01	0	0.07	0	0.14	0.14
Sea ducks	0.01	0	0	0	0	0.15	0.15
Gulls	1.83	0.22	0.72	2.27	0.62	2.28	2.28
Auks	0.09	0.07	0.72	0.83	9.09	1.15	9.09
No. of surveys	1	1	1	1	1	1	-

Table 3.5 Monthly mean densities (ind./km²) of selected species/species groups recorded in the survey area during the ship-based transect surveys between May and October 2024. Densities lower than 0.01 ind./km² are represented as <0.01 ind./km² and no sightings are represented by 0. Highlighted in bold the highest monthly density registered per species and species-group.

Survey method	Ship-based transect surveys						
Species / Species-group	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Max. (ind./km ²)
Red-throated Diver	0.09	0	0	0	0	0.01	0.09
Black-throated Diver	1.12	0	0	0	0.15	0.03	1.12
Great Cormorant	0.03	0	0	0	0.52	0	0.52
Common Eider	0.01	0	0	0	0	0	0.01
Long-tailed Duck	0.02	0	0	0	0	0	0.02
Common Scoter	0.01	0	0	0	0	0.14	0.14
Velvet Scoter	0.07	0	0	0.17	0	0.12	0.17
Little Gull	1.48	0.04	6.65	2.19	0.03	0.12	6.65
Common Gull	0.06	0.04	0.75	0.15	0.18	0.35	0.75
Lesser Black-backed Gull	0.58	0	0	0.04	0.14	0	0.58
Great Black-backed Gull	0	0.01	0.02	0	0	0	0.02
Black-headed Gull	0	0.03	0.01	0.02	0	0.01	0.03
Herring Gull	0.14	0.34	1.95	1.05	1.08	0.37	1.95
Common Tern	0.01	0	0	0	0	0	0.01
Common Guillemot	1.38	0.12	0.39	3.57	2.80	1.28	3.57
Razorbill	0.47	0.01	0	0	0	0.25	0.47
Divers	1.27	0	0.01	0	0.16	0.09	1.27
Cormorants	0.03	0	0	0	0.52	0	0.52
Sea ducks	0.11	0	0	0.17	0	0.26	0.26
Gulls	0.77	0.4	2.72	1.24	1.40	0.73	2.72
Auks	1.97	0.13	0.40	3.57	2.80	1.53	3.57
No. of surveys	1	1	1	1	1	1	-

3.1.1 Digital aerial surveys

2023-2024

A total of six aerial surveys were conducted between November 2023 and April 2024, one survey per month (see Table 2.2). During this period, 7,049 birds belonging to 20 species were recorded, of which 6,625 were resting birds (Table 3.2). There were 1,043 resting birds which could not be identified to species level (15.7 % of the total). Nonetheless, resting birds could be classified into 16 species.

Sea ducks dominated the resting bird community, making up to 44.6 % (n=2,952) of the total. Auks and gulls represented 29.1 % (n= 1,926) and 16.0 % (n= 1,058), respectively. Divers, mainly represented by Red-throated Divers, contributed to 10.1 % (n= 669) of the observed resting birds during the survey period (Figure 3.1).

In terms of species, the most common was the Velvet Scoter, whose abundance was 31.3 % (n= 2,073), followed by Common Guillemot (11.1 %; n= 736), Long-tailed Duck (9.7 %; n= 640), Red-throated Diver (9.0 %; n= 599) and Razorbill (7.9 %; n= 520). Three species of gulls: Little Gull (7.8 %; n= 514), Herring Gull (4.8 %; n= 317) and Common Gull (1.4 %; n=93), contributed to 13.9 % of all resting birds detected (Figure 3.1).

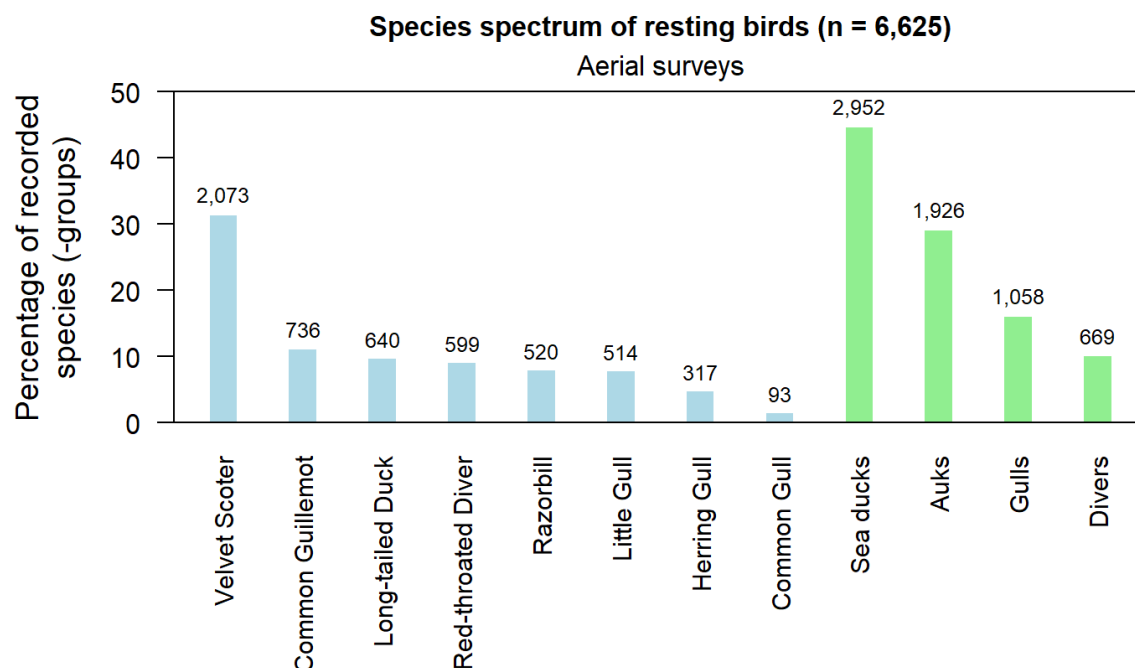


Figure 3.1 Percentage of the most common species or species groups representing at least 0.5 % of the total number of resting birds recorded during aerial surveys in the surveyed area between November 2023 and April 2024 (number of recorded individuals per species/species group is shown above each bar). Species are depicted in blue, species groups in green.

2024-2025

A total of three aerial surveys were conducted between November 2024 and January 2025, one survey per month (see Table 2.2). During this period, 5,782 birds belonging to 17 species were recorded, of which 5,682 were resting birds (Table 3.1). There were 461 resting birds which could not be identified to species level (8.0 % of the total). Nonetheless, resting birds could be classified into 12 species.

Sea ducks dominated the resting bird community, making up to 52.6 % (n=2,990) of the total. Auks and gulls represented 25.7 % (n= 1,461) and 17.6 % (n= 998) of all resting birds, respectively. Divers, mainly represented by Red-throated Divers, contributed to 4.0 % (n= 225) of the observed resting birds during the survey period (Figure 3.1).

In terms of species, the most common one was the Velvet Scoter, whose abundance was 45.0 % (n= 2,559), followed by Common Guillemot (15.5 %; n= 880), Long-tailed Duck (6.7 %; n= 381), Red-throated Diver (3.1 %; n= 178) and Razorbill (4.4 %; n= 249). Three species of gulls: Little Gull (10.2 %; n= 578), Herring Gull (5.3 %; n= 301) and Common Gull (1.2 %; n=66), contributed to 13.6% of all resting birds detected (Figure 3.2).

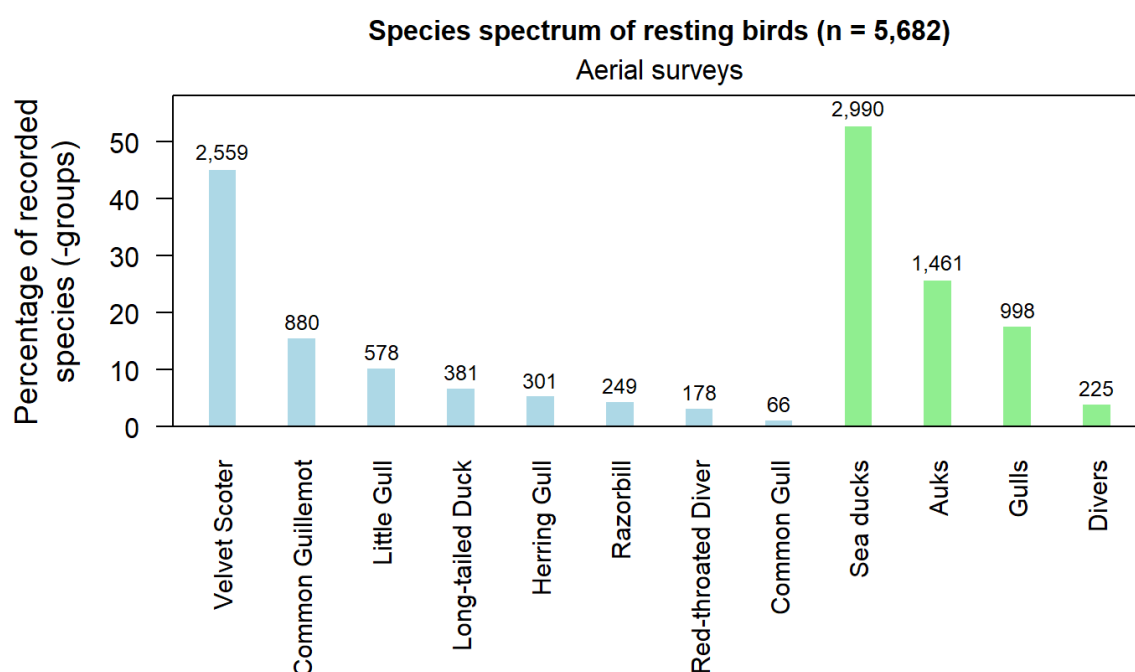


Figure 3.2 Percentage of the most common species or species groups representing at least 0.5 % of the total number of resting birds recorded during aerial surveys in the surveyed area between November 2024 and January 2025 (number of recorded individuals per species/species group is shown above each bar). Species are depicted in blue, species groups in green.

Interannual group comparison

The comparison between the 2023–2024 and 2024–2025 aerial survey periods should be interpreted with caution, as the latter includes only three months of monitoring compared to six in the former. Nonetheless, we present the results to highlight interannual variability and differences across bird groups.

During the aerial surveys conducted in 2023–2024, a total of six resting bird groups were identified, while in the 2024–2025 campaign, four resting bird groups were classified. The only group that was not detected during the second year of monitoring was Cormorants. The group composition was maintained, being sea ducks the most abundant group of birds during both years (2023-2024: 44.6 % - n= 2,952; 2024-2025: 52.6 % - n= 2,990). Auks, gulls and divers followed, respectively. The highest increment in terms of percentage or abundance was among sea ducks, as this group went from 44.6 % to 52.6 % of representation among resting birds. Divers were the group that experienced the highest negative variation, from 10.1 % to 4.0 %, with 444 less individuals detected (Figure 3.3).

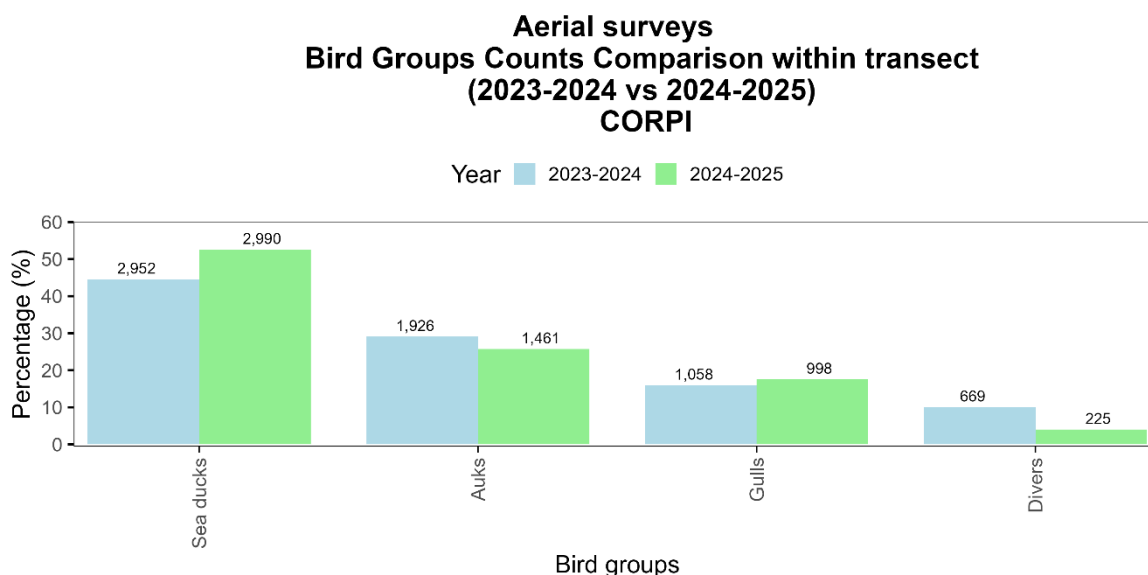


Figure 3.3 Percentage of the most common bird groups representing at least 0.5 % of the total number of resting birds recorded during the aerial surveys in the investigated zone, between November 2023 to April 2024 and (blue) and November 2024 to January 2025 (green). Total number of individuals recorded per group is shown above each bar.

3.1.2 Ship-based surveys

2023

During the six ship-based transect surveys conducted between May and October 2023, a total of 2,644 birds were observed, within transect 2,296 birds. From those observations, 38 species were positively identified to the species level. In total, 2,289 resting birds were registered, 87.7 % (n=2,009) of which occurred within the transect area and are used for further analysis in this report (Table 3.2). These birds correspond to 17 different species (within the transect area) and eight groups. All resting birds observed during the ship-based surveys could be identified to species level.

The majority of birds identified belonged to the groups of gulls (67.8 %; n=1,361) or auks (25.7 %; n=517), which combined represented 93.5 % (n=1,878) of all identified birds. One species, the Little Gull, dominated in numbers observed and accounted for 39.2 % (n=787) of all resting birds during all surveys. Two other species, the Common Guillemot and the Herring Gull followed in dominance with 23.3 % (n=469) and 22.2 % (n=445), respectively. These three species represented 84.7 % (n=1,701) of all species sighted within transect. Additionally, 308 birds belonging to 14 species were observed across the surveyed area. From those, only the species which abundance represented more than 0.5 % were visually represented for clarity (Figure 3.4).

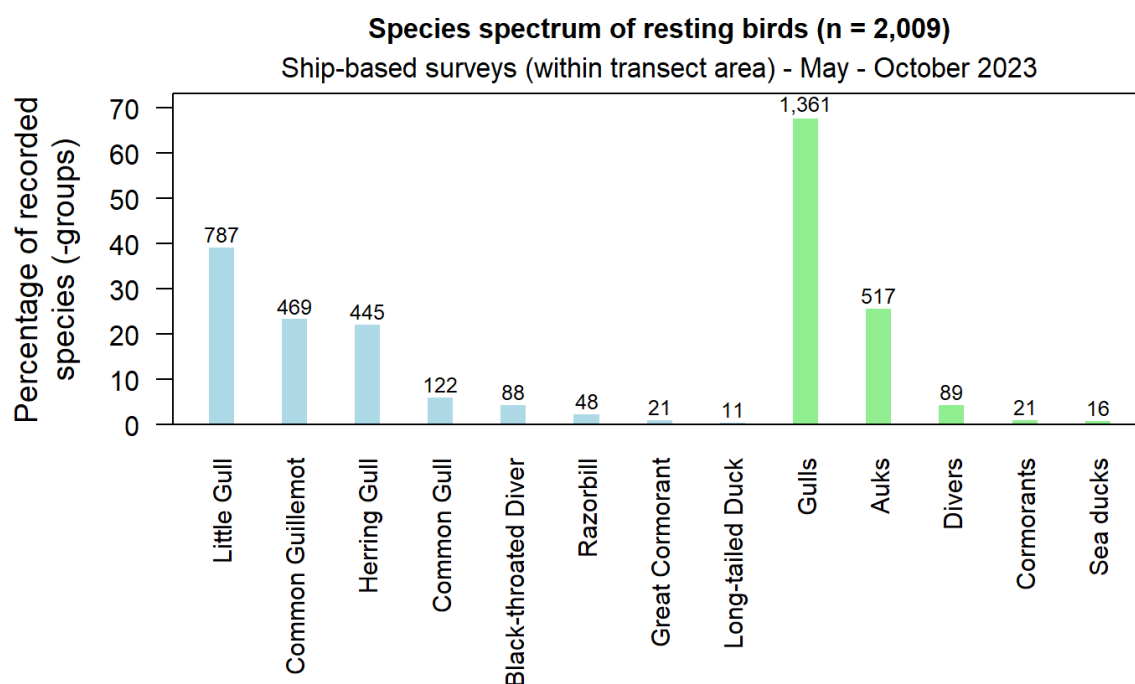


Figure 3.4 Percentage of the most common species (blue) or species groups (green) representing at least 0.5 % of the total number of resting birds recorded during ship-based transect surveys in the investigated zone within the transect area between May and October 2023 (number of individuals recorded is shown above each bar). Species are depicted in blue and species groups in green.

2024

During the six ship-based transect surveys conducted between May and October 2024, a total of 3,014 birds were observed, within the transect only 2,745 birds. From those observations, 44 species were positively identified to the species level. In total, 1,942 resting birds were registered, 88.5 % (n=1,718) of which occurred within the transect area and are used for further analysis in this report (Table 3.2). These birds correspond to 18 different species (within the transect area) and seven groups. All resting birds observed during the ship-based surveys could be identified to species level.

The majority of birds identified belonged to the groups of gulls (61.1 %; n=1,049) or auks (27.6 %; n=474), which combined represented 88.6 % (n=1,523) of all identified birds. One species, the Little Gull, dominated in numbers observed and accounted for 33.6 % (n=577) of all resting birds during all surveys. Two other species, the Common Guillemot and the Herring Gull followed in dominance with 25.0 % (n=430) and 17.8 % (n=306), respectively. These three species represented 76.4 % (n=1,313) of all species sighted within transect. Additionally, 405 birds belonging to 15 different species were observed across the surveyed area. From those, only the species which abundance represented more than 0.5 % were visually represented for clarity (Figure 3.5).

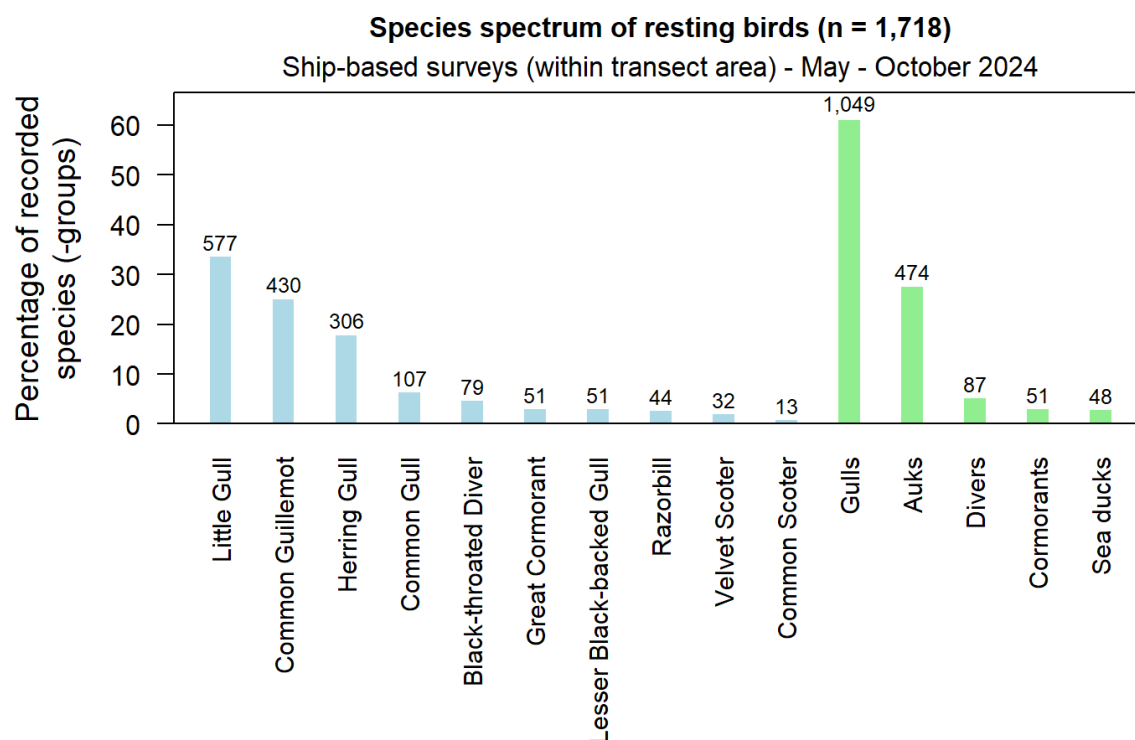


Figure 3.5 Percentage of the most common species (blue) or species groups (green) representing at least 0.5 % of the total number of resting birds recorded during ship-based transect surveys in the investigated zone within the transect area between May and October 2024 (number of individuals recorded is shown above each bar).

Interannual group comparison

During the surveys conducted in 2023, a total of eight resting bird groups were identified while in 2024, seven resting bird groups were detected. The only group of birds not detected in 2024 were the grebes. The group's composition was maintained for both periods of study, being gulls and auks the most abundant groups, followed by divers, cormorants and sea ducks (Figure 3.6). For 2024, there were 14.5 % less resting birds detected. While most of the groups maintained an interannual variability <2.0 %, only the group of gulls showed a higher decrease in detections, with a difference of 6.7 % less sightings when compared to 2023. The drop in gull sightings was due to the reduction in detection of Little Gulls, from 787 to 577 individuals from 2023 to 2024 (Figure 3.5).

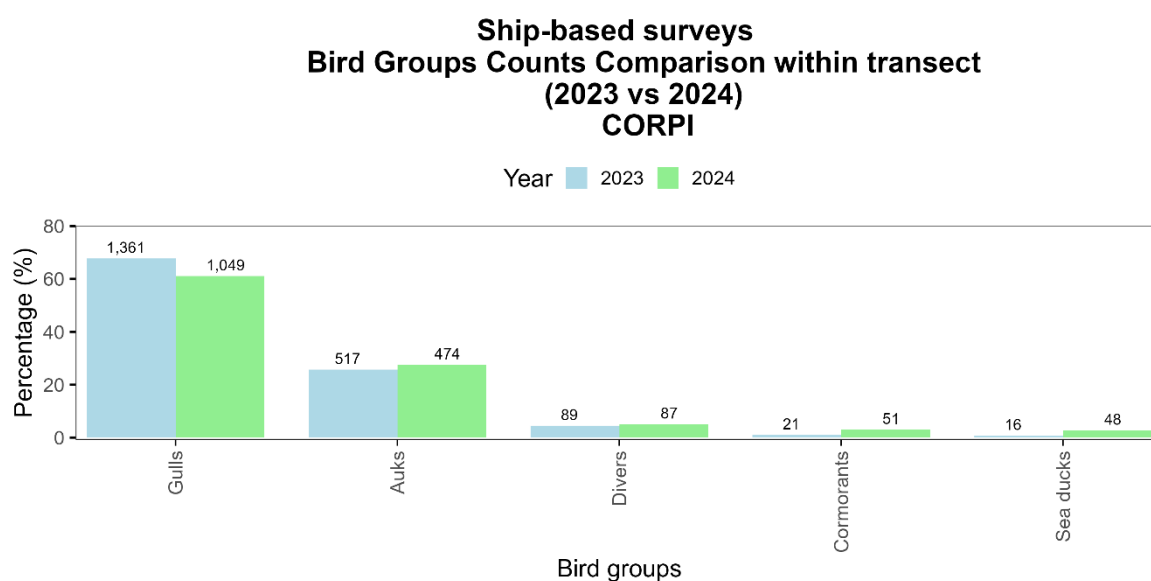


Figure 3.6 Percentage of the most common bird groups representing at least 0.5 % of the total number of resting birds recorded during the ship-based transect surveys in the investigated zone within the transect area (as number shown above each bar), between May to October 2023 (blue) and May to October 2024 (green).

3.2 Frequency and distribution of most common species

In this chapter, all resting bird species that represented at least 0.5 % of the total number of birds surveyed in any of the methodologies used (aerial or ship-based) are further described, sorted in ascending order according to their EURING code. Each species description is followed by a distribution map of the months covered during the surveys and a graph showing how their densities vary across the months.

In addition, a full list of maps of all surveys can be found in the appendixes for these species. The species' ranges and population sizes are obtained from the most recent available data (AEWA CSR 8) of species factsheets from Wetlands International (<http://wpe.wetlands.org>, accessed on 10.11.2024). Their conservation status is based on Birdlife International (2017), IUCN Red List Europe (<http://www.iucnredlist.org>, accessed 10.10.2024) and Annex I of the EU Bird Directive (EUROPEAN UNION 2010).

Additionally, based on the report compiled by BirdLife International (PIGGOTT ET AL. 2021), the collision and displacement risk produced by offshore windfarms is highlighted per species, ranging from very low to very high. All distribution maps can be found in the appendixes A.2 and A.3.

3.2.1 Red-throated Diver

Red-throated Diver – <i>Gavia stellata</i>	LI: Rudakaklis naras
Biogeographic population: North-west Europe & Caspian, Black Sea & East Mediterranean Breeding range: Arctic and boreal W Eurasia, Greenland Wintering / core non-breeding range: NW Europe Global population size: 200,000 – 600,000 individuals European population size: 210,000 – 340,000 individuals 1% value: 3,000 Conservation status: ✓ EU Birds Directive, Annex I: listed ✓ EU SPEC Category: SPEC 3 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Decreasing? Trend quality: Reasonable Key food: fish, crustaceans, molluscs and aquatic insects	 © Claudia Burger Bioconsult SH Impact Offshore windfarms ✓ Collision risk: Low ✓ Displacement risk: High

The Red-throated Divers (also known as Red-throated Loon) breed at higher latitudes, in the boreal zone. They are distributed across the northern hemisphere and two distinctive populations occur in the area of interest. As highly migratory species, their non-breeding range is located in northwest Europe as well as around the Caspian Sea, Black Sea and East Mediterranean.

Red-throated Divers feed on marine and freshwater fish species while diving. They undertake shallow dives with maximum depths of 20 m in summer (DUCKWORTH ET AL. 2020), and little is known about their foraging behaviour and energetics during the non-breeding period (See <https://www.divertracking.com>)

The Northwest European population of Red-throated Divers, the majority within the scope of this study, comprised 210,000 - 340,000 mature individuals with a decreasing trend over the last decades. The Caspian Sea, Black Sea and East Mediterranean population slightly overlaps its distribution range within the study area in its western range as their migratory route from high Arctic grounds (Siberia) towards their non-breeding grounds (Black Sea, East Mediterranean) edges the southeastern Baltic Sea. This population is composed of 230 - 10,000 individuals with a similar decreasing trend as their western counterparts. Although this species is considered as Least Concern by IUCN-Red List, regionally it has been classified as Critically Endangered in the Baltic Sea due to its drastic decline (HELCOM 2013a).

Some of the threats this species faces are oil spills, habitat loss and eutrophication of lakes in the breeding grounds. Red-throated Divers have a high risk of displacement, especially in their non-breeding grounds, due to offshore windfarms (HEINÄNEN ET AL. 2020; GARTHE ET AL. 2023).

Density and distribution of Red-throated Divers in the survey area

The presence of this species in the surveyed area was substantially detected towards the period in which aerial surveys were conducted. It represented 9.0 % (n= 599) and 3.1 % (n= 178) of all resting birds detected for 2023-2024 and 2024-2025 and it was the fourth most common species sighted using this methodology for 2023-2024 (Figure 3.1 and Figure 3.2). During the ship-based surveys only one and eight individuals (<0.1 and 0.5 % of all recorded resting birds within transect for 2023 and 2024, respectively) were observed between the months of May and October (Table 3.2).

Temporally, the months of February and March accounted for 81.1 % of all detected encounters of Red-throated Divers (n=486) with aerial surveys for 2023-2024, while November 2024 accounted for 66.9 % (n= 119) of all detected individuals during the second year of monitoring.

During the aerial surveys, the highest densities were found in March 2024 (Figure 3.7), with 1.06 ind./km², while for ship-based surveys May 2024 (Figure 3.8) registered the highest densities (0.09 ind./km²).

Red-throated Divers were widespread across the surveyed area. Although some sightings fell within the borders of the planned OWF, the main distribution area for this species appeared to be towards shallower and coastal waters, in the eastern side of the scanned area during the aerial surveys (Figure 3.9). The ship-based surveys only recorded few individuals, which were sighted westwards of the planned OWF (Figure 3.10 and Figure 3.10).

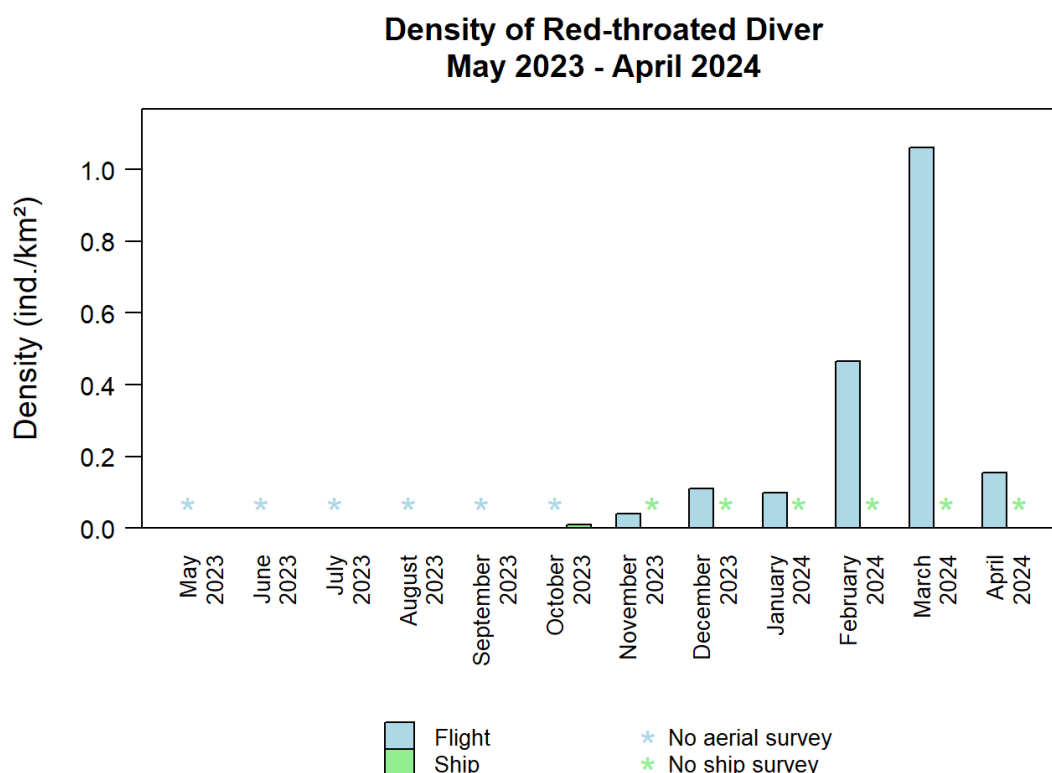


Figure 3.7 Monthly densities of Red-throated Divers during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

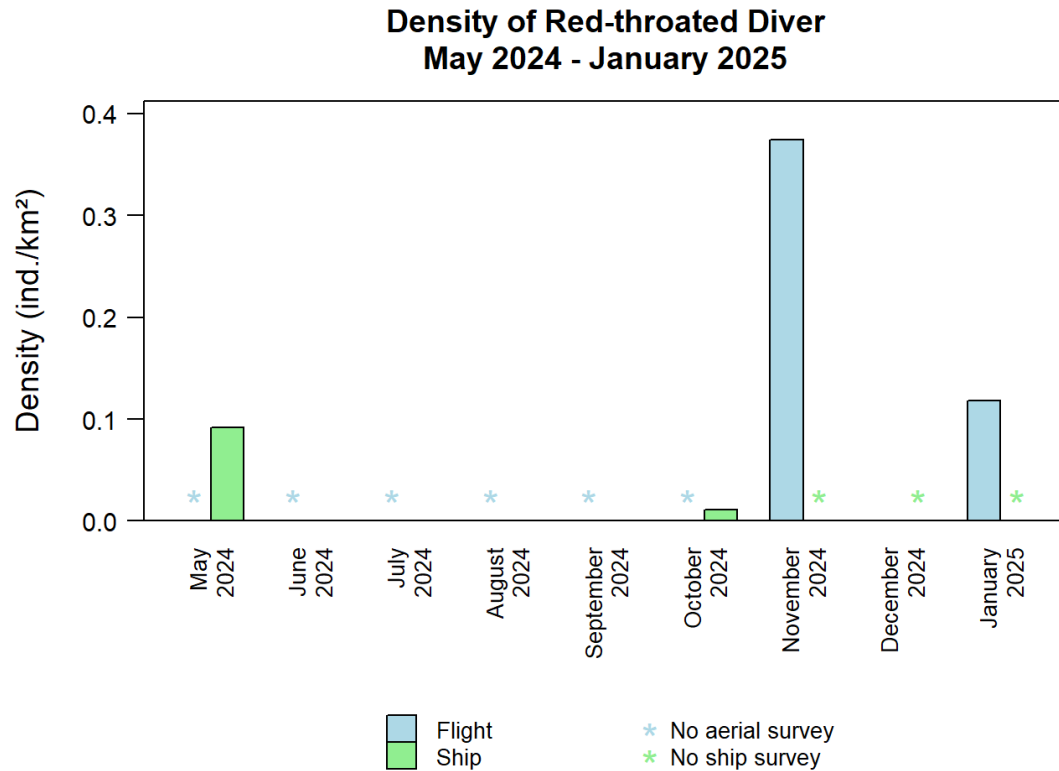


Figure 3.8 Monthly densities of Red-throated Divers during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

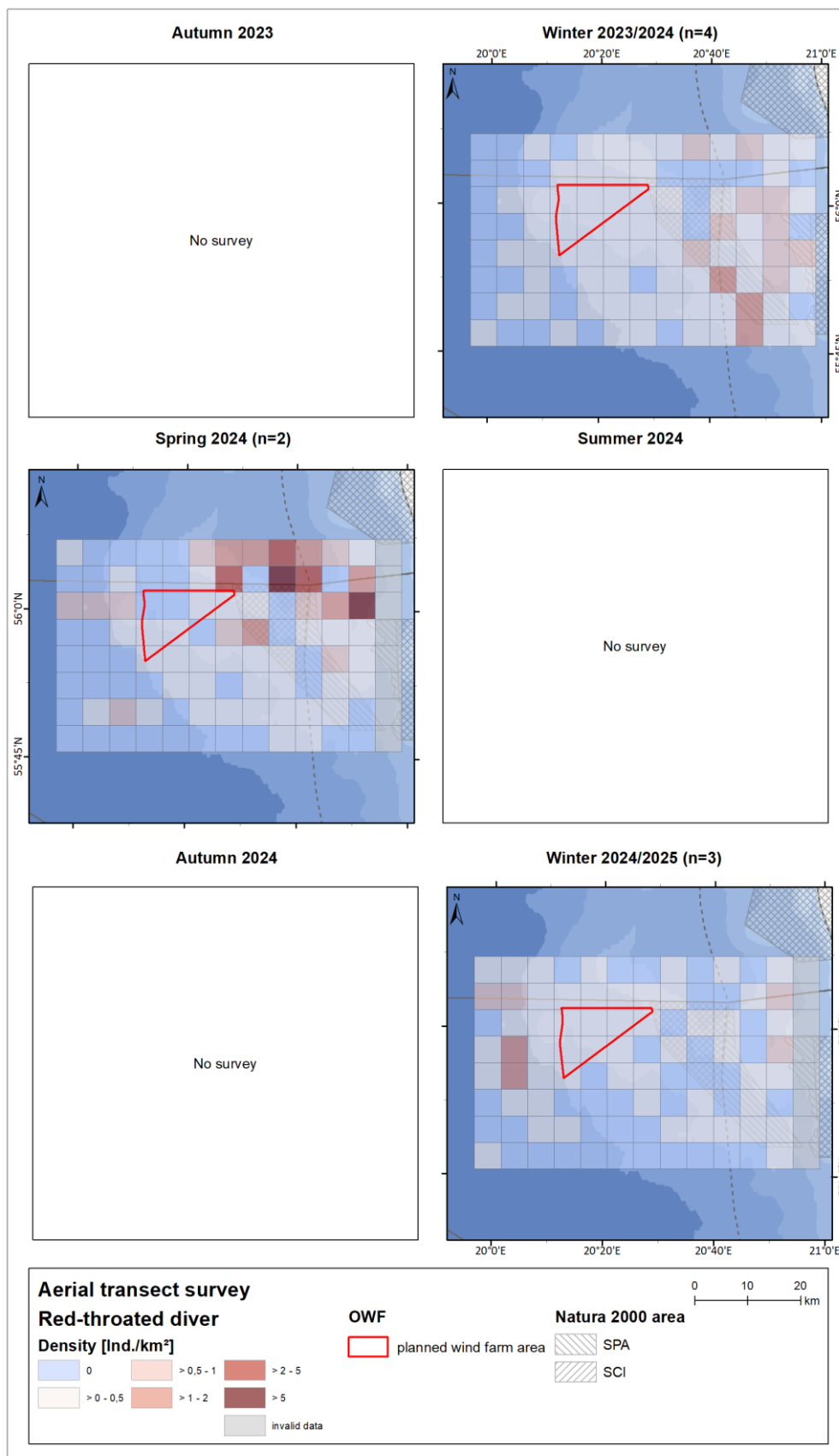


Figure 3.9 Distribution of Red-throated Divers in the survey area per season during the digital aerial surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

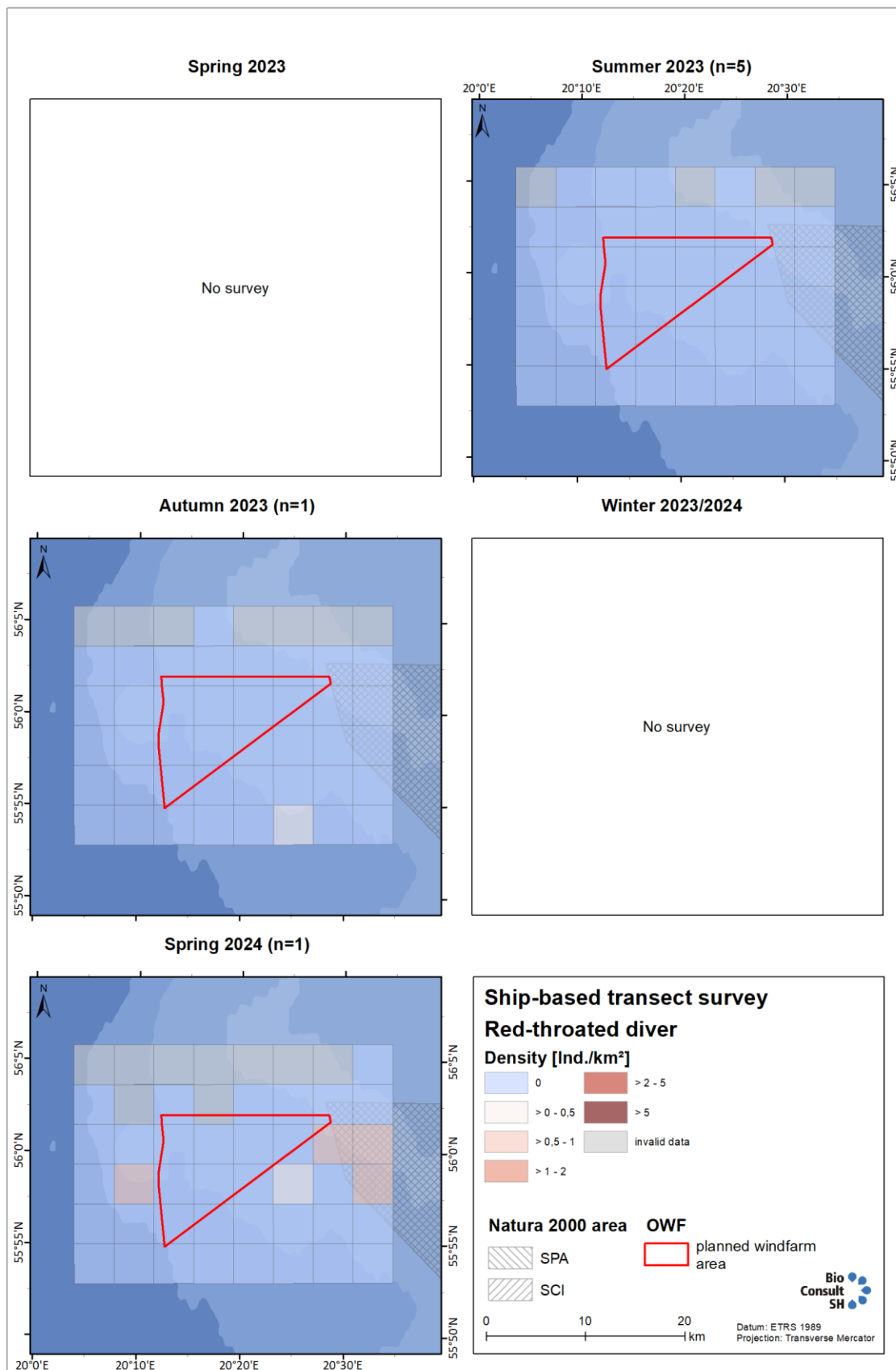


Figure 3.10 Distribution of Red-throated Divers in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

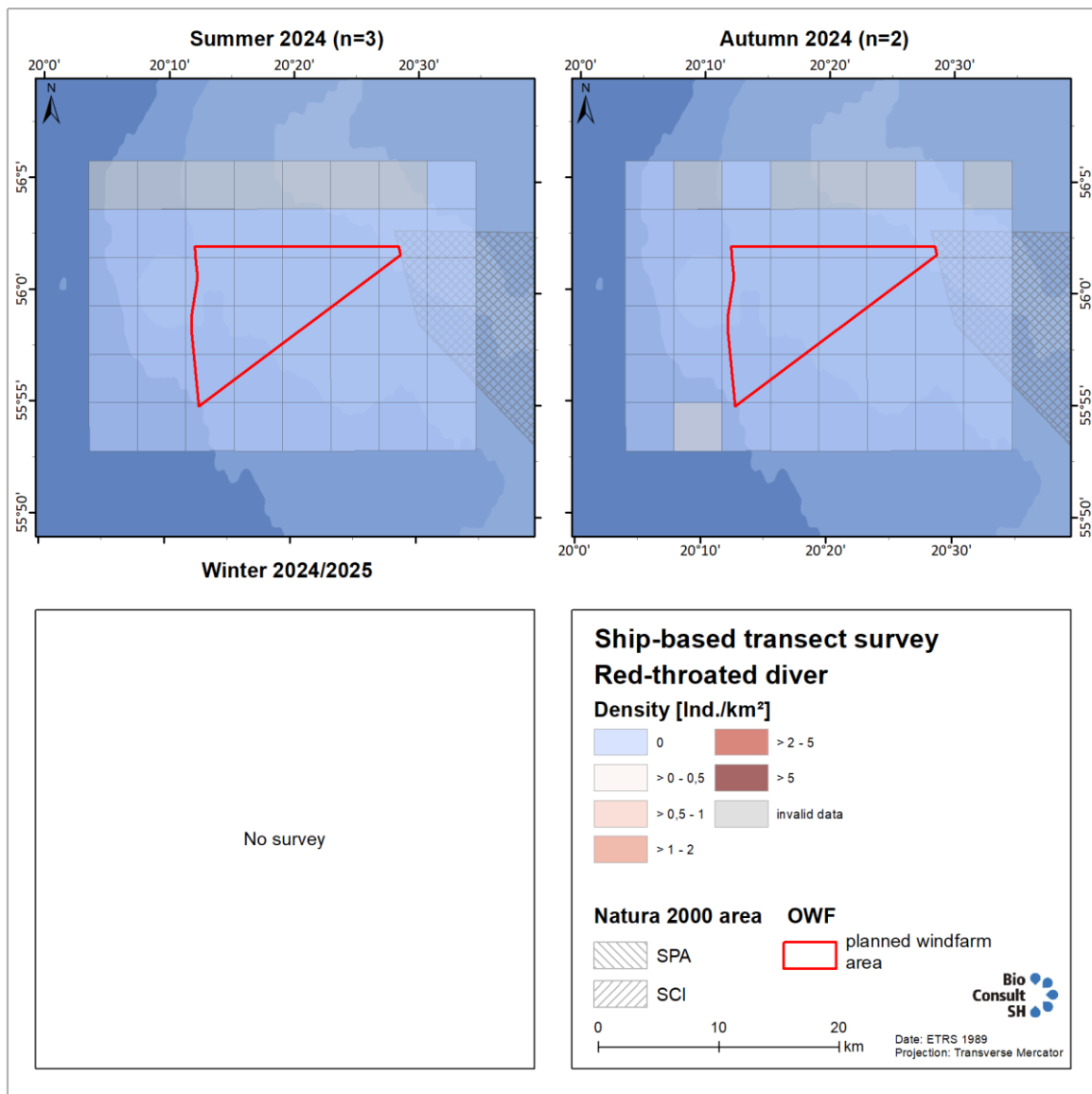


Figure 3.11 Distribution of Red-throated Divers in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.2 Black-throated Diver

Black-throated Diver – <i>Gavia arctica</i>	LI: Juodakaklis naras
Biogeographic population: Northern Europe & Western Siberia / Europe Breeding range: N Europe & W Siberia Wintering / core non-breeding range: Coastal NW Europe, Mediterranean, Black & Caspian Seas Global population size: 415,100 – 1,591,000 individuals European population size: 390,000 – 590,000 individuals 1% value: 4,800 Conservation status: ✓ EU Birds Directive, Annex I: listed ✓ EU SPEC Category: SPEC 3 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Decreasing? Trend quality: Poor Key food: fish	 © Steve Garvie - Creative Commons Impact Offshore windfarms ✓ Collision risk: Low ✓ Displacement risk: High

The Black-throated Divers (also known as Arctic Divers/Loons) are also breeding in the Arctic and boreal zone and are distributed from Northwest Europe to Northeast Siberia and Northwest Alaska. There are two subspecies recognized although only one occurs within the studied area. Their breeding grounds are located in Northern Europe and Western Siberia, followed by a non-breeding distribution along coastal northwestern Europe, Mediterranean, Black and Caspian Seas.

Black-throated Divers inhabit freshwater bodies where small fish comprise their diet during the breeding season. During the non-breeding season, they winter offshore mostly in areas of 5 to 30 m water depths, close to coastal areas or frontal systems where food sources are found (SKOV ET AL. 2011).

The population is estimated to be 390,00 to 590,000 individuals, with a decreasing trend and therefore categorized as “Least Concern” by IUCN-Red List. However, in the Baltic Sea this species has experienced a drastic decrease and it is classified regionally as “Critically Endangered” (HELCOM 2013b).

The Black-throated Diver, as other diver species occurring in the region, is a sensitive species and affected by many anthropogenic factors. In the breeding grounds, pollution of freshwater bodies and destruction of habitats due to acidification (ERIKSSON 1994) can lead towards a decrease in food availability and therefore impact their breeding success. In their non-breeding or wintering grounds, this species has been classified as extremely vulnerable towards offshore windfarms due to displacement (GARTHE & HÜPPOP 2004).

Density and distribution of Black-throated Divers in the survey area

Black-throated Divers were present in the survey area. During the aerial surveys, their presence was residual with 11 individuals detected during 2023-2024 (0.2 % of all resting birds) and none during 2024-2025 (Table 3.1 and Table 3.2). However, during the ship-based surveys, their detection increased as this species represented 4.4 % (n= 88) and 4.6 % (n= 79) of all resting birds (Figure 3.4 and Figure 3.5). The months with highest detections during ship-based surveys were May 2023 and 2024 (n= 146 and n= 74, respectively) while April 2024 (n= 7) was the month with highest counts.

The densities varied across the studied period but remained at low levels during aerial surveys. The highest density was reached in November 2024 with 0.03 ind./km² (Figure 3.13). Nonetheless, ship-based surveys registered higher densities, especially during May 2023 (Figure 3.12), when up to 1.28 ind./km² were detected.

The main distribution area for Black-throated Divers followed a similar distribution as the other diver species. During spring months, they were observed mainly eastwards of the planned OWF, both within and bordering its limits (Figure 3.15 and Figure 3.16). The scarce observations from aerial surveys reported a similar distribution in which this species was seen westwards of the OWF or in the bordering SPA (Figure 3.15). Nonetheless, few individuals were registered within the planned OWF area.

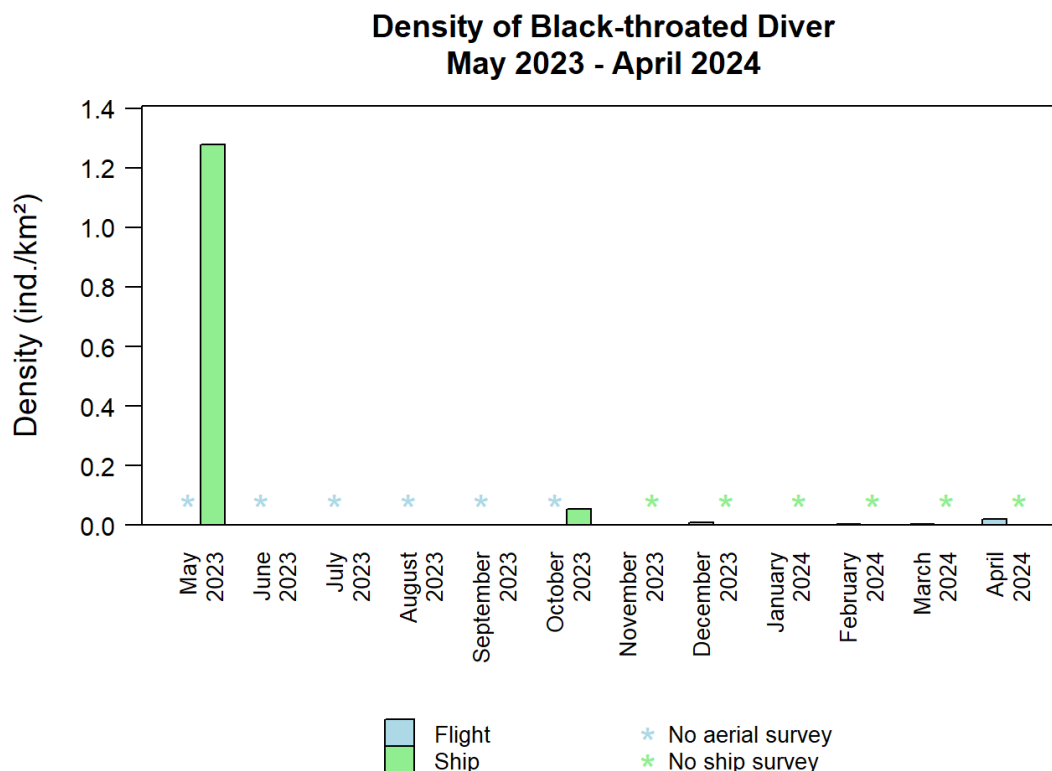


Figure 3.12 Monthly densities of Black-throated Divers during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

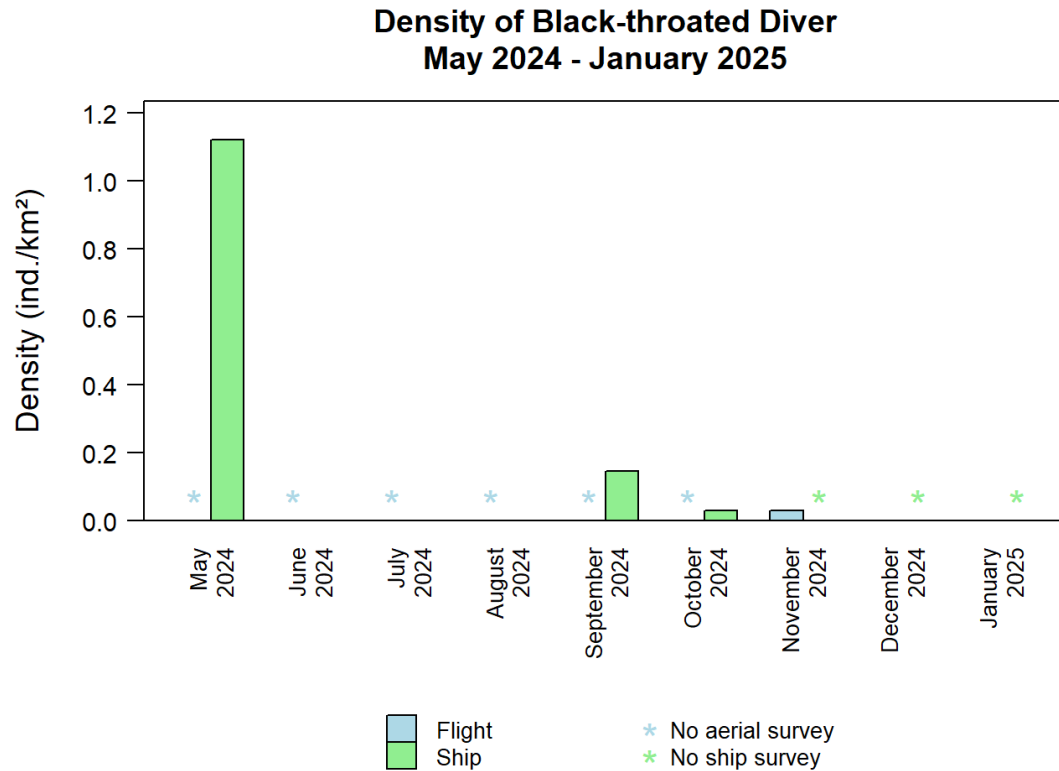


Figure 3.13 Monthly densities of Black-throated Divers during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

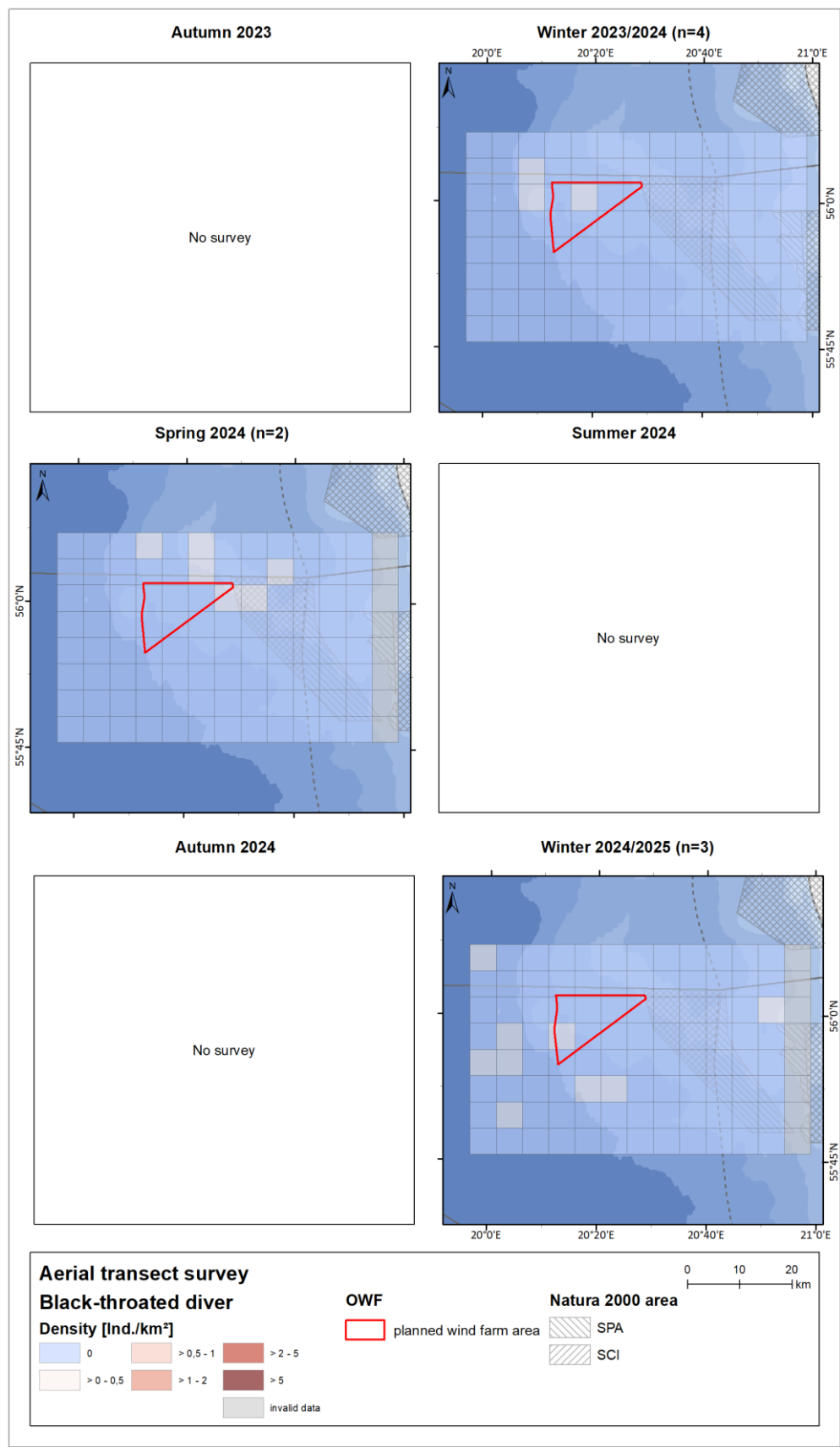


Figure 3.14 Distribution of Black-throated Divers in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

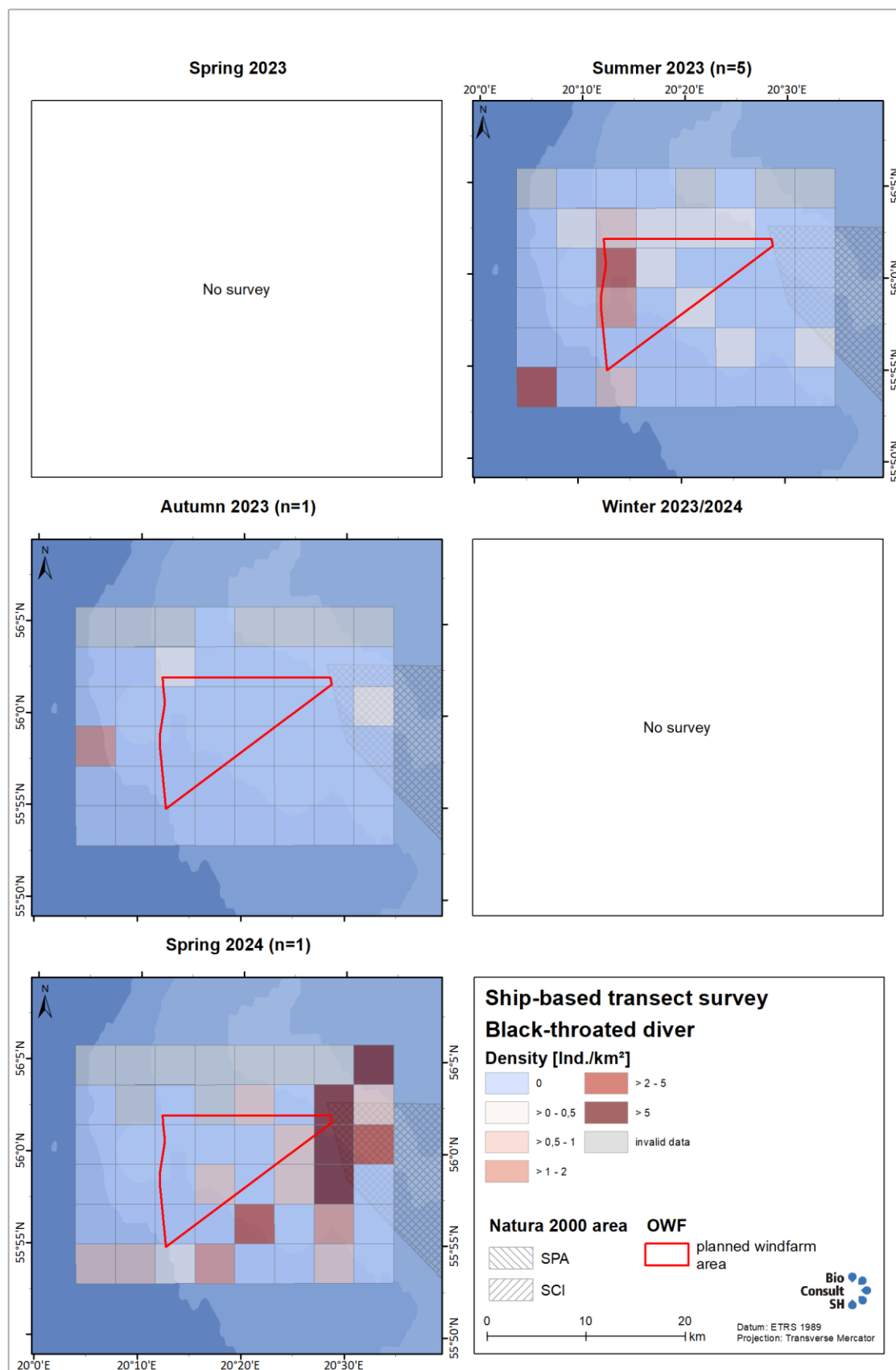


Figure 3.15 Distribution of Black-throated Divers in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

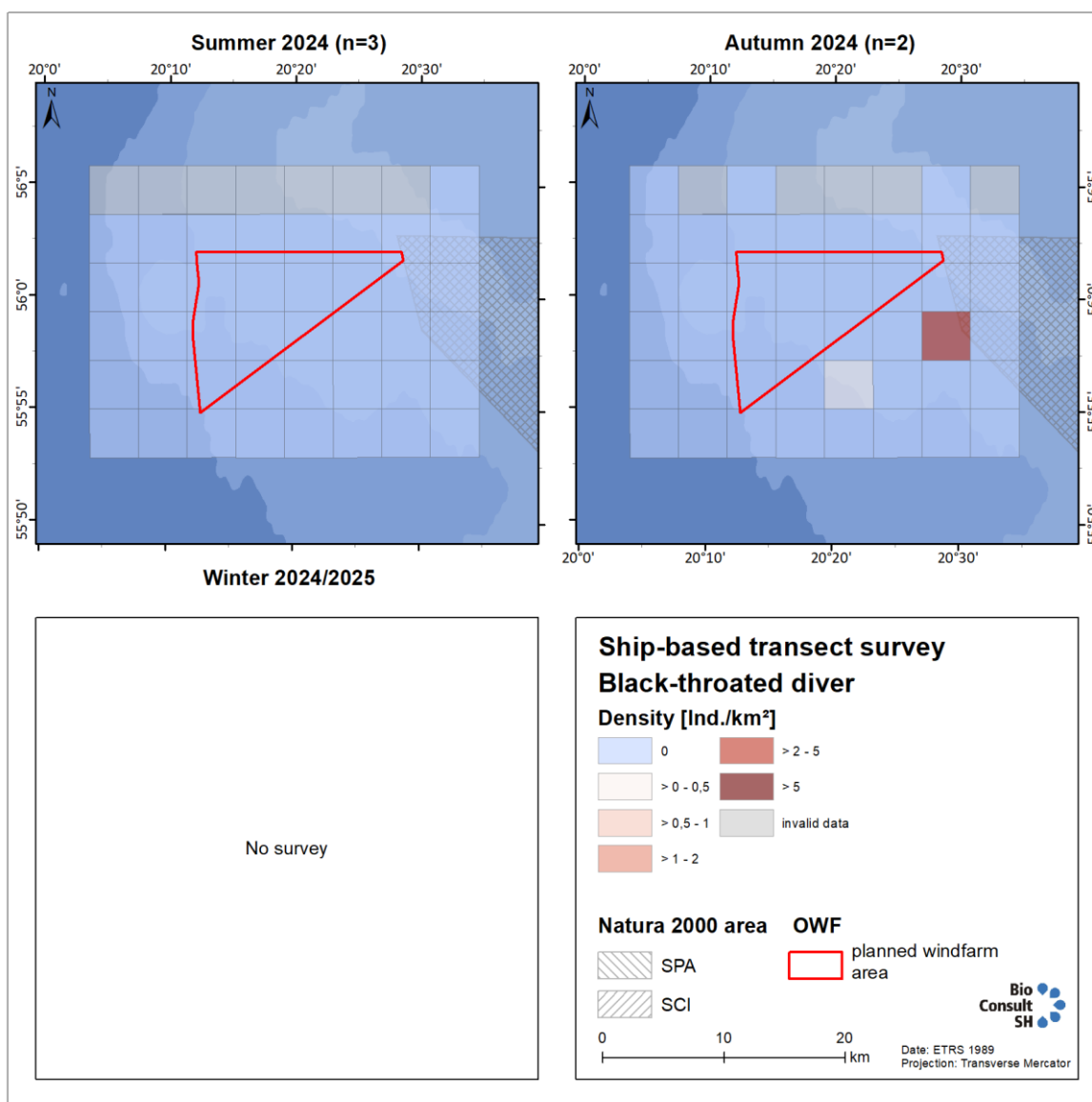
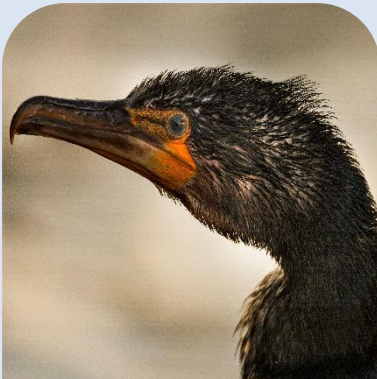


Figure 3.16 Distribution of Black-throated Divers in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.3 Great Cormorant

Great Cormorant – <i>Phalacrocorax carbo (sinensis)</i>	LI: Didysis kormoranas
Biogeographic population: ✓ <i>carbo</i>, Northwest Europe ✓ <i>sinensis</i>, North & Central Europe Breeding range: ✓ <i>carbo</i>, Iceland, Norway, Britain, Ireland. ✓ <i>sinensis</i>, North & Central Europe Wintering / core non-breeding range: ✓ <i>carbo</i>, North & middle Europe ✓ <i>sinensis</i>, Up to Mediterranean Sea Global population size: 1,400,000 – 2,100,000 individuals European population size: ✓ <i>carbo</i>, 86,000 – 110,000 individuals. ✓ <i>sinensis</i>, 610,000 – 740,000 individuals 1% value: ✓ <i>carbo</i>, 970 ✓ <i>sinensis</i>, 6,200 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: Non-SPEC ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: ✓ <i>Carbo</i>: Decreasing ✓ <i>Sinensis</i>: Incomplete Trend quality: ✓ <i>Carbo</i>: Good ✓ <i>Sinensis</i>: Good Key food: fish	 © Rodrigo A. Martinez Catalan Subspp. <i>P. c. carbo</i> - Bioconsult SH Impact Offshore windfarms ✓ Collision risk: Moderate ✓ Displacement risk: Moderate

In total, six subspecies of Great Cormorants are known to breed in the world (MENDEL ET AL. 2008). In the area, *P. c. sinensis* is widely present and *P. c. carbo* could be a potential visitor as its distribution range borders the area of interest. A widely spread bird species, it inhabits coastal areas and larger freshwater bodies where it preys over small and medium sized fish (e.g., sticklebacks, herring, eelpout, ruffe, roach, and perch, (MENDEL ET AL. 2008).

The most recent estimates suggest the numbers of breeding pairs to be ranging between 203,170 - 245,888 pairs or approximately 610,000 to 740,000 individuals. The population trend seems to be decreasing although it is classified as “Least Concern” according to the IUCN – Red List.

After its almost complete disappearance at the beginning of the 20th century, the subspecies has recovered, increased in numbers, and recolonized former breeding areas, thanks to protection measures and the ban of Polychlorinated Biphenyls (PCBs) and Dichlorodiphenyltrichloroethane (DDTs, HERRMANN ET AL. 2022). Cormorants seem to be attracted towards OWF structures (Fox &

PETERSEN 2019) and might have a positive effect as they can increase their foraging range due to the use of structures as dry roosting sites (DIERSCHKE ET AL. 2016).

Density and distribution of Great Cormorants in the survey area

Great Cormorants were found in the studied area. However, their presence was residual. During the aerial surveys, this species was only spotted during the months of February (n= 1), March (n= 5) and April (n= 1) 2024 (Table 3.2). The ship-based surveys detected more individuals of this species, representing up to 1.1 % (n= 21) and 3.0 % (n= 51) of all resting birds for the monitoring surveys of 2023 and 2024 respectively (Figure 3.4 and Figure 3.5). Worth noting that the highest counts were found during a single event in October 2024, when 40 individuals were spotted flying together.

Their presence within the studied area was not significant when compared to other species, since sightings were concentrated in two months: March 2024 (aerial surveys) and September 2024 (ship-based surveys), when the highest density for this species was detected (0.52 ind./km²; Table 3.5, Figure 3.18).

During the aerial surveys, Great Cormorants' densities varied from <0.01 ind./km² in February and April 2024 to 0.02 ind./km² in March 2024 and no observations were recorded from November 2023 to January 2024 as well as November 2024 to January 2025 (Figure 3.17 and Figure 3.18). Spatially, Great Cormorants were mainly distributed at low densities towards the east of the survey area, both during the aerial (Figure 3.19) and ship-based surveys (Figure 3.20 and Figure 3.21).

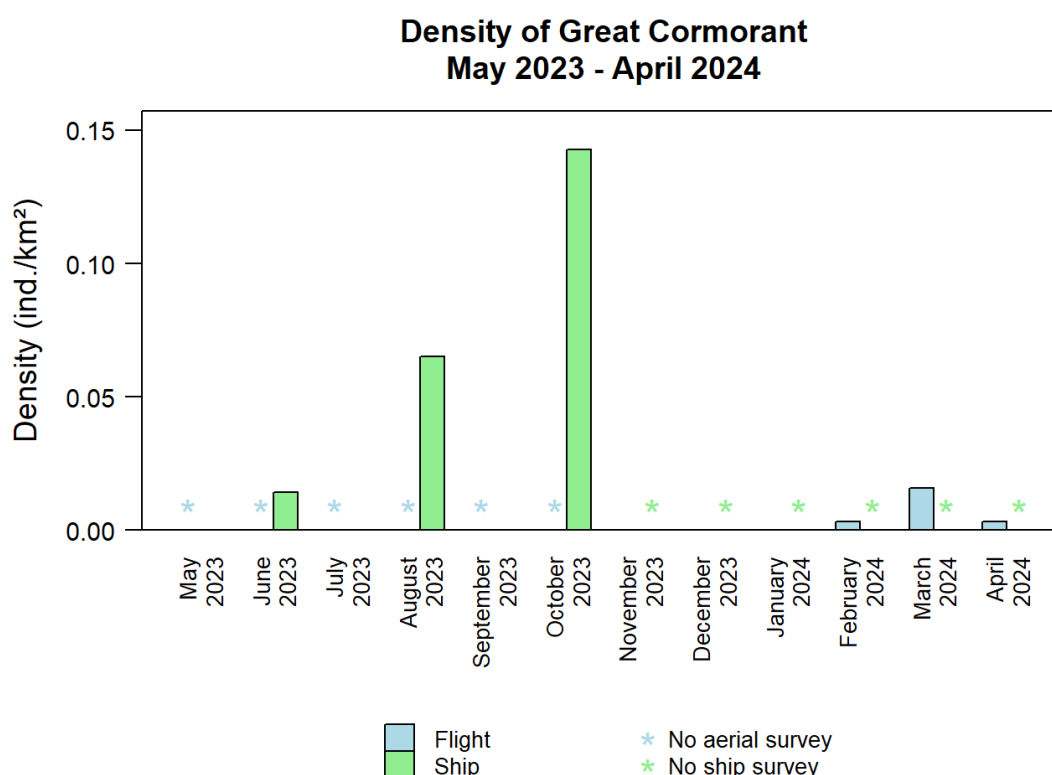


Figure 3.17 Monthly densities of Great Cormorants during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

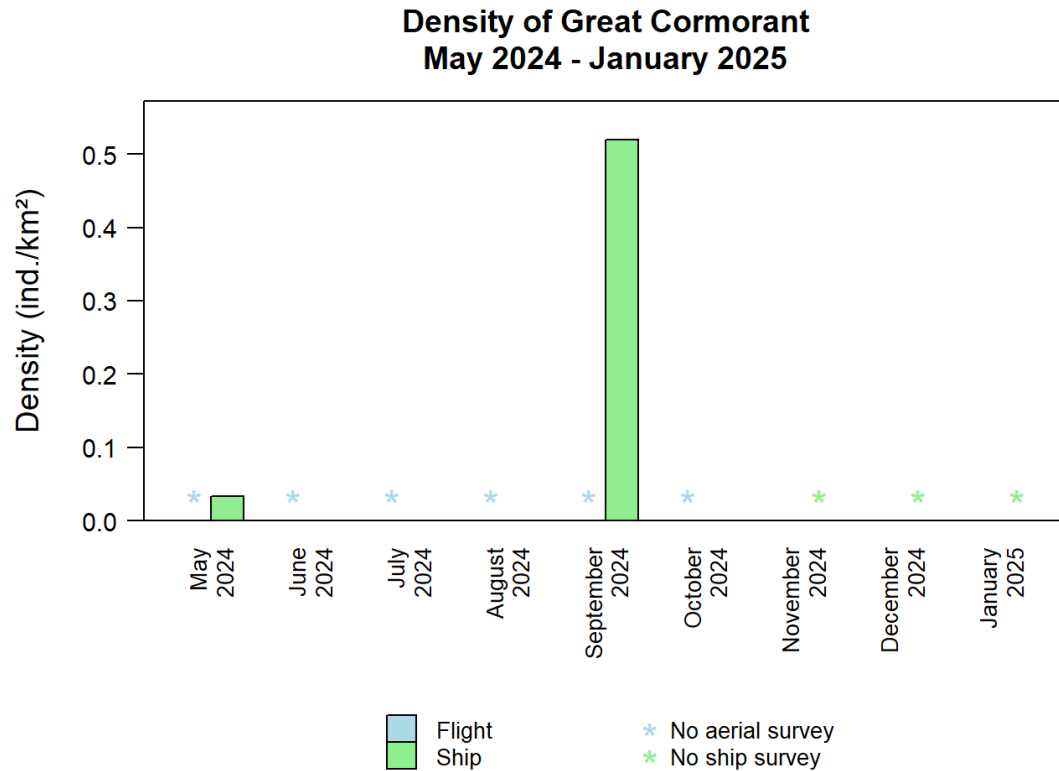


Figure 3.18 Monthly densities of Great Cormorants during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

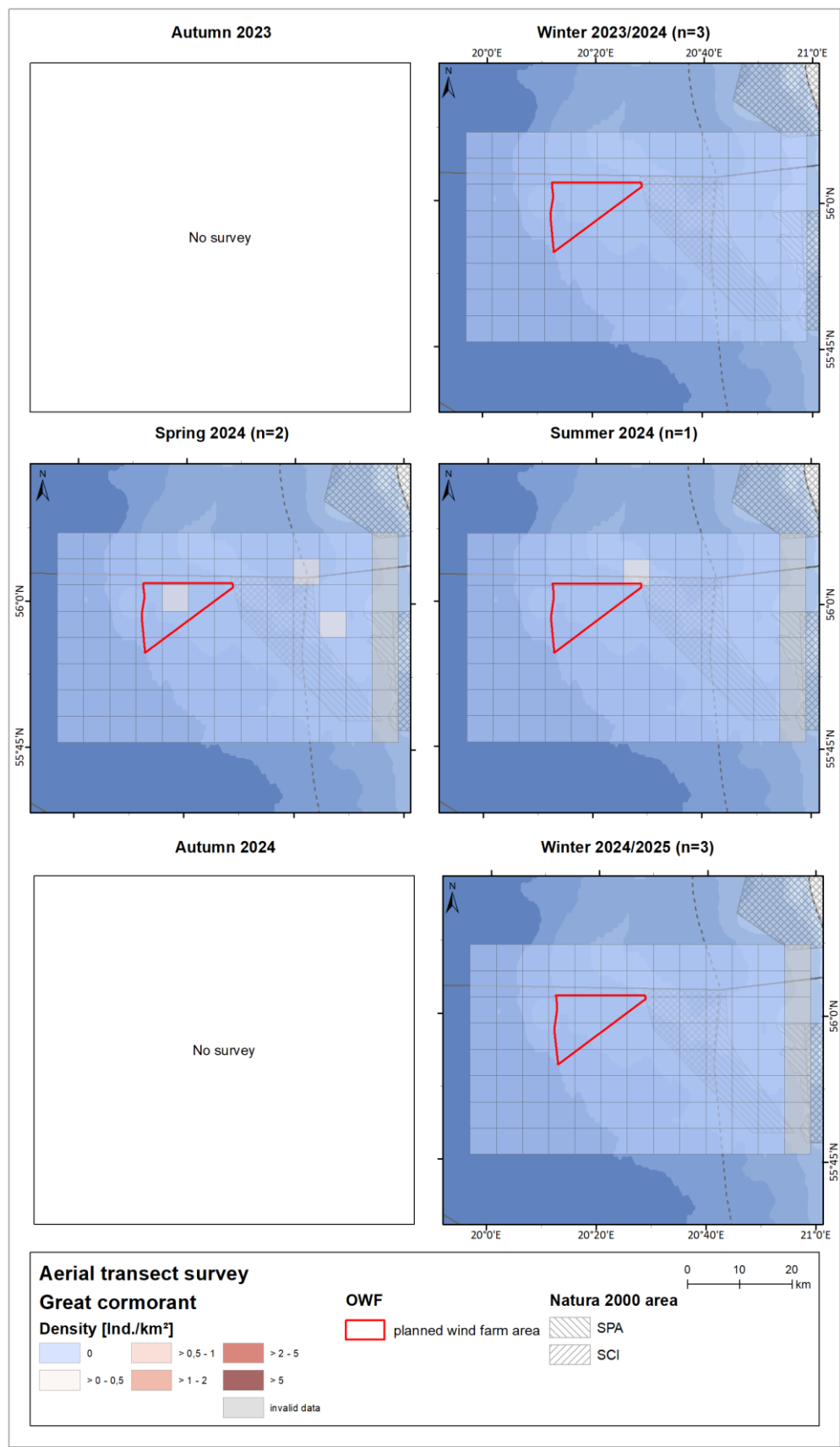


Figure 3.19 Distribution of Great Cormorants in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

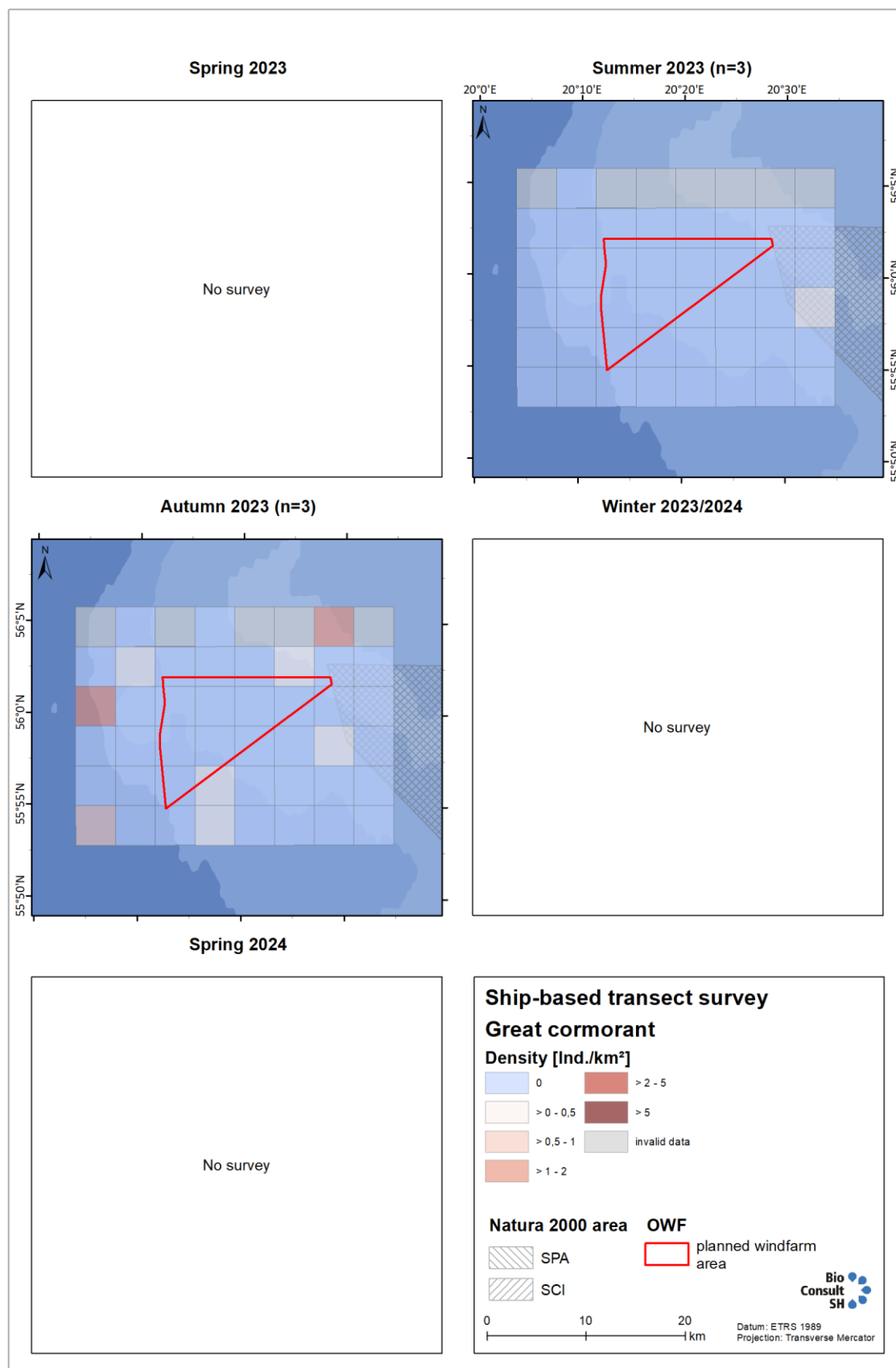


Figure 3.20 Distribution of Great Cormorants in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

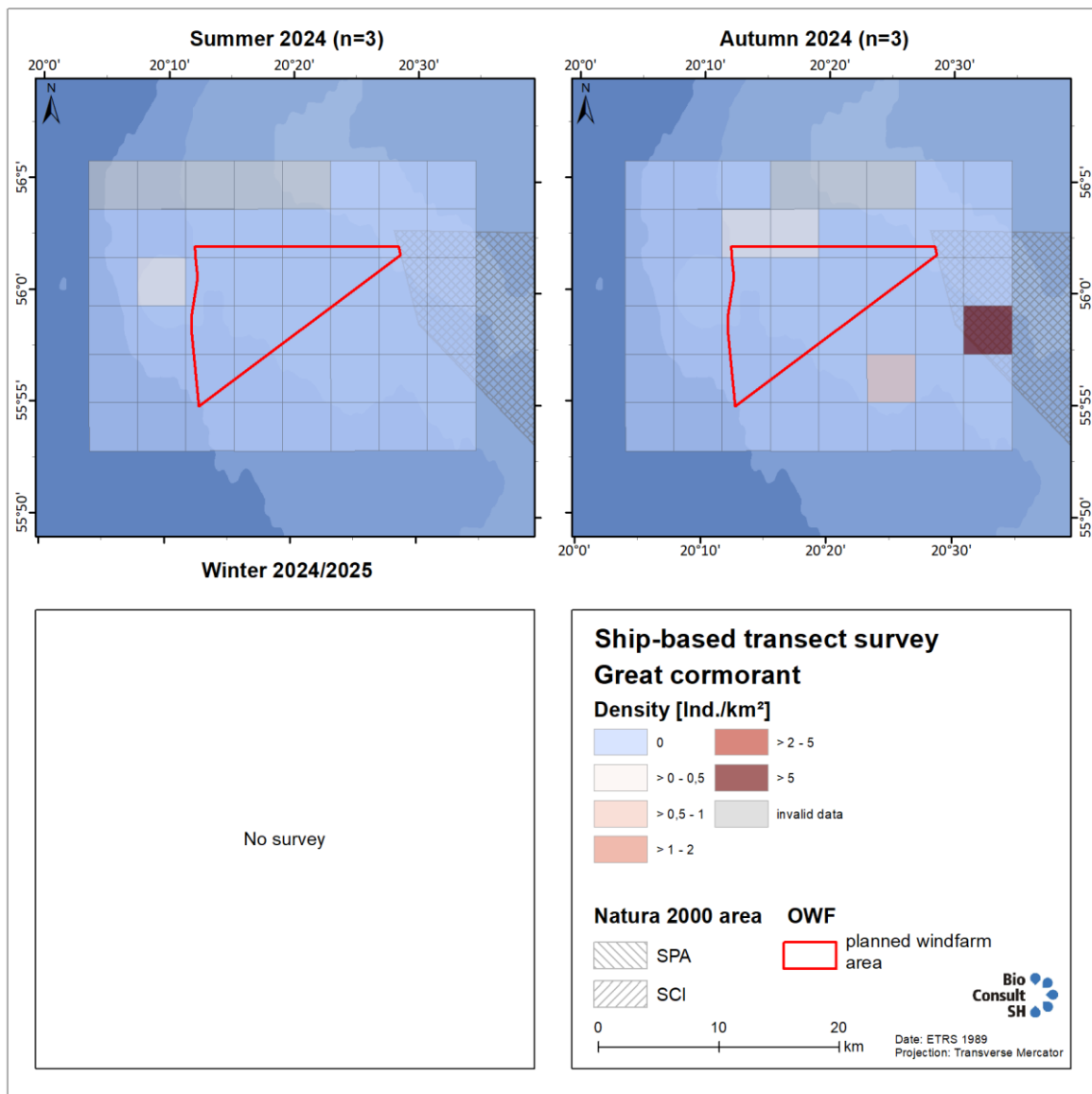


Figure 3.21 Distribution of Great Cormorants in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.4 Long-tailed Duck

Long-tailed Duck – <i>Clangula hyemalis</i>	LI: Ledinė antis
Biogeographic population: Western Siberia & Northern-Western Europe Breeding range: Western Siberia, Northern Europe Wintering / core non-breeding range: North Atlantic, Baltic, North Sea, Central European Lakes Global population size: 3,200,000 – 3,750,000 mature individuals European population size: 362,000 – 502,000 individuals 1% value: 1,600 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: non-spec ✓ IUCN Red List Category, Global & Europe: Vulnerable / Least Concern Trend: Stable Trend quality: Reasonable Key food: molluscs, crustaceans, small fish	 © Rodrigo A. Martinez Catalan - Bioconsult SH Impact Offshore windfarms ✓ Collision risk: Very Low ✓ Displacement risk: Moderate

Long-tailed Ducks are native breeding birds of the northern hemisphere with circumpolar range that spans from North America to Greenland and Iceland, Western Europe and Siberia and East Asia. Fully migratory species, breeds in higher latitudes of the northern hemisphere, in marshy grass tundra and spends the non-breeding period in large aggregations in inshore and offshore waters.

Globally, the population consists in over 3,000,000 mature individuals, while the European population range goes between 362,000 to 502,000 mature individuals. In the Baltic Sea, Long-tailed Ducks have experienced declines during the winter counts in offshore waters (SKOV ET AL. 2011). Although classified as “Least Concern” in the EU 28 Red List (BIRDLIFE INTERNATIONAL 2021), this species has experienced declines within the range of 65-85 % of the population in some parts of the Baltic Sea (BELLEBAUM ET AL. 2014), therefore its declaration as “Endangered” by HELCOM (2013c).

Some of the threats affecting the population could be increase on predatory risk by snowy owls due to lack of their main source in their diet affected by changes in average temperatures, hunting or other human pressures such as oil pollution (BELLEBAUM ET AL. 2012).

Related to offshore windfarms, the presence of this species in the Baltic is concentrated mostly during the winter period in offshore areas. The expected effect from windfarms leads to displacement, however despite localized shifts in wintering populations around windfarms, total numbers seems to remain stable in the areas where OWF have been installed (PETERSEN ET AL. 2011; NIELSEN ET AL. 2023).

Density and distribution of Long-tailed Ducks in the survey area

Long-tailed Ducks were found with both methodologies, but their presence was higher during aerial surveys. For ship-based surveys, this species represented 0.6 % (n= 11) and 0.1 % (n= 2) of all resting birds for 2023 and 2024, respectively (Table 3.1 and Table 3.2). However, the representation of this species among the resting bird community during aerial surveys was 9.7 % (n= 640) and 6.7 % (n= 381) for the 2023-2024 and 2024-2025 monitoring campaigns (Figure 3.1 and Figure 3.2). The months with highest detections were March 2024 (n= 197) and January 2025 (n= 333).

Most of the sightings occurred eastwards of the planned OWF during aerial surveys (Figure 3.24), where the SPA Klaipėdos–Ventspilio plynaukštė is located, whereas during the ship-based surveys the 2 individuals detected were found northeast of the studied location (Figure 3.24 and Figure 3.25). Densities ranged from 0.16 to 1.04 ind./km² for aerial surveys, being January 2025, the highest density registered (Figure 3.23). During ship-based surveys, Long-tailed Duck densities remained below 0.1 ind./km² during the study period. (Figure 3.22 and Figure 3.23).

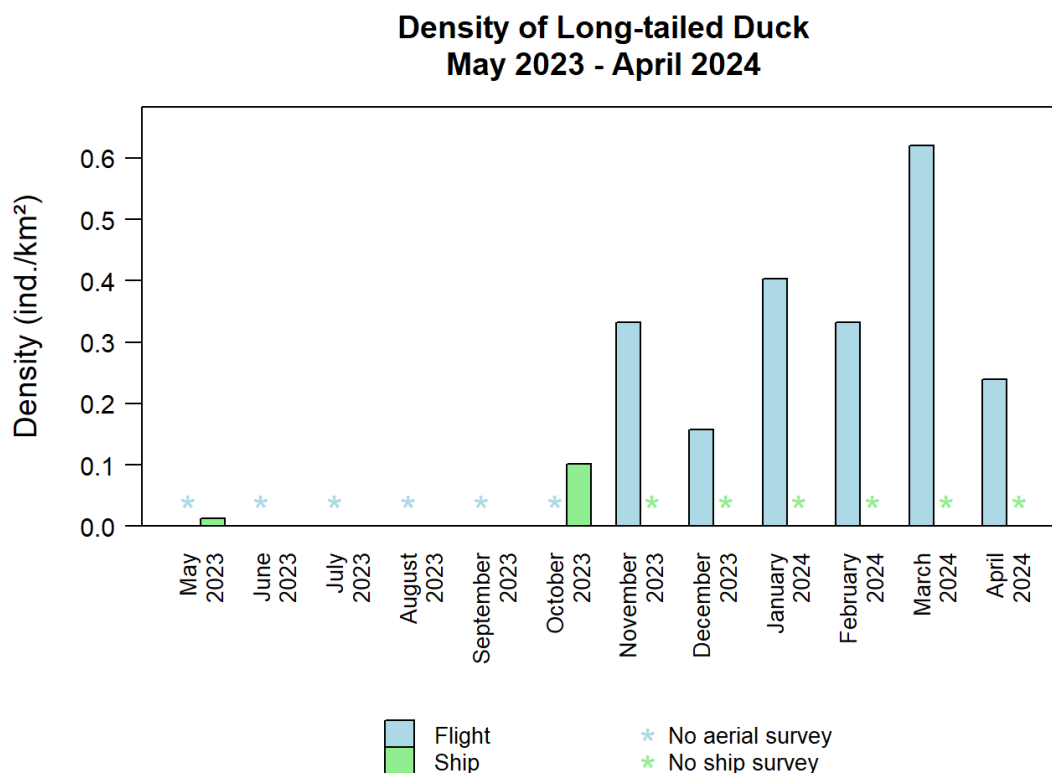


Figure 3.22 Monthly densities of Long-tailed Ducks during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

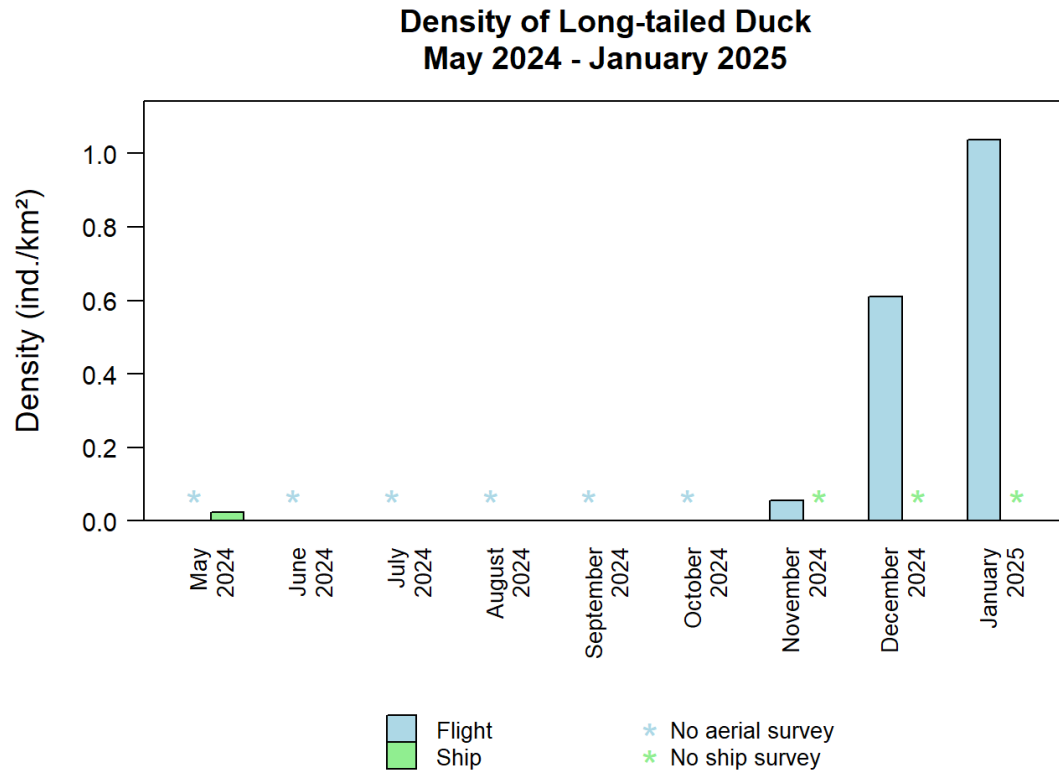


Figure 3.23 Monthly densities of Long-tailed Ducks during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

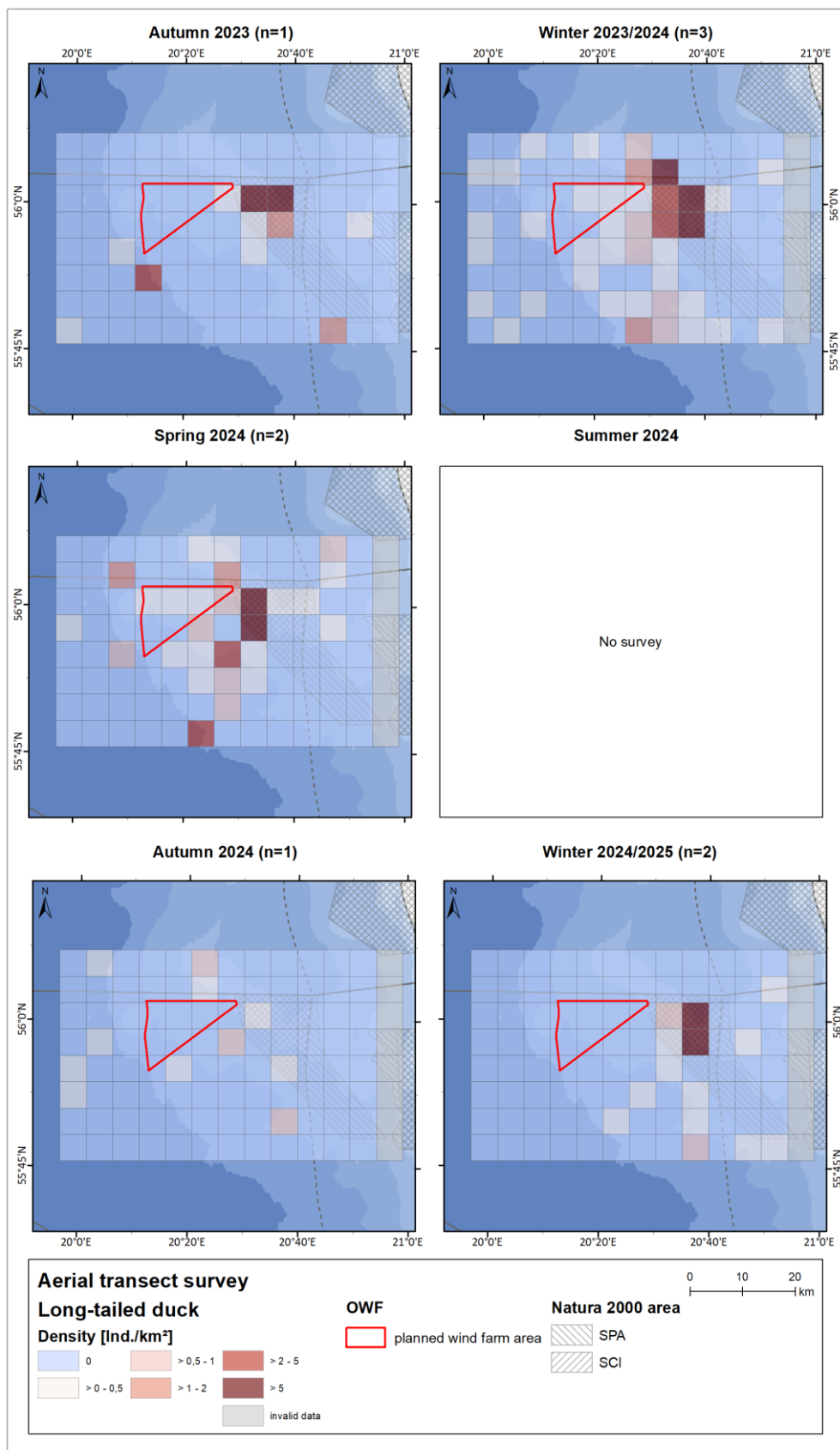


Figure 3.24 Distribution of Long-tailed ducks in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

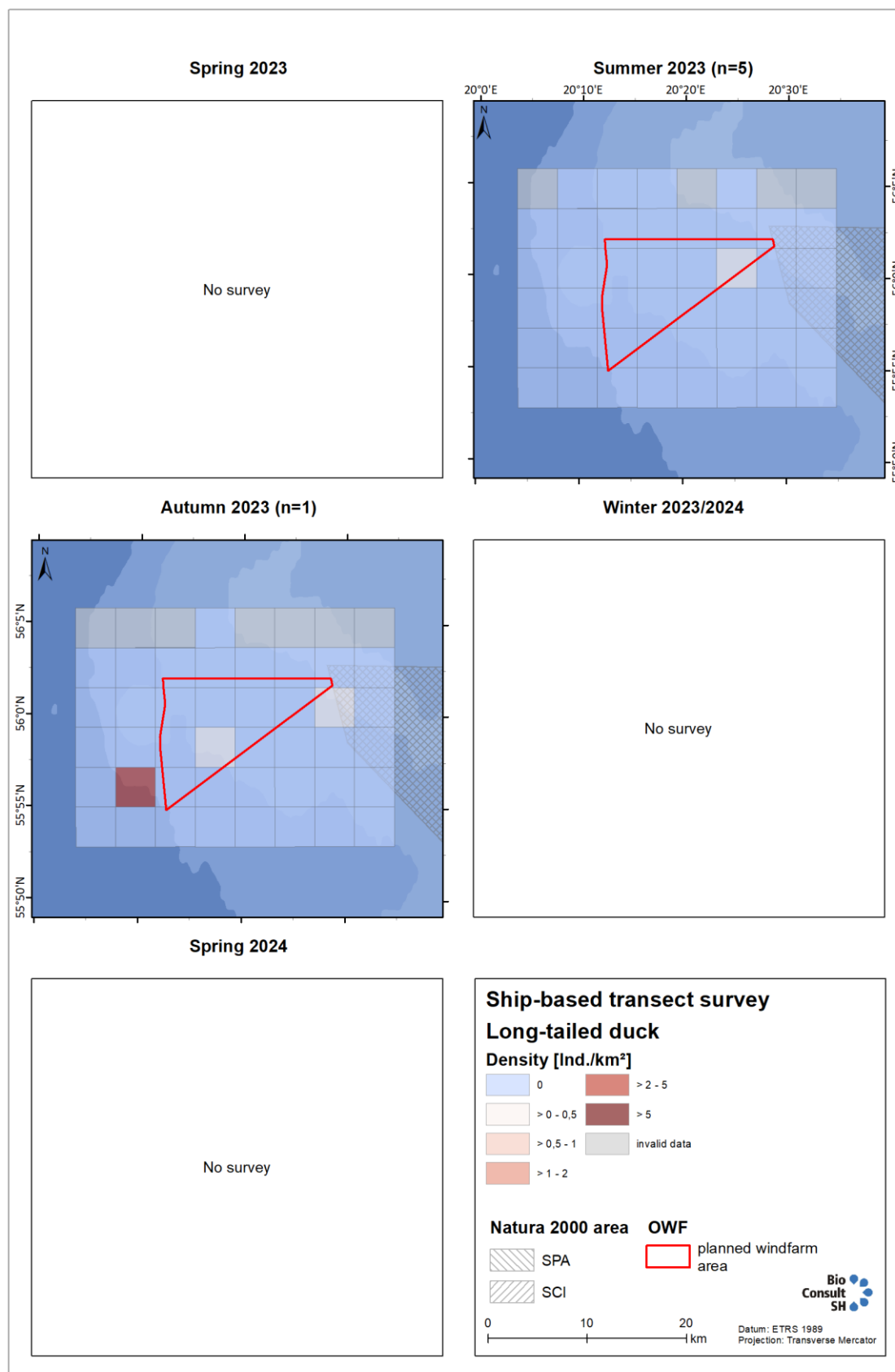


Figure 3.25 Distribution of Long-tailed Ducks in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

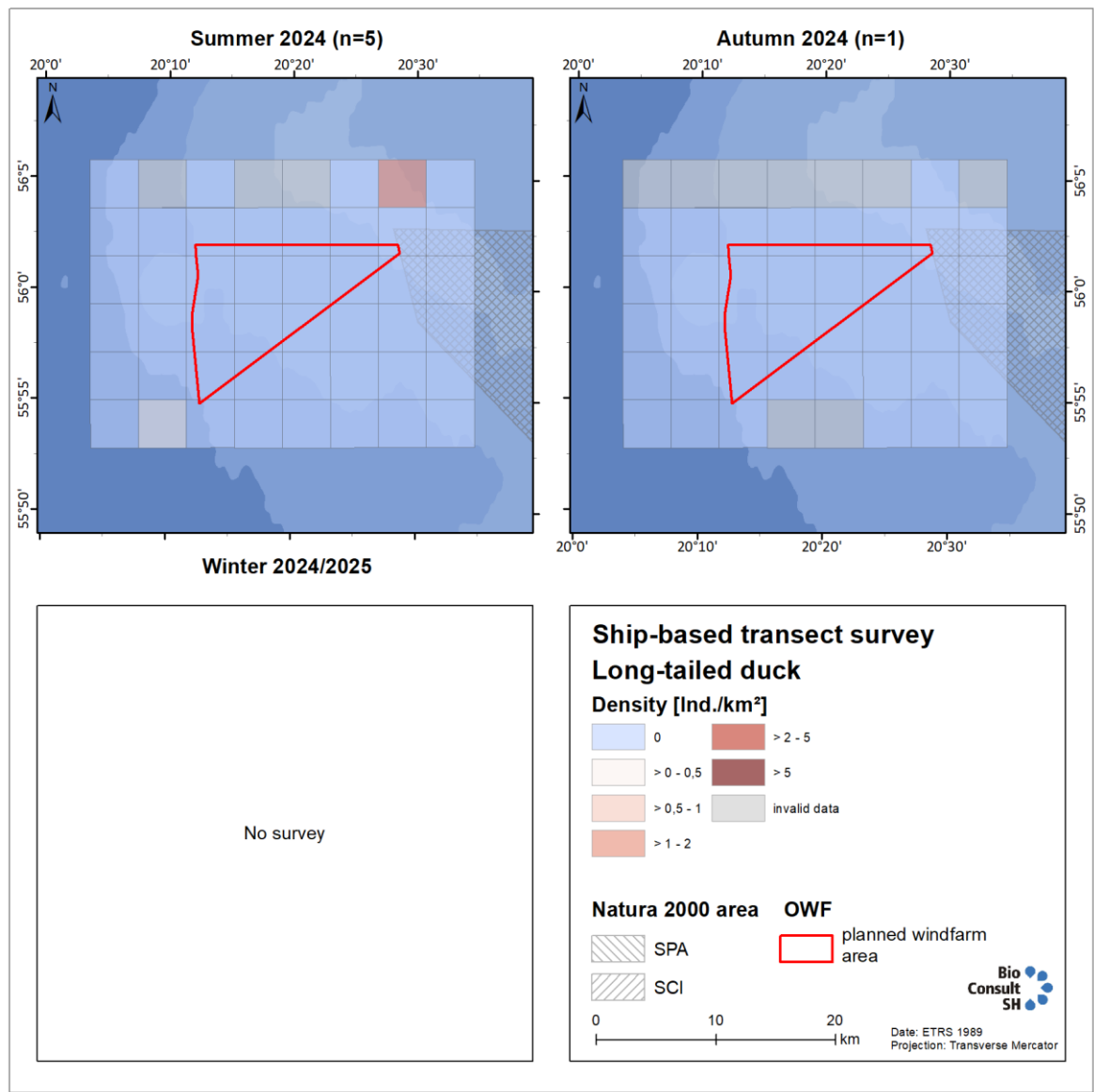
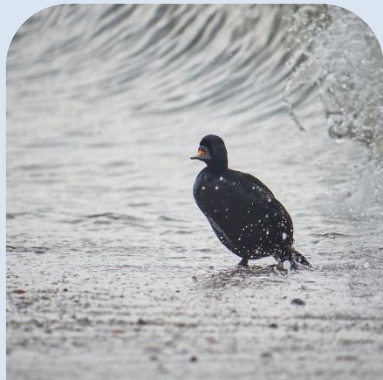


Figure 3.26 Distribution of Long-tailed Ducks in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.5 Common Scoter

Common Scoter – <i>Melanitta nigra</i>	LI: Juodoji antis
Biogeographic population: Western Siberia & Northern-Western Europe & Northwestern Africa Breeding range: Western Siberia, Scandinavia, Iceland, Scotland & Ireland Wintering / core non-breeding range: Baltic, East Atlantic up to South of Mauritania Global population size: 1,070,000 mature individuals European population size: 687,000 – 815,000 individuals 1% value: 7,500 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: Non-SPEC ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Increasing Trend quality: Reasonable Key food: fish, shellfish, crustaceans	 © Constill - Creative Commons - CC BY-SA 2.0 Impact Offshore windfarms ✓ Collision risk: Low ✓ Displacement risk: High

Common Scoters are native breeding birds of the Northern hemisphere that span their range from Northern Europe to Western Siberia. They breed in the tundra region and migrate during the non-breeding season towards marine areas with shallow waters along the coast or shallow offshore banks. In the Baltic Sea, Common Scoters show a preference for areas with water depths between 5 to 15 m. (SKOV ET AL. 2011).

The European population shows an increasing trend with 687,000 – 815,000 individuals. However, the Baltic Sea population seems to have undergone through a drastic decline during the late 90s and early 2000s, period in which 57 % of the population decreased and therefore is currently considered as “Endangered” under the HELCOM commission in the Baltic Sea area (HELCOM 2019a). However, recent studies suggest a moderate increase in the population, especially in the southern Baltic (MARCHOWSKI ET AL., 2024), which makes this species to be categorized as of “Least Concern” by IUCN – Red List.

Some of the threats that Common Scoters face are bycatch (MARCHOWSKI 2021), habitat disruption and displacement in their non-breeding grounds due to construction of offshore windfarms (Fox & PETERSEN 2019).

Density and distribution of Common Scoters in the survey area

Common Scoters presence was detected in low numbers. For aerial surveys, the month with highest counts was April 2024 (n= 32) and they represented 0.5 % (n= 33) of all resting birds detected during 2023-2024, but no Common Scoters were detected in the following year of monitoring (Table 3.1). For ship-based surveys, 2023 registered only two sightings during May 2023, but their presence increased during the 2024 campaign as they represented 0.8 % (n= 13) of all resting birds (Figure 3.4 and Figure 3.5).

The monthly density for Common Scoters was low during the extension of the monitoring period. For aerial surveys, densities were below 0.10 ind./km², being April 2024 the month with highest densities (Figure 3.27). For ship-based surveys, values obtained were similar, and October 2024 was the month that reached the highest densities at 0.14 ind./km² (Figure 3.28).

The distribution of this species was scattered all over the surveyed area (Figure 3.29, Figure 3.30 and Figure 3.31) but no clear sightings were reported within the OWF. The highest recorded number of sightings during the aerial surveys was detected during April 2024, in the southern limit of the planned OWF area, within less than 2 km distance.

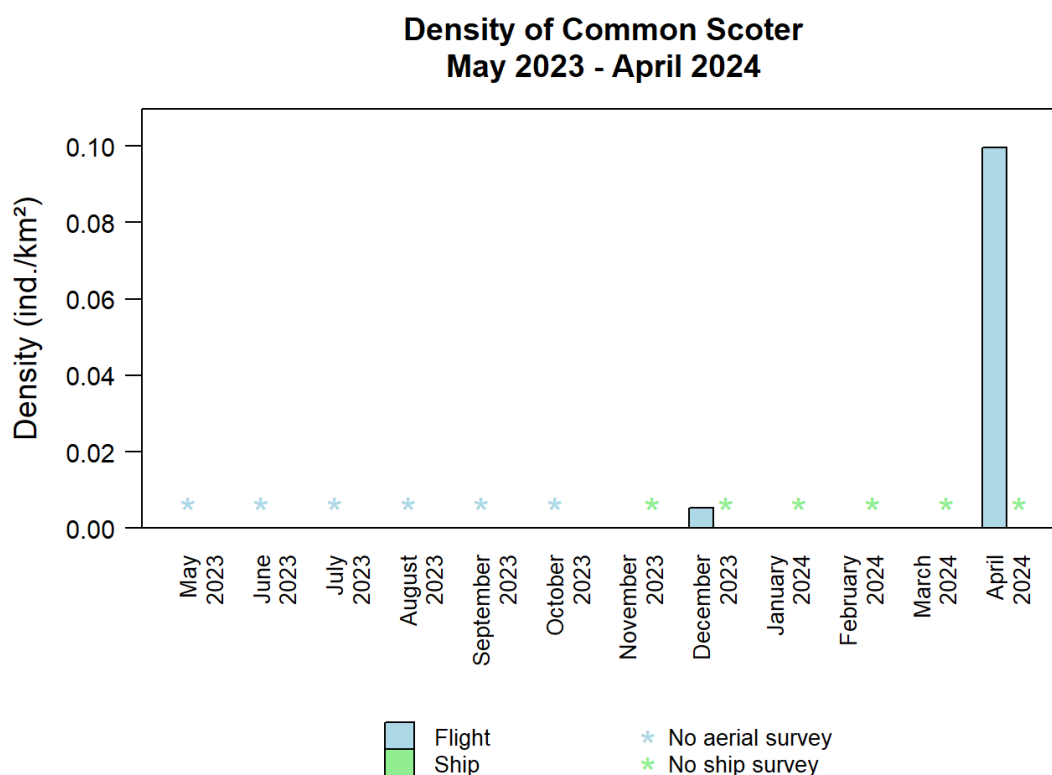


Figure 3.27 Monthly densities of Common Scoters during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

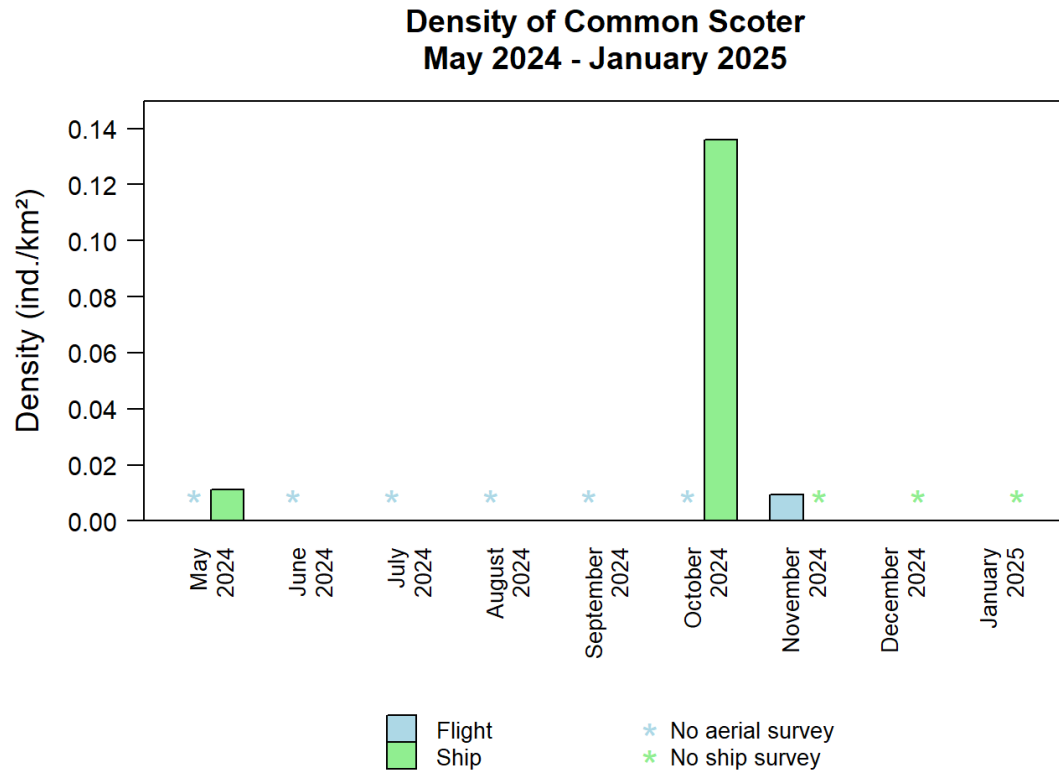


Figure 3.28 Monthly densities of Common Scoters during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and April 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

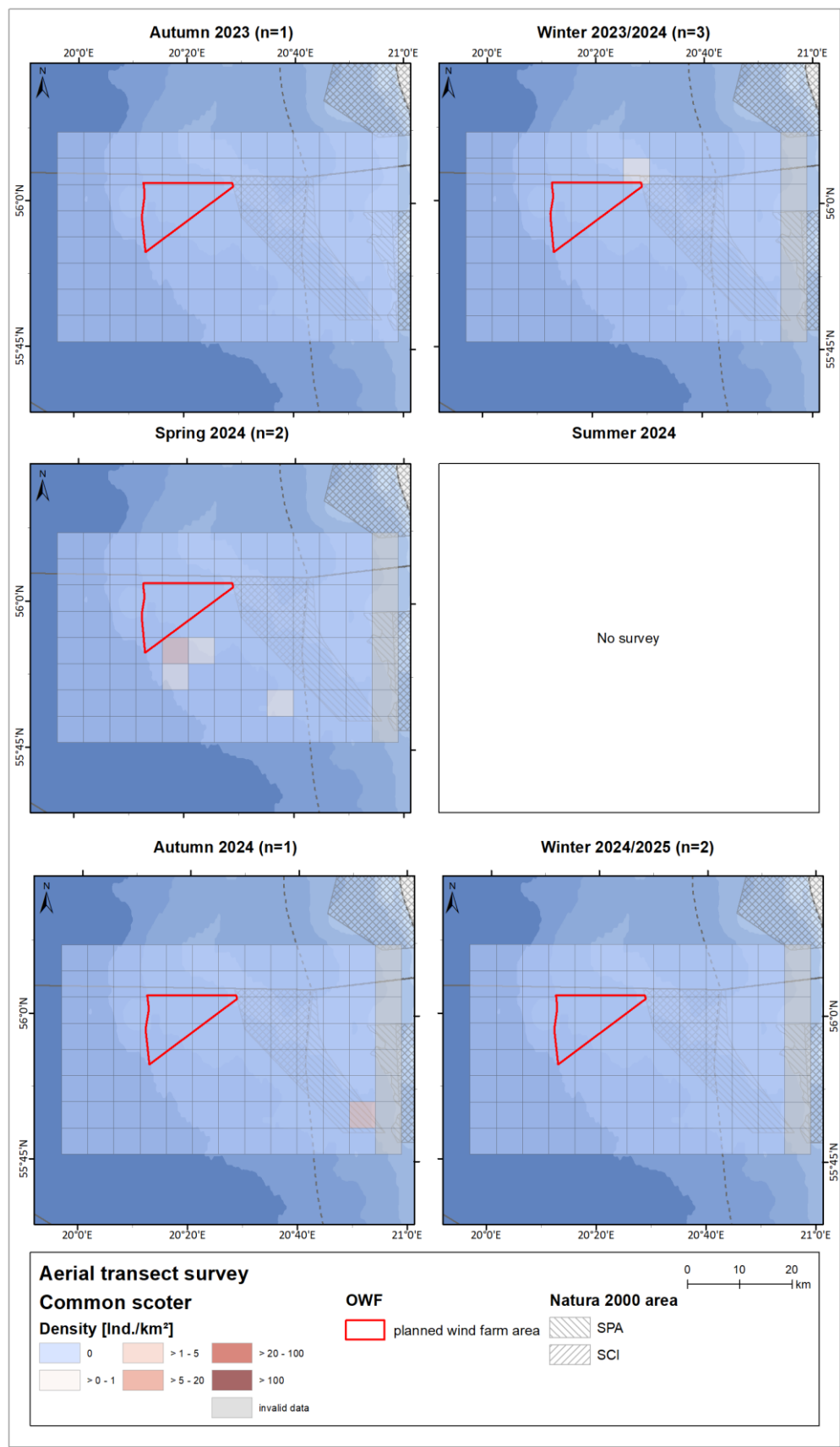


Figure 3.29 Distribution of Common Scoters in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

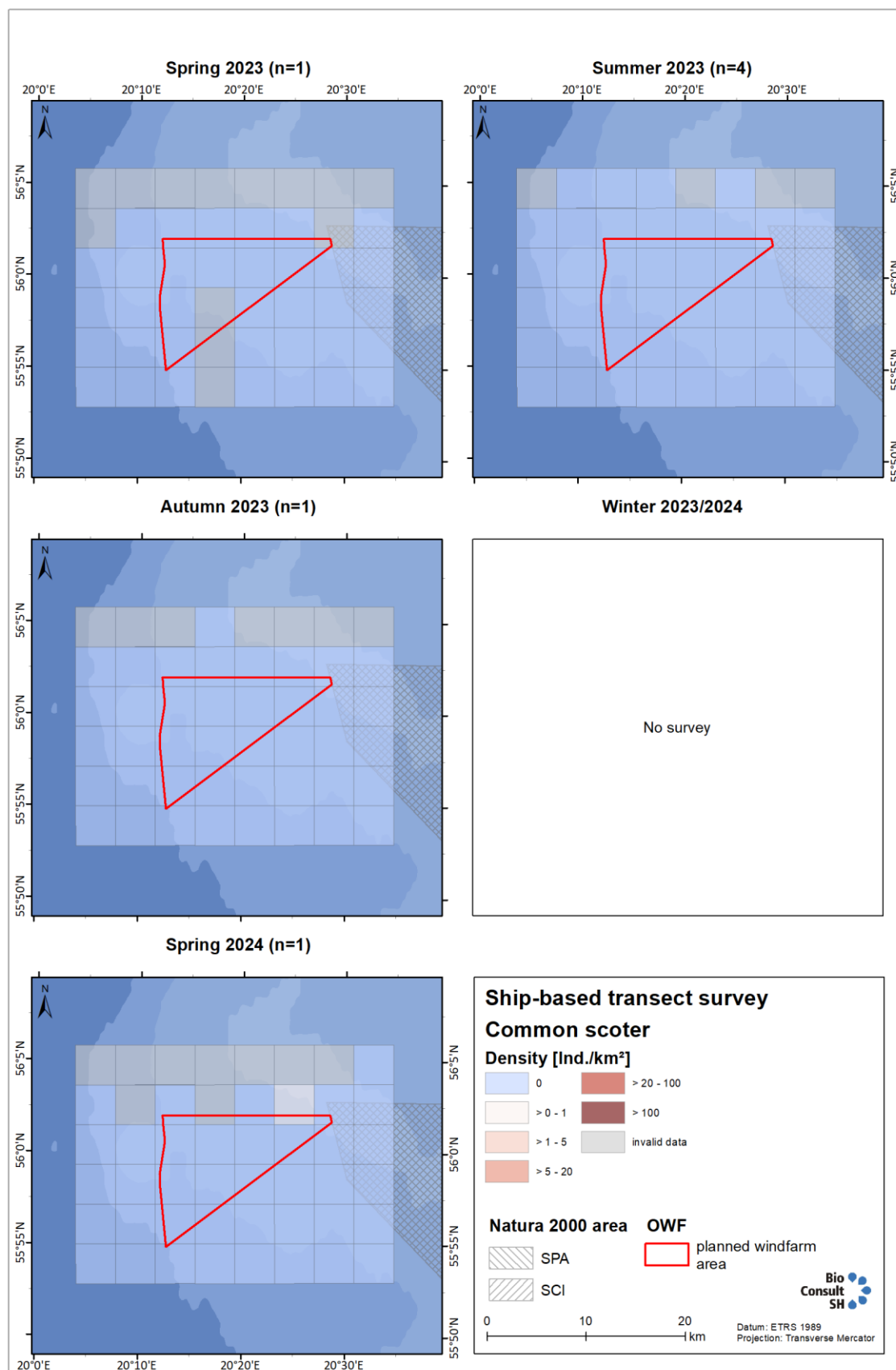


Figure 3.30 Distribution of Common Scoters in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

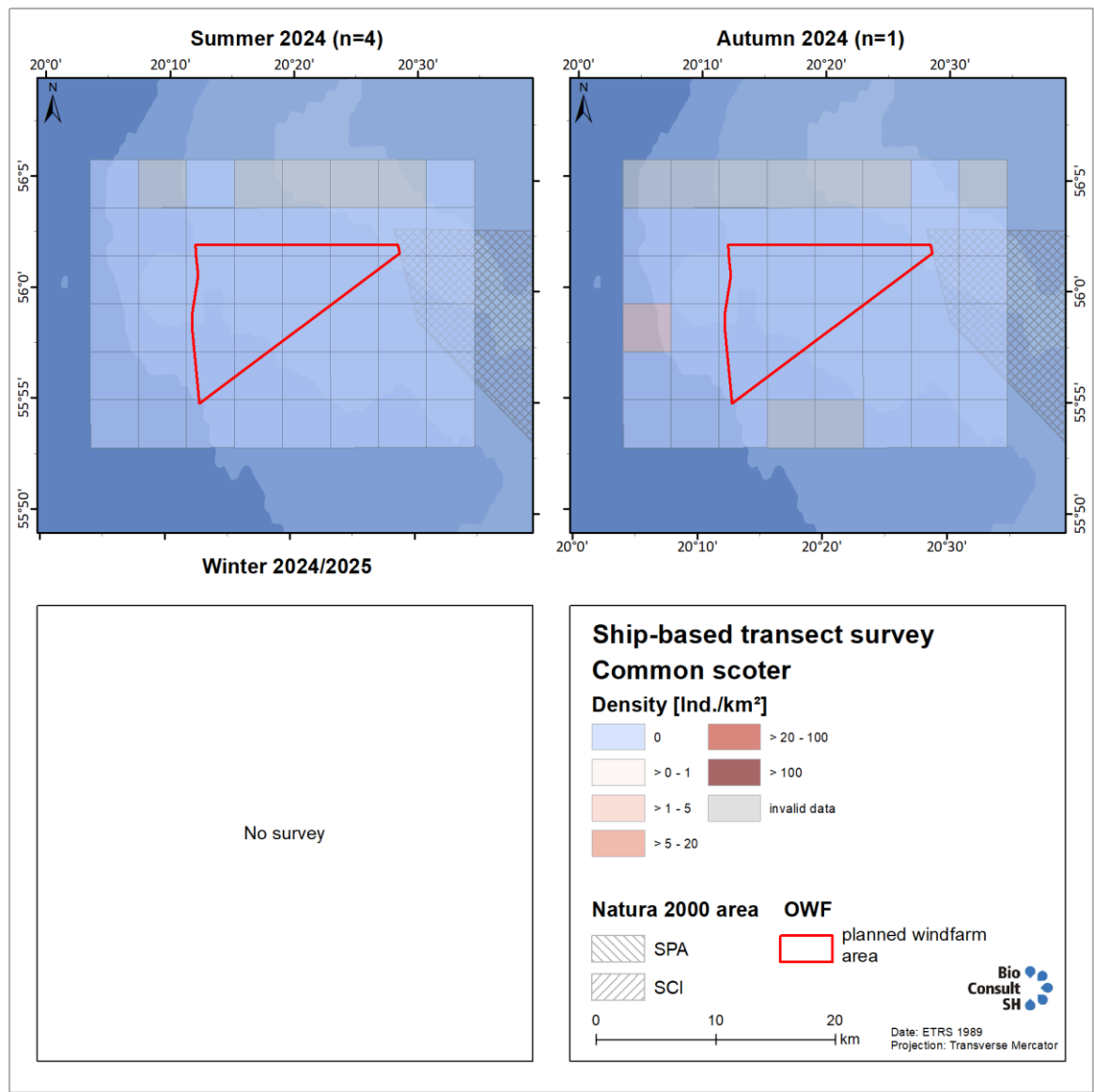


Figure 3.31 Distribution of Common Scoters in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.6 Velvet Scoter

Velvet Scoter – <i>Melanitta fusca</i>	LI: Paprastoji nuodegule
Biogeographic population: Western Siberia & Northern Europe / NW Europe Breeding range: W Siberia, N Europe Wintering / core non-breeding range: Baltic, W Europe Global population size: 220,000 – 410,000 individuals European population size: ✓ <i>graellsii</i>, 480,000 - 500,000 individuals ✓ <i>intermedius</i>, 560,000 – 610,000 individuals ✓ <i>fuscus</i>, 40,000 – 73,000 individuals 1% value: 3,000 Conservation status: ✓ EU Birds Directive, Annex I: listed ✓ EU SPEC Category: SPEC 1 ✓ IUCN Red List Category, Global & Europe: Vulnerable Trend: Increasing? Trend quality: Reasonable Key food: fish, shellfish, crustaceans	 © Åsa Berndtsson - Creative Commons Impact Offshore windfarms ✓ Collision risk: Low ✓ Displacement risk: Moderate

Velvet Scoters mainly breed in northern parts of Fennoscandia and western Russia, and to a lesser extent along the Baltic Sea coast of Sweden, Finland, Russia and Estonia (MENDEL ET AL. 2008). DURINCK ET AL. (1994) mentioned that about 93% of the European population was wintering in the Baltic Sea. Birds start the migration towards their wintering areas in September and migrate back to their breeding grounds around March, but the last birds may leave the wintering areas only in May (MENDEL ET AL. 2008).

Velvet Scoters prefer waters with depths below 20 m. Often, the larger abundances are found in shallow waters (5-10 m of depth). Nonetheless, they tend to be more common in deeper waters (20-30 m) than the two other common sea duck species: Common Scoters and Long-tailed Ducks. Velvet Scoters feed mainly on mussels, but fish, polychaetes and crustaceans also make up part of their diet (MENDEL ET AL. 2008).

The European population of Velvet Scoters is estimated to range between 220,000 to 410,000 with a tendency to increase. They are listed as “Vulnerable” under the IUCN Red List and is a species of European conservation concern (SPEC category 1). Lithuania supports about 4 % of the European wintering population of this species (STANEVA & BURFIELD 2017). In the Baltic region, this species is classified as “Vulnerable” in their breeding grounds and “Endangered” in the wintering grounds (HELCOM 2019b).

Not much is known about the response of Velvet Scoters to OWF, but some weak avoidance can be expected, similar to the closely related Common Scoter (DIERSCHKE ET AL. 2016). Also, Velvet Scoters are sensitive to ship traffic, but less so than Common Scoters (FLIESSBACH ET AL. 2019).

Density and distribution of Velvet Scoters in the survey area

Velvet Scoters were the most sighted species during aerial surveys, representing 31.3 % (n=2,073) and 45.0 % (n= 2,559) of all resting birds observations for 2023-2024 and 2024-2025, respectively (Table 3.1 and Table 3.2). Conversely, this species represented the tenth most common with only 13 sightings within transect during the ship-based surveys during 2024 monitoring period, while no sightings within transect were recorded in 2023 (Figure 3.4 and Figure 3.5).

The highest number of registered individuals during aerial surveys was January 2025, when 2,296 velvet scoters were reported. Velvet Scoters reached the highest densities per species found in the studied area. During aerial surveys, January 2025 registered up to 7.16 ind./km², while ship-surveys showed a contrasted difference with lower densities during the summer months (Figure 3.32 and Figure 3.33) , reaching the maximum registered density at 0.17 ind./km² in August 2024 (Figure 3.33).

The distribution of Velvet Scoters was highly marked towards the east-southeastern area of the planned OWF (Figure 3.34), distributed along the depth gradient found within the SPA. Although there were sightings reported within the OWF, the majority of them fell outside of its limits. The ship-surveys registered grid cells with higher densities allocated around the planned OWF but outside its limits (Figure 3.35 and Figure 3.36).

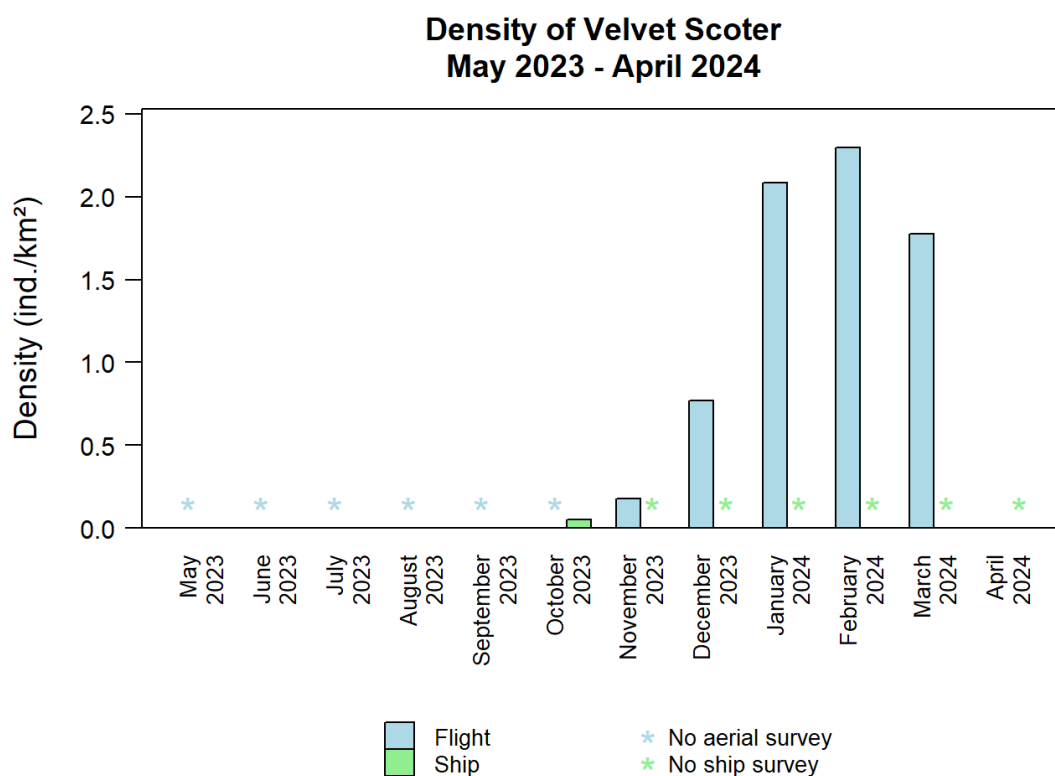


Figure 3.32 Monthly densities of Velvet Scoters during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

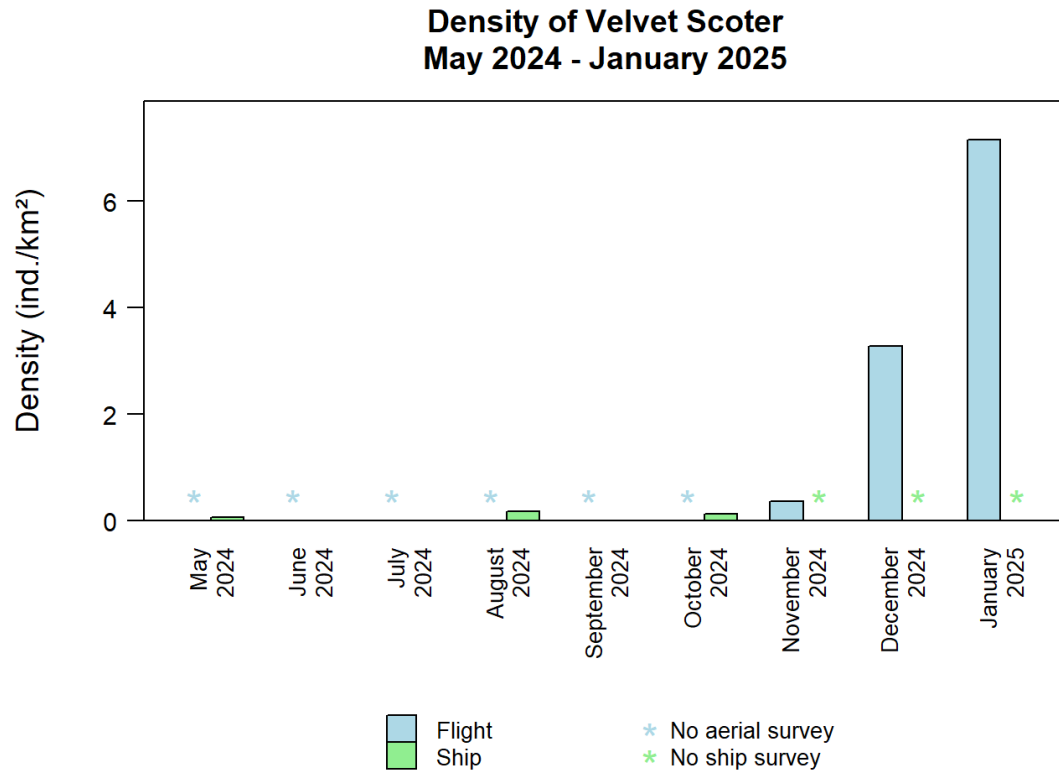


Figure 3.33 Monthly densities of Velvet Scoters during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and April 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

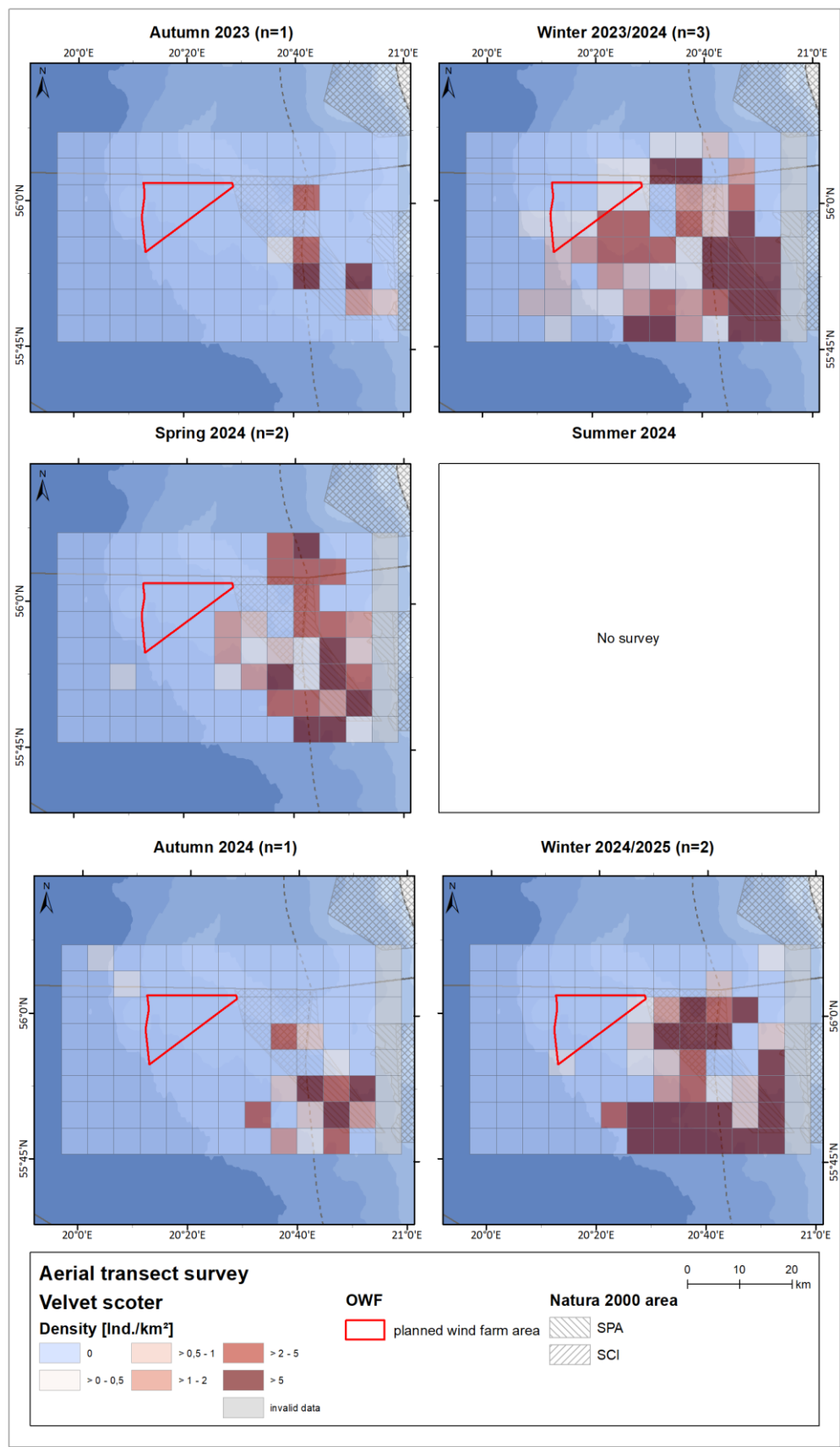


Figure 3.34 Distribution of Velvet Scoters in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

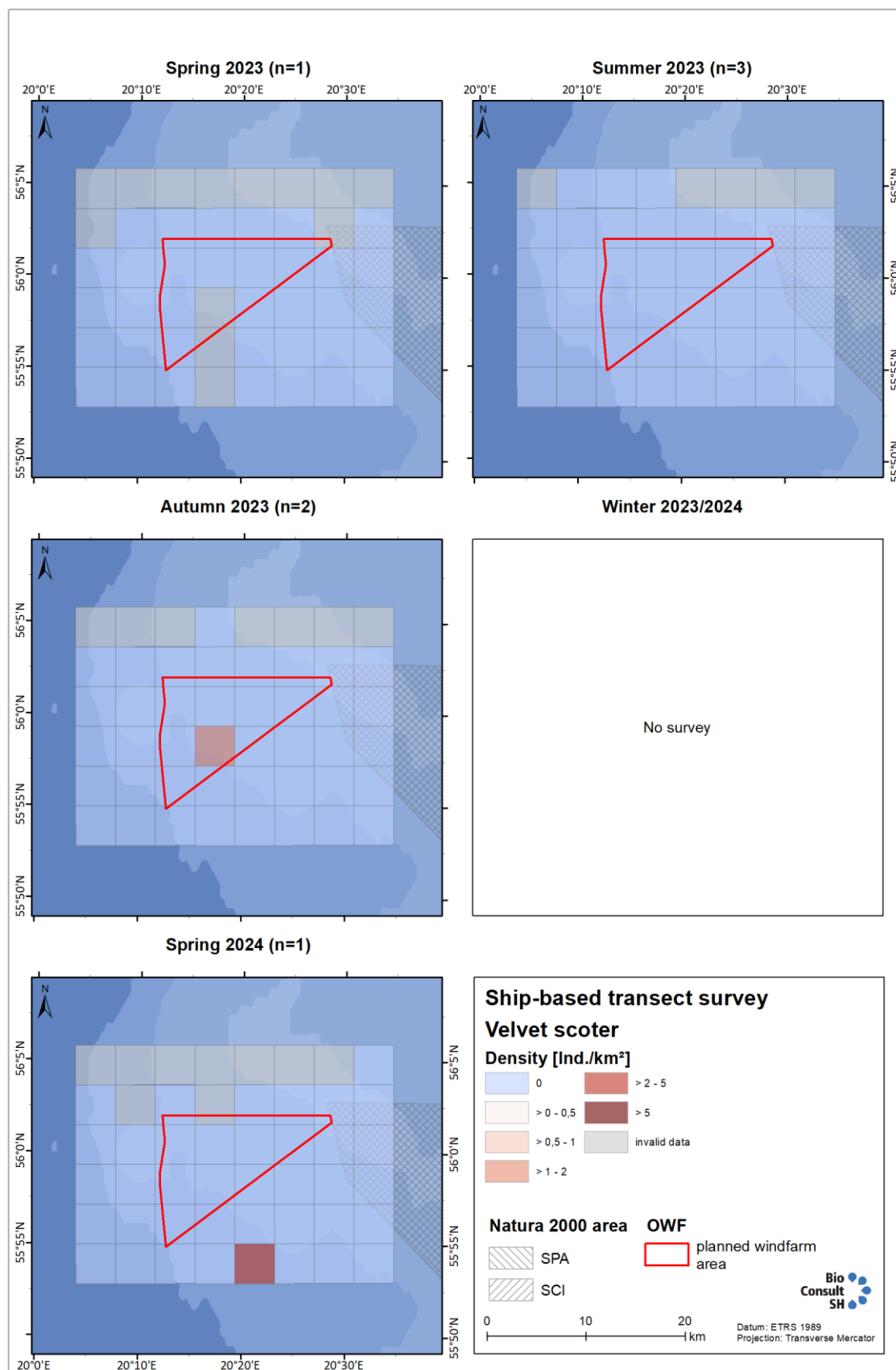


Figure 3.35 Distribution of Velvet Scoters in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

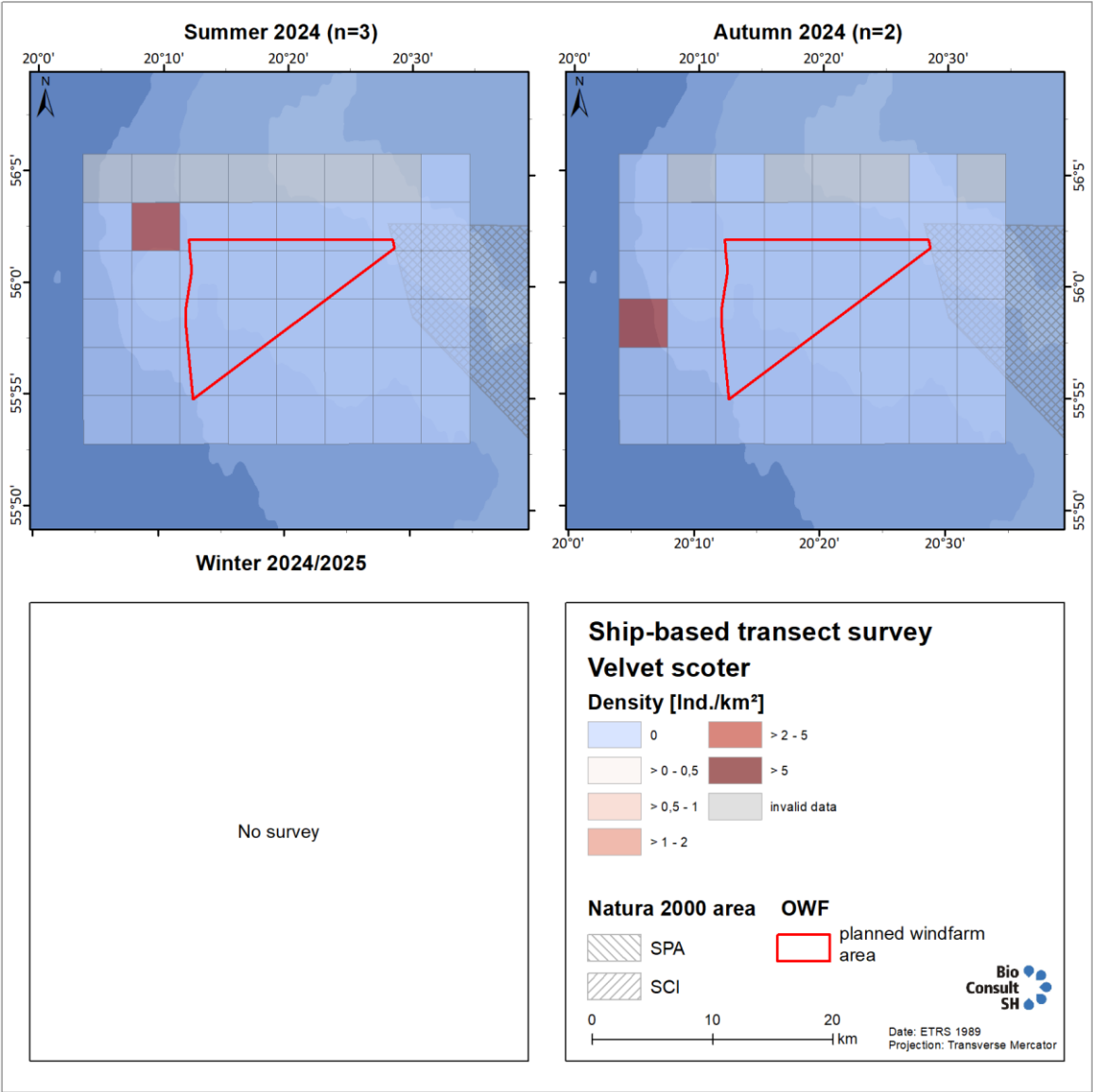


Figure 3.36 Distribution of Velvet Scoters in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.7 Little Gull

Little Gull – <i>Hydrocoloeus minutus</i>	LI: Mažasis kiras
Biogeographic population: Central & E Europe & W Mediterranean Breeding range: N Scandinavia, Baltic States, W Russia, Belarus, Ukraine Wintering / core non-breeding range: W Europe, NW Africa Global population size: 97,000 – 270,000 individuals European population size: 96,000 – 180,000 individuals 1% value: 1,300 Conservation status: ✓ EU Birds Directive, Annex I: listed ✓ EU SPEC Category: SPEC 3 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Decreasing Trend quality: Reasonable Key food: mostly insects, some crustaceans, molluscs and small fish	 © Andrej Chudý – Wikimedia commons Impact Offshore windfarms ✓ Collision risk: High ✓ Displacement risk: Very low

Little Gulls are distributed in Europe, West Asia and North America. The population that occurs in the surveyed area is the Central European population breeding in North Scandinavia to the Baltic Sea and Belarus and Western Russia. Little Gulls are migratory, and their wintering grounds extend to Western Europe and Northwest Africa (MENDEL ET AL. 2008).

Within the Baltic, the main wintering areas are the Gulf of Riga, the Irbe Strait and the southwestern part of the Baltic (DURINCK ET AL. 1994). In late July and August, Little Gulls arrive from their breeding grounds to the coast of Lithuania, Latvia and Poland to moult (DURINCK ET AL. 1994). Little Gulls occur mainly at water depths ranging between 20 and 50 m, but they may also occur at much deeper waters (up to 100 m, DURINCK ET AL. 1994). Their diet mainly consists of insects and small fish.

The European population is estimated at 96,000 to 180,000 individuals with a decreasing trend. They are classified as “Least Concern” by IUCN – Red List but they are considered regionally as “Near Threatened” in the Baltic Sea (HELCOM 2019c).

Little Gulls have been found to show non-significant reaction (LEEMANS & COLLIER 2022) or are weakly affected by OWF, showing some avoidance behaviour (DIERSCHKE ET AL. 2016) due to high collision risk (PIGGOTT ET AL. 2021).

Density and distribution of Little Gulls in the survey area

Little Gulls were detected with both methodologies at similar absolute quantities. However, it represented an abundance of the species of 7.8 % (n= 514) and 10.2% (n= 578) during the aerial surveys for 2023-2024 and 2024-2025, respectively (Table 3.1 and Table 3.2). While for the ship-based surveys, it corresponded to 39.2 % (n=787) and 33.6 % (n= 577) of all resting birds detected within transect for 2023 and 2024 (Figure 3.4 and Figure 3.5). Little Gulls became the most sighted species for the period May-October in both studied periods. This species was detected unevenly during the period of observation, with the highest detections during July and August, while June and September had the lowest for ship-based surveys.

The highest density during the ship-based surveys was observed in July 2024 at 6.65 ind./km² (Figure 3.38), while the lowest was registered in September 2024 with 0.03 ind./km². The aerial surveys detected densities that ranged from 0.03 ind./km² in February 2024 to 0.93 ind./km² in December 2023 (Table 3.5, Figure 3.37).

Little Gulls occurred at high densities over the OWF area and its limiting areas southwards and westwards. Their occurrence was highly manifested during the summer months (Figure 3.40 and Figure 3.41), although during the aerial surveys its presence was mostly detected either within the planned OWF limits or westwards (Figure 3.39).

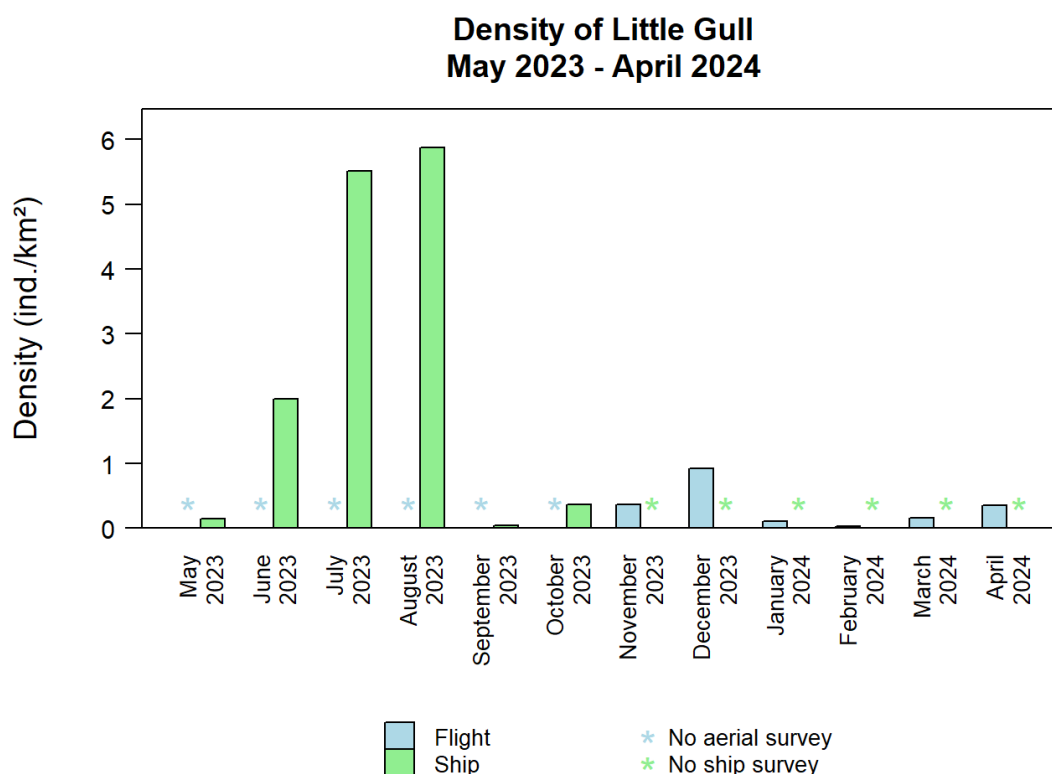


Figure 3.37 Monthly densities of Little Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

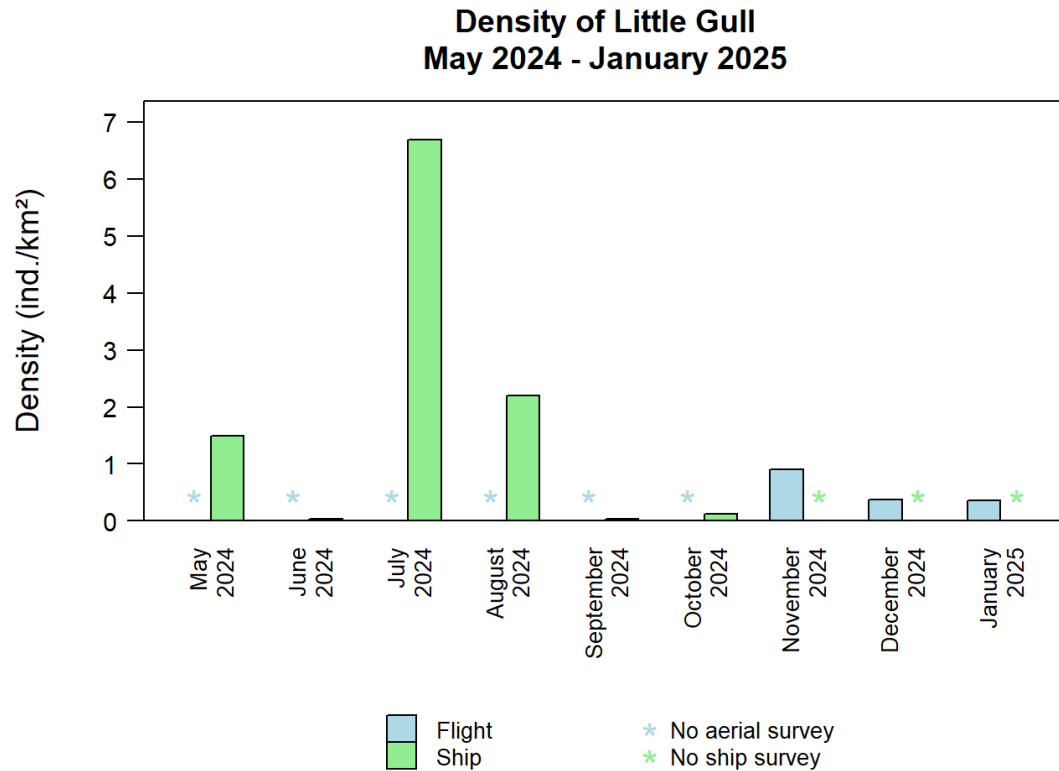


Figure 3.38 Monthly densities of Little Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks () show where no survey was conducted (blue = aerial, green = ship).*

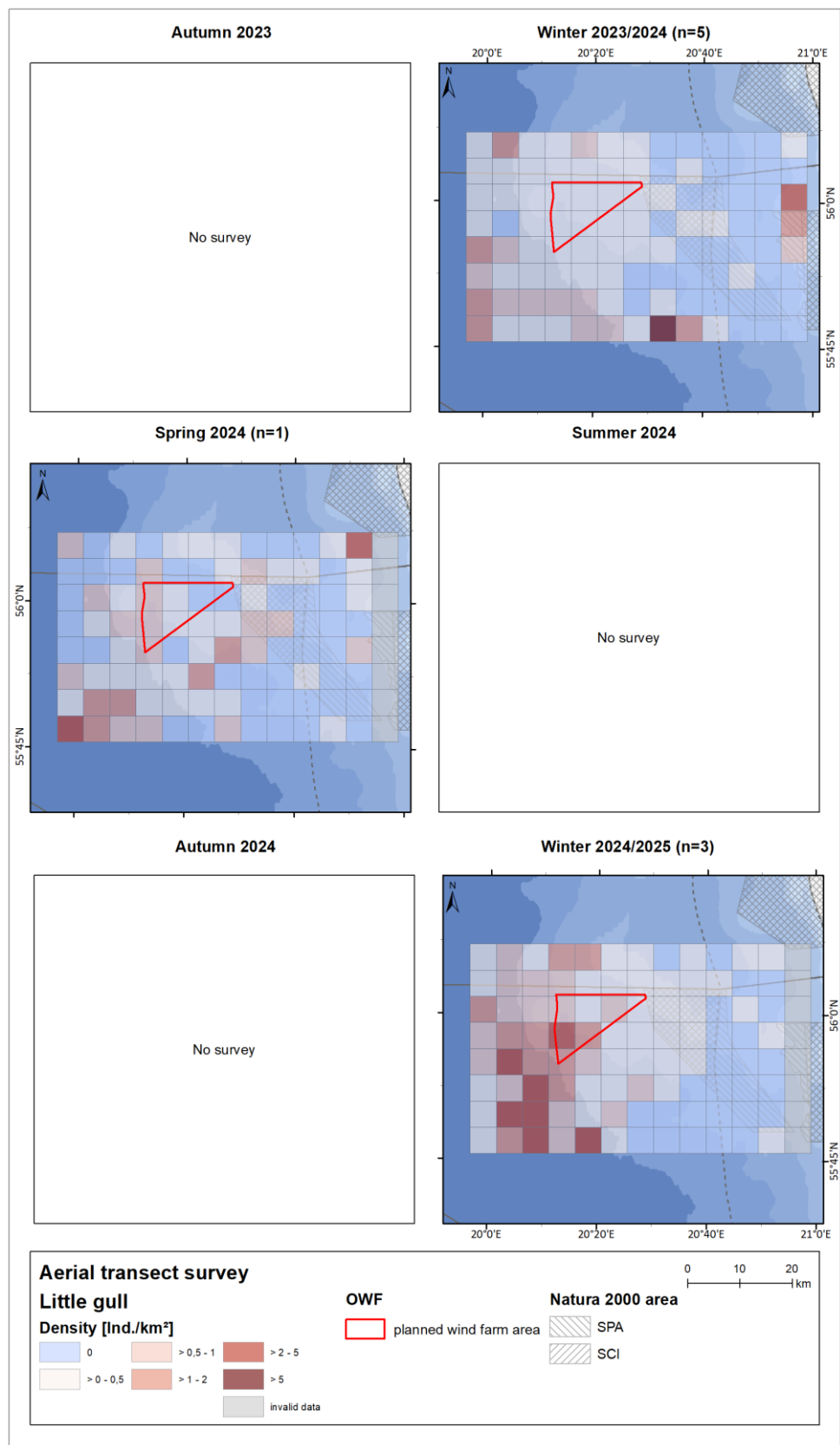


Figure 3.39 Distribution of Little Gulls in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

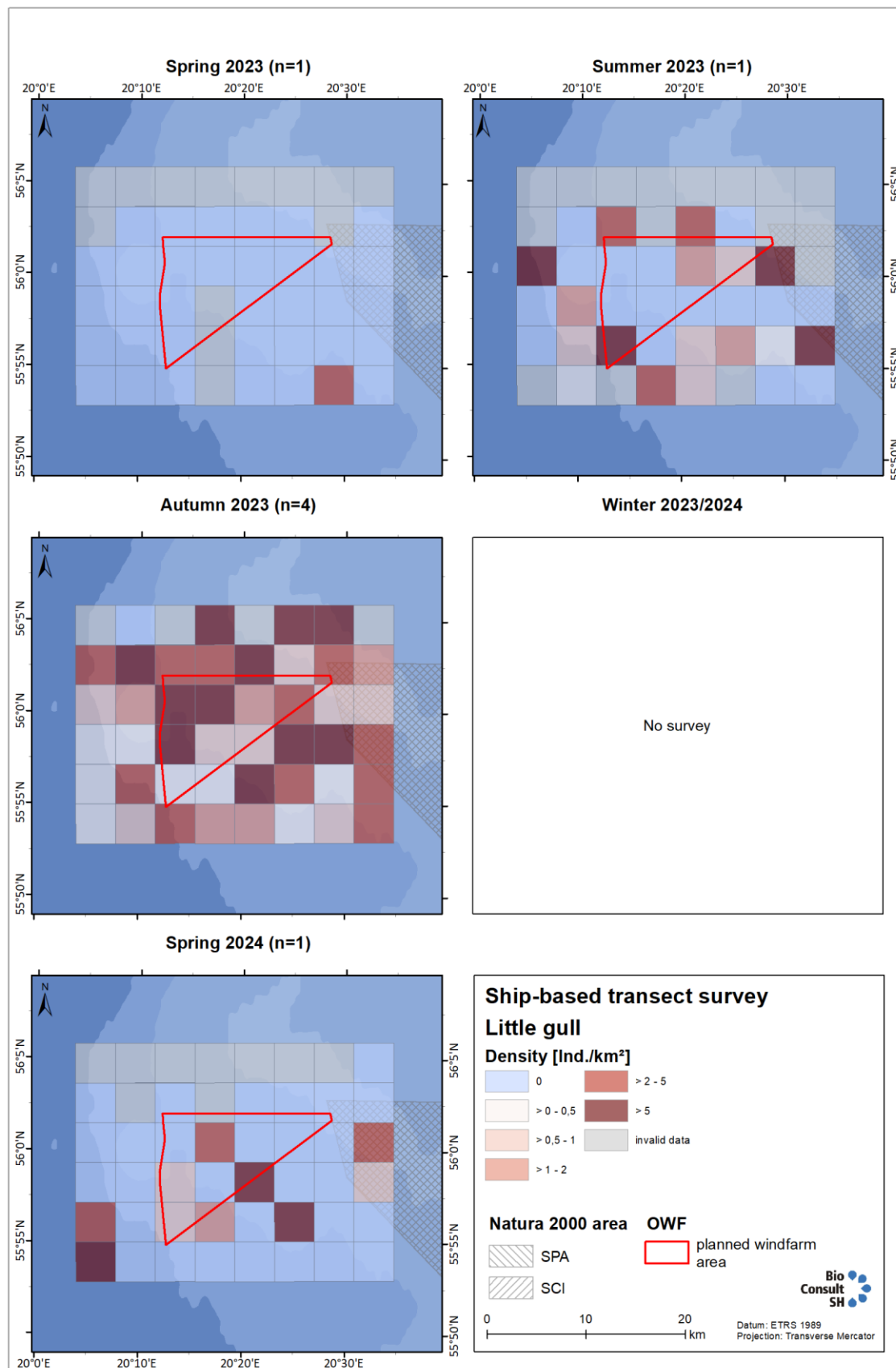


Figure 3.40 Distribution of Little Gulls in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

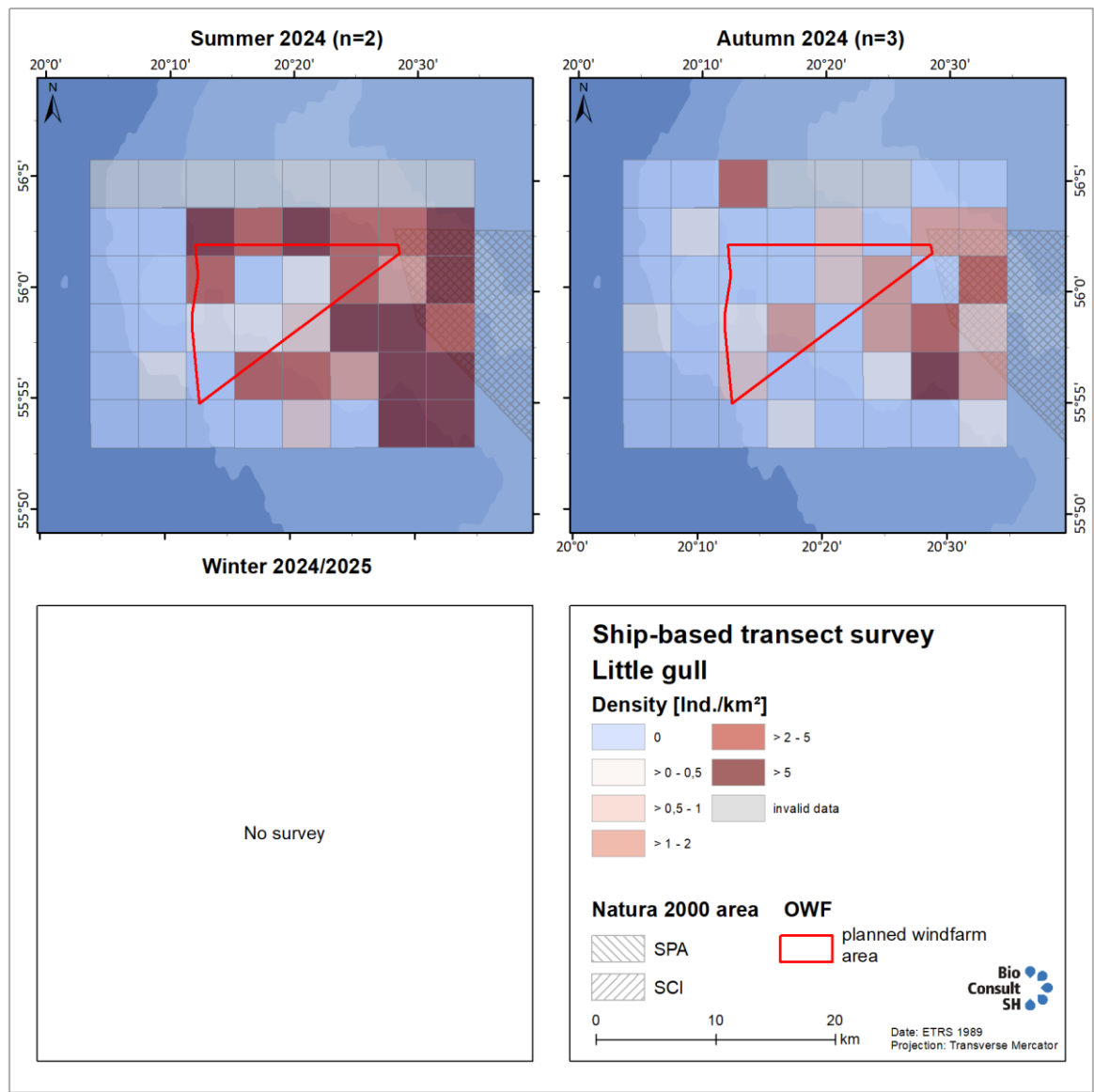


Figure 3.41 Distribution of Little Gulls in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.8 Common Gull

Common Gull – <i>Larus canus</i>	LI: Paprastasis kiras
Biogeographic population: ✓ <i>canus</i>, NW & C Europe/Atlantic coast & Mediterranean ✓ <i>heinei</i>, NE Europe & Western Siberia/Black Sea & Caspian Breeding range: ✓ <i>canus</i>: Iceland, Ireland, UK, eastwards to White Sea ✓ <i>heinei</i>: NW Russia, West and Central Siberia E to R. Lena Wintering / core non-breeding range: ✓ <i>canus</i>: Europe to N Africa ✓ <i>heinei</i>: SE Europe, Black & Caspian Seas Global population size: 2,500,000 – 3,700,000 individuals European population size: ✓ <i>canus</i>: 1,400,000 – 2,000,000 individuals ✓ <i>heinei</i>: 2,200,000 – 3,500,000 individuals 1% value: ✓ <i>canus</i>: 16,400 ✓ <i>heinei</i>: 16,400 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: Non-SPEC ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Decreasing? (both subsp.) Trend quality: Reasonable (both subsp.) Key food: opportunistic	 © Andreas Trepte Wikimedia Commons Impact Offshore windfarms ✓ Collision risk: High ✓ Displacement risk: Very low

The Common Gull is a medium-sized gull that breeds in the Palearctic, from Eurasia to western North America. The species has four subspecies and two of them occur sympatrically in the survey area. The nominate form: *L. c. canus* breeds from Iceland to Fennoscandia and winters from Central Europe to North Africa. The subspecies *L. c. heinei* breeds from Northeast Europe and Western and Central Siberia and winters in Northwest Russia down to the Black Sea and the Caspian area.

DURINCK and colleagues (1994) mention that less than 4 % of the *canus* subspecies winters offshore in the Baltic Sea and that high densities are often only recorded around the Gulf of Riga and to the north and northwest coast of Bornholm. They are generalist feeders with a large variety of food prey from terrestrial and marine ecosystems (MENDEL ET AL. 2008).

Despite being relatively numerous both subspecies are showing potential declining trends. However, the species is classified as of “Least Concern” by the IUCN – Red List.

In the past, Little Gull had faced pressure because of habitat loss and land degradation due to human activities as well as predation by invasive American Mink (*Neogale vison*; NORDSTRÖM ET AL. 2003). This species has been found to frequent the offshore windfarm structures (VANERMEN ET AL. 2015) and it has been classified with a high collision risk due to its flying patterns (PIGGOTT ET AL. 2021).

Density and distribution of Common Gulls in the survey area

Common Gulls were observed across the entire survey period. For aerial surveys, Common Gulls represented 1.4 % (n= 93) and 1.2 % (n= 66) of all resting birds during 2023-2024 and 2024-2025 campaigns (Figure 3.1 and Figure 3.2). The highest counts were recorded during November for both years (November 2023; n= 39 and November 2024; n= 27). During ship-based surveys, Common Gulls represented the fourth most common resting bird, representing 6.1 % (n= 122) and 6.2 % (n= 107) for 2023 and 2024 respectively (Figure 3.4 and Figure 3.5). The highest number of individuals were registered during October 2023 (n = 74) and July 2024 (n= 53).

Common Gulls were distributed evenly across the surveyed area and higher densities were found outside and inside the planned OWF (Figure 3.44, Figure 3.45 and Figure 3.46). The highest densities were observed in July 2024 with 0.76 ind./km² during ship-based surveys (Table 3.5, Figure 3.43).

Aerial surveys recorded densities ranging from 0.01 ind./km² in January 2024 to 0.17 ind./km² in December 2024 (Figure 3.43).

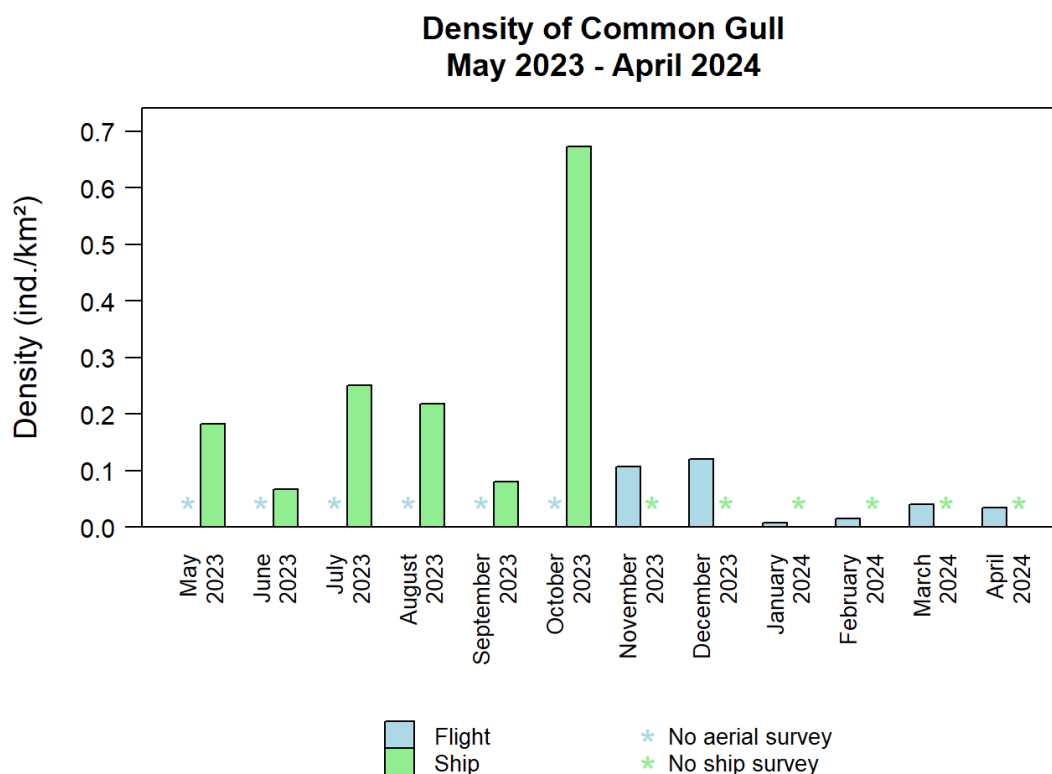


Figure 3.42 Monthly densities of Common Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

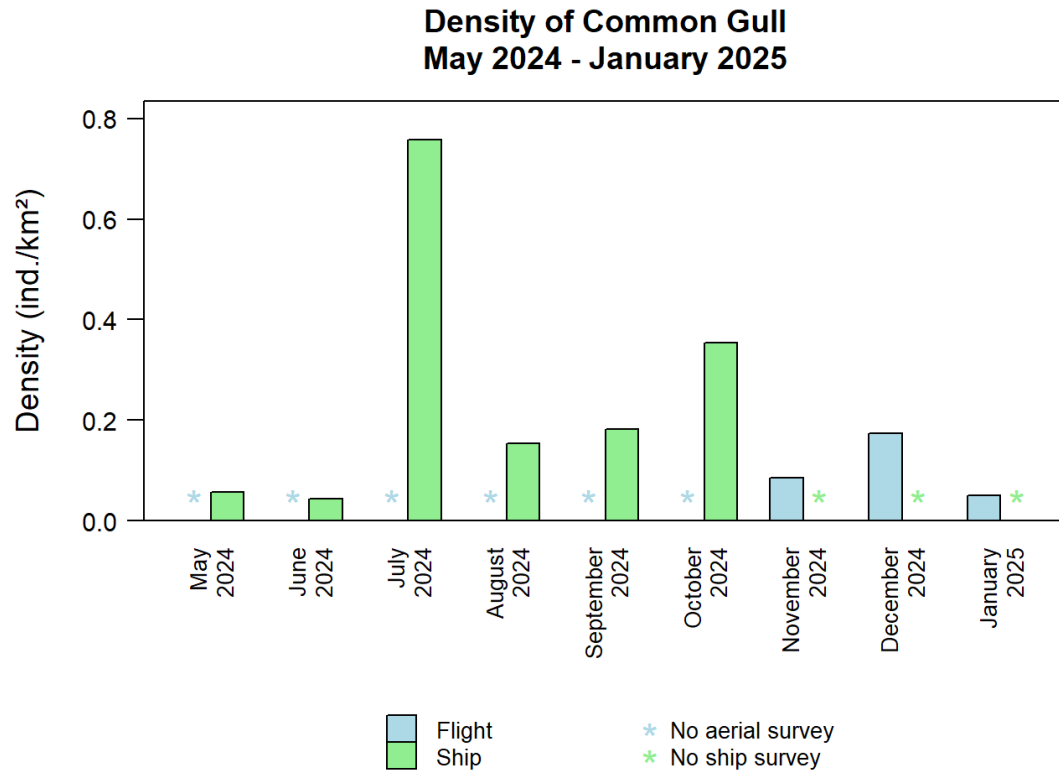


Figure 3.43 Monthly densities of Common Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

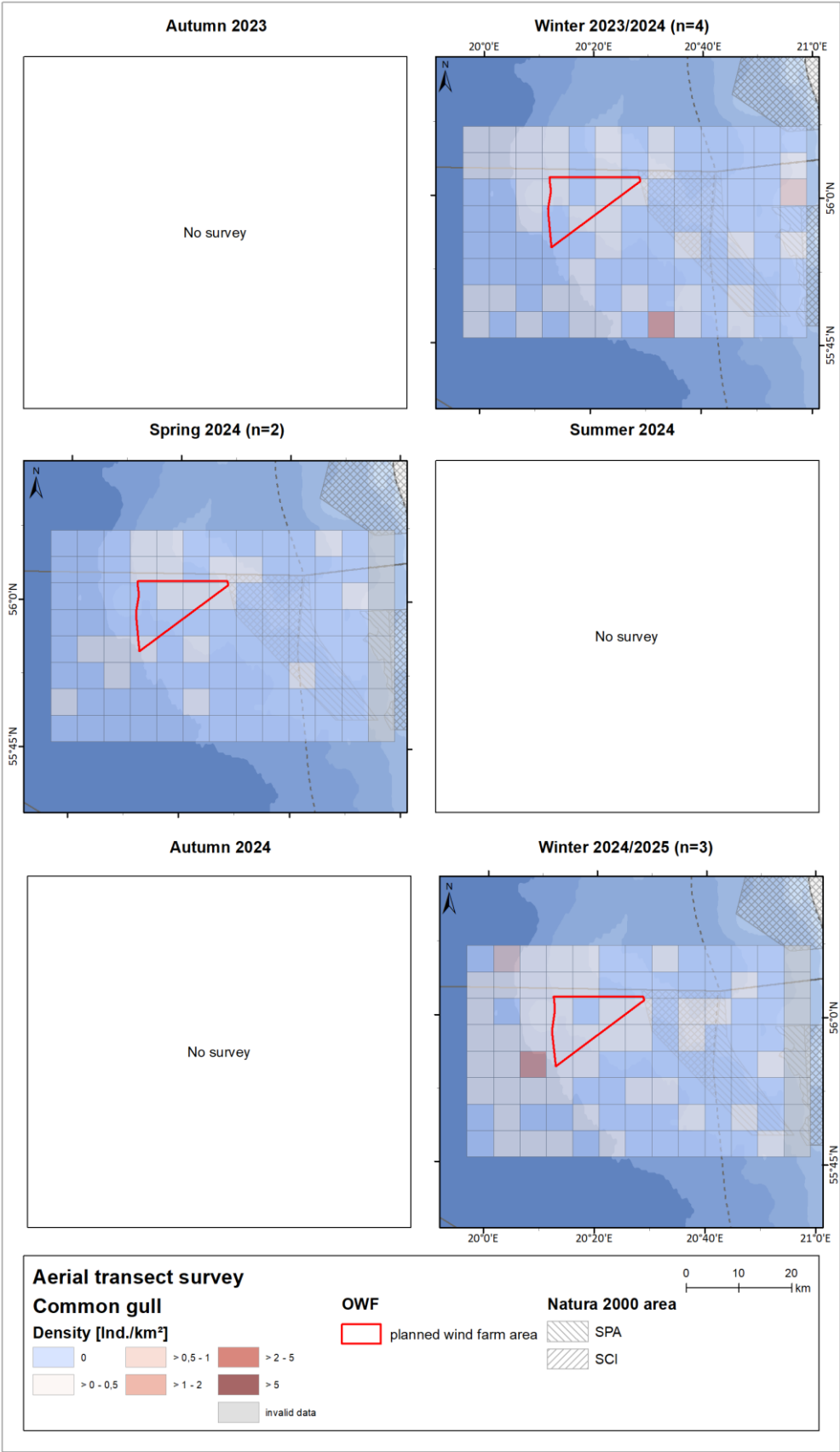


Figure 3.44 Distribution of Common Gulls in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

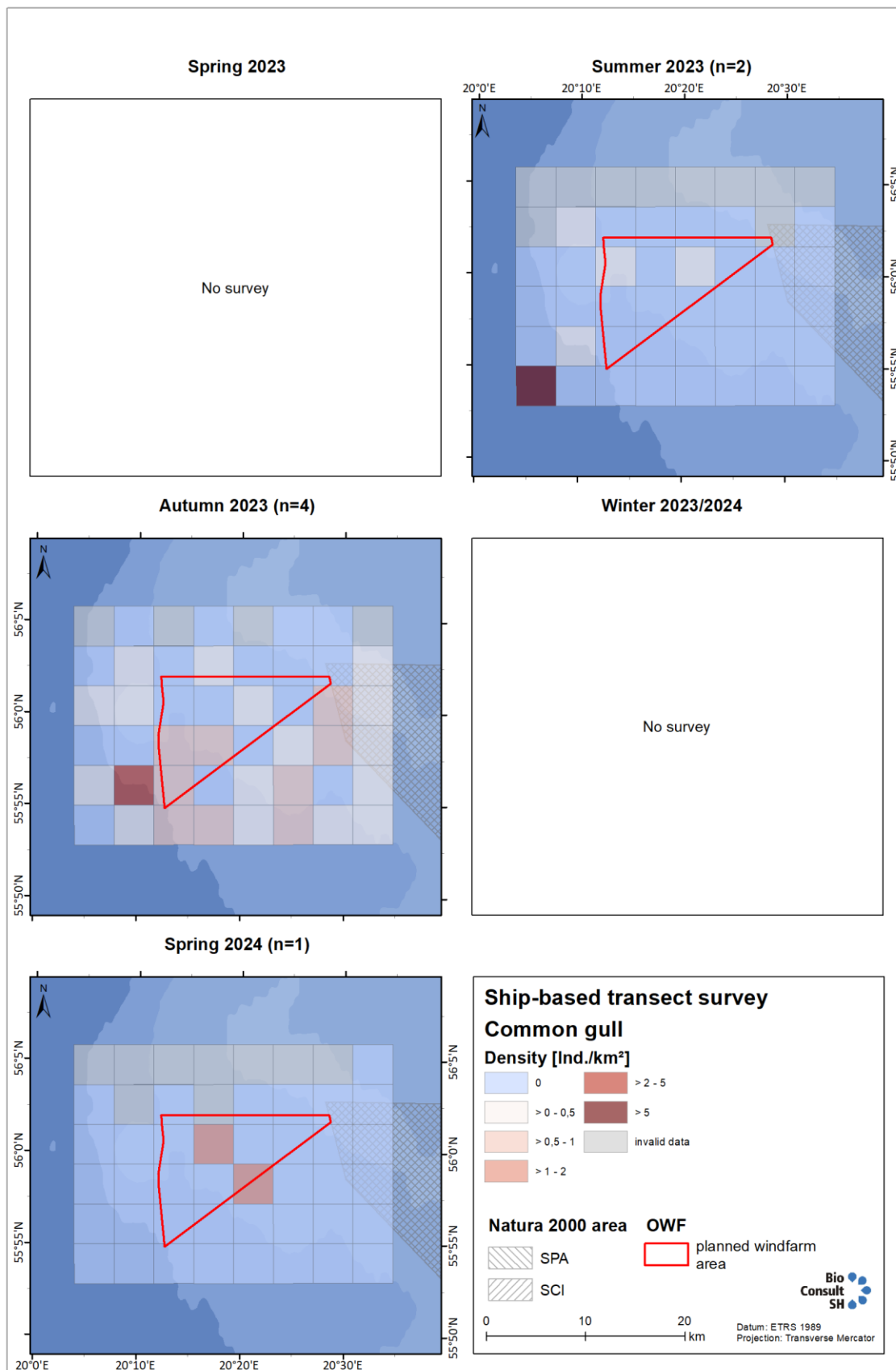


Figure 3.45 Common Gull distribution in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

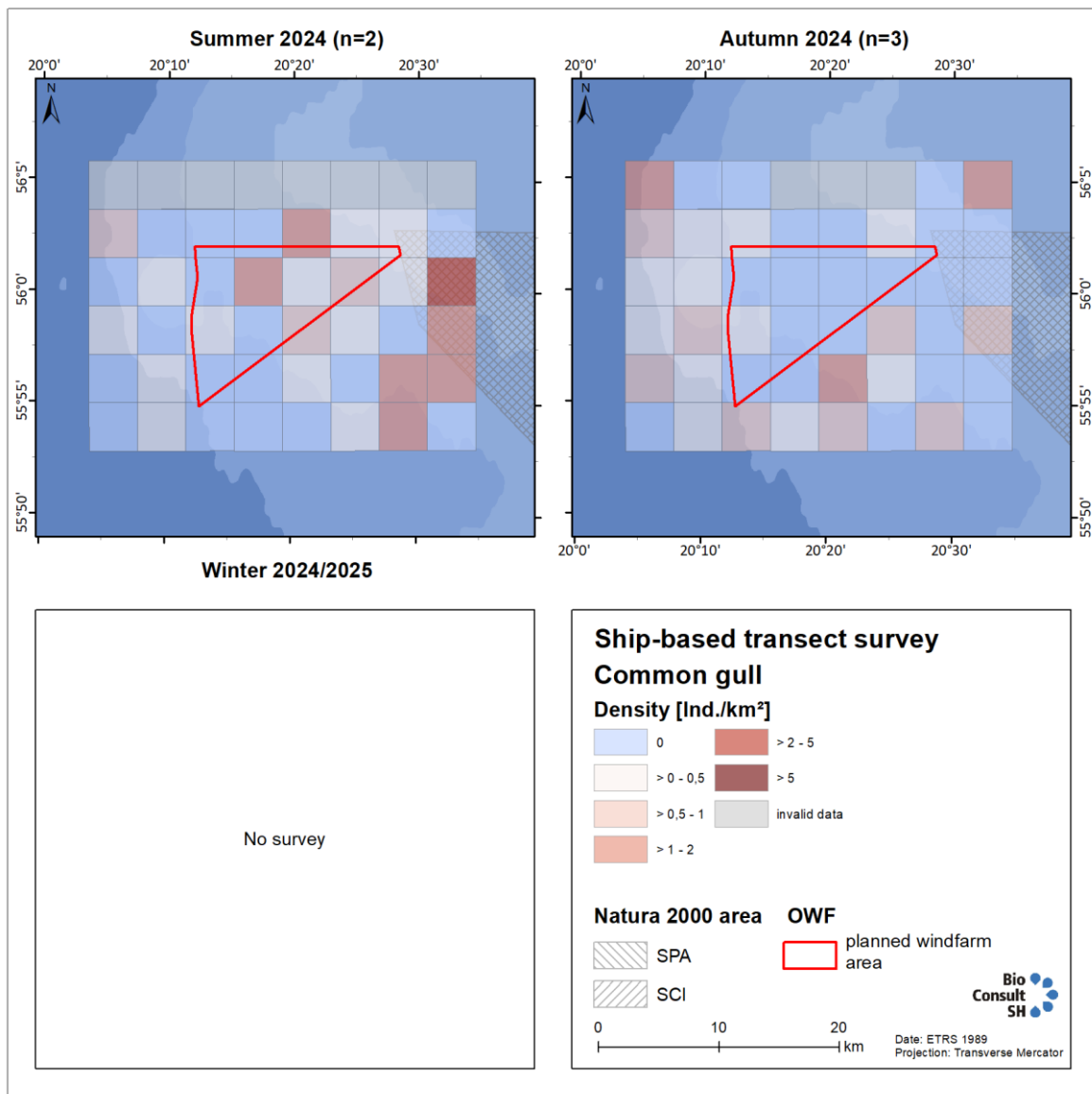


Figure 3.46 Common Gull distribution in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.9 Lesser Black-backed Gull

Lesser Black-backed Gull – <i>Larus fuscus</i> (<i>fuscus</i>)	LI: Silkinis kiras
Biogeographic population: NE Europe / Black Sea, SW Asia & Eastern Africa Breeding range: N Norway, E Sweden, E Denmark, Finland, Estonia, W Russia E to White Sea Wintering / core non-breeding range: E Africa S to Tanzania Global population size: 940,000 – 2,070,000 individuals European population size: ✓ <i>graellsii</i>, 480,000 - 500,000 individuals ✓ <i>intermedius</i>, 560,000 – 610,000 individuals ✓ <i>fuscus</i>, 40,000 – 73,000 individuals 1% value: ✓ <i>graellsii</i>, 4,900 ✓ <i>intermedius</i>, 6,300 ✓ <i>fuscus</i>, 6,300 Conservation status: ✓ EU Birds Directive, Annex I: listed ✓ EU SPEC Category: Non-SPEC ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: ✓ <i>Graellsii</i>: Decreasing ✓ <i>Intermedius</i>: Stable ✓ <i>Fuscus</i>: Decreasing	 © Andreas Trepte - Creative Commons Impact Offshore windfarms ✓ Collision risk: Very high ✓ Displacement risk: Very Low Trend quality: ✓ <i>Graellsii</i>: Poor ✓ <i>Intermedius</i>: Good ✓ <i>Fuscus</i>: Reasonable Key food: fish, shellfish, crustaceans

In total, five subspecies of *L. fuscus* are known in the world (MENDEL ET AL. 2008). In the western and central Baltic Sea area, two subspecies partially overlap their distribution range: *L. f. intermedius* and *L. f. fuscus*. Lesser Black-backed Gulls are coastal breeders and its populations have been observed to expand their distribution ranges across Europe since the mid-1900s (CAMPHUYSEN 2013). In the Baltic Sea, it breeds at the Swedish West coast and the Danish Kattegat with a stable population, and it has started to expand towards the southwestern coasts. The species is omnivorous but predominantly fish-feeder.

However, larger colonies of Lesser Black-backed Gulls are found in Finland, Sweden and Russia, where they have suffered a strong long-term decline since the 1970s. Reasons for such trend were caused by high chick mortality by sympatric gull species (Herring Gull), due to predatory activity or disease dispersion. Lesser Black-backed Gull is the only African migrant among the Baltic gulls, and therefore prone to develop adverse effect against the chemical compound DDT due to exposure. Current population is estimated at 40,000 - 73,000 individuals (WETLANDS INTERNATIONAL 2021), with 14,200-19,200 breeding pairs across the Baltic Sea (HELCOM 2013d). It is classified as “Least Concern” by IUCN – Red List due to its widespread range and population. Nonetheless, the decline in the Baltic Sea region has been of such extent that it is classified as “Vulnerable” (HELCOM 2013d).

Lesser Black-backed Gulls have shown high collision risk towards offshore windfarm structures, especially when such developments take place near their breeding colonies (THAXTER ET AL. 2019). Nevertheless, terrestrial environmental changes are more important influencing factors determining foraging movements and affecting colonies' productivity when considering the breeding season (CLEWLEY ET AL. 2023).

Density and distribution of Lesser Black-backed Gull in the survey area

Lesser Black-backed Gulls were present during the survey period, but in low numbers. The highest presence was detected during ship-based surveys. While they represented 0.3 % (n= 5) during 2023 monitoring period, in 2024 they increased in numbers up to 3.0% (n= 51). The month with highest counts was May 2024 (Figure 3.4 and Figure 3.5). Aerial surveys showed lower representation of this species between November and April. For the 2023-2024 period, 13 individuals representing 0.2 % of all resting birds were accounted for, while no individuals were sighted during the 2024-2025 period (Figure 3.1 and Figure 3.2). The month with highest counts registered was April 2024, with 13 individuals.

However, observations were clustered in small groups or associations of 2-3 individuals. The highest density was observed in May 2024 at 0.58 ind./km² and the lowest in June 2023 at 0.01 ind./km² (Table 3.5 Figure 3.47) for ship surveys. This species was mostly not present during the aerial surveys, with the highest detections occurring in April 2024 with low densities of 0.04 ind./km² (Figure 3.47 and Figure 3.48):

Lesser Black-backed Gulls were mostly observed westwards of the OWF, where the main clusters occurred. Only one individual was recorded within the planned OWF (Figure 3.50 and Figure 3.51) and this species was found westwards and eastwards of the OWF as well for aerial surveys (Figure 3.49).

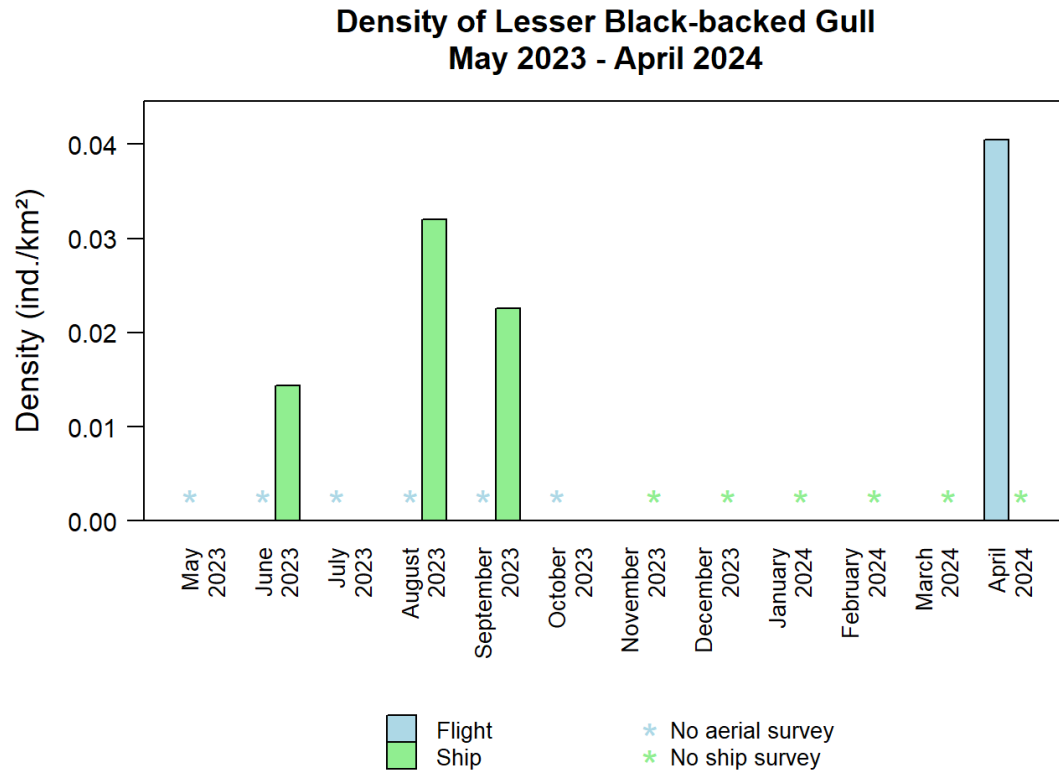


Figure 3.47 Monthly densities of Lesser Black-backed Gull during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

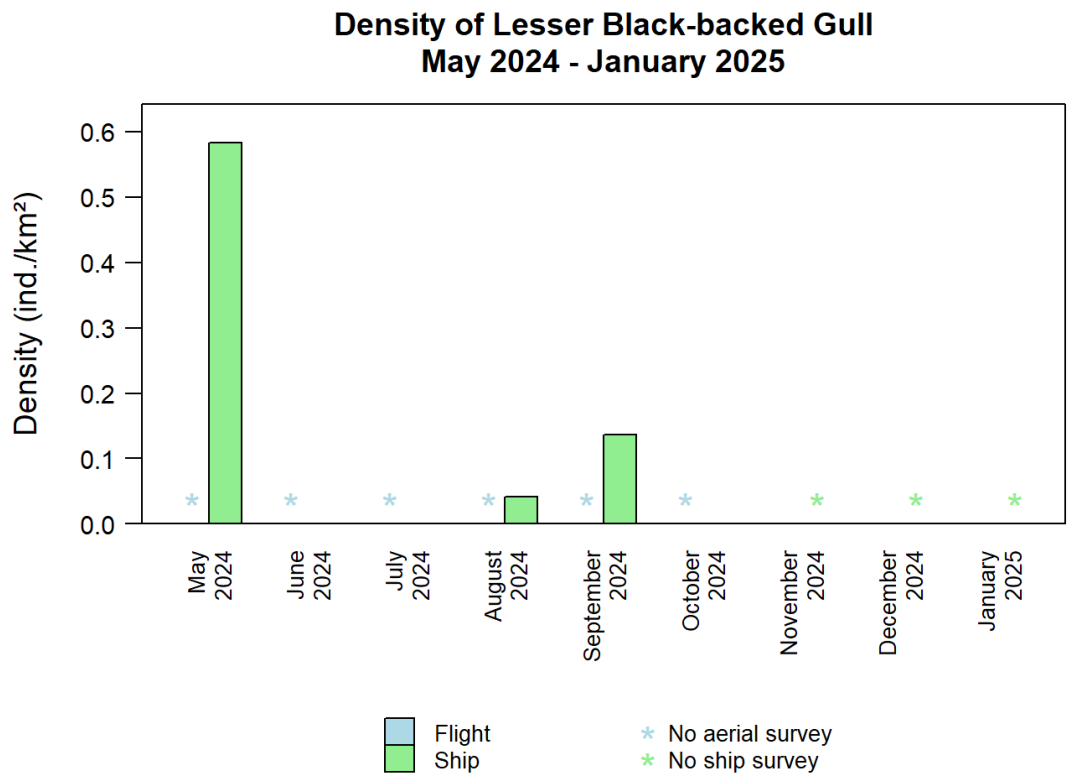


Figure 3.48 Monthly densities of Lesser Black-backed Gull during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

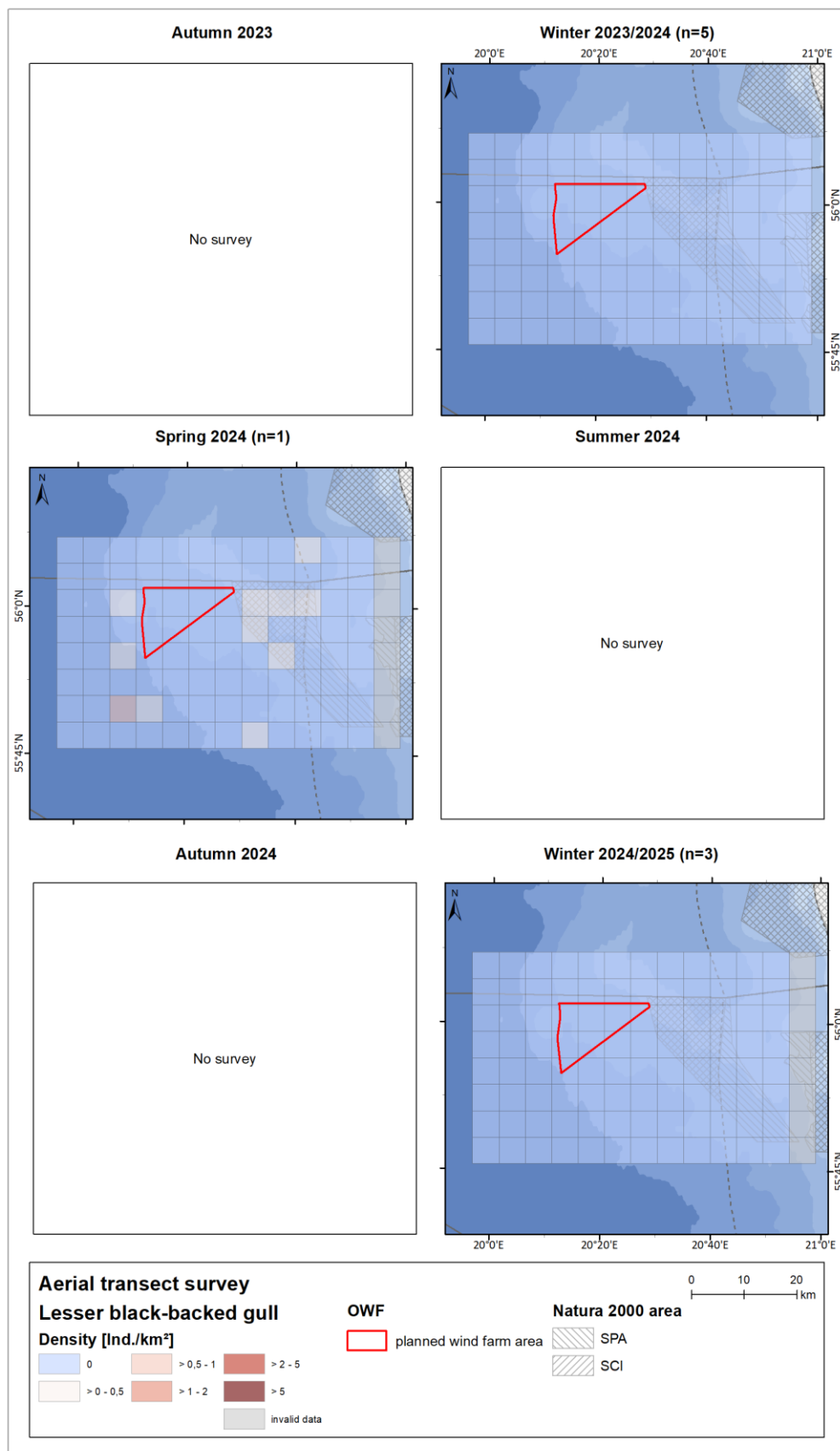


Figure 3.49 Distribution of Lesser Black-backed Gulls in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

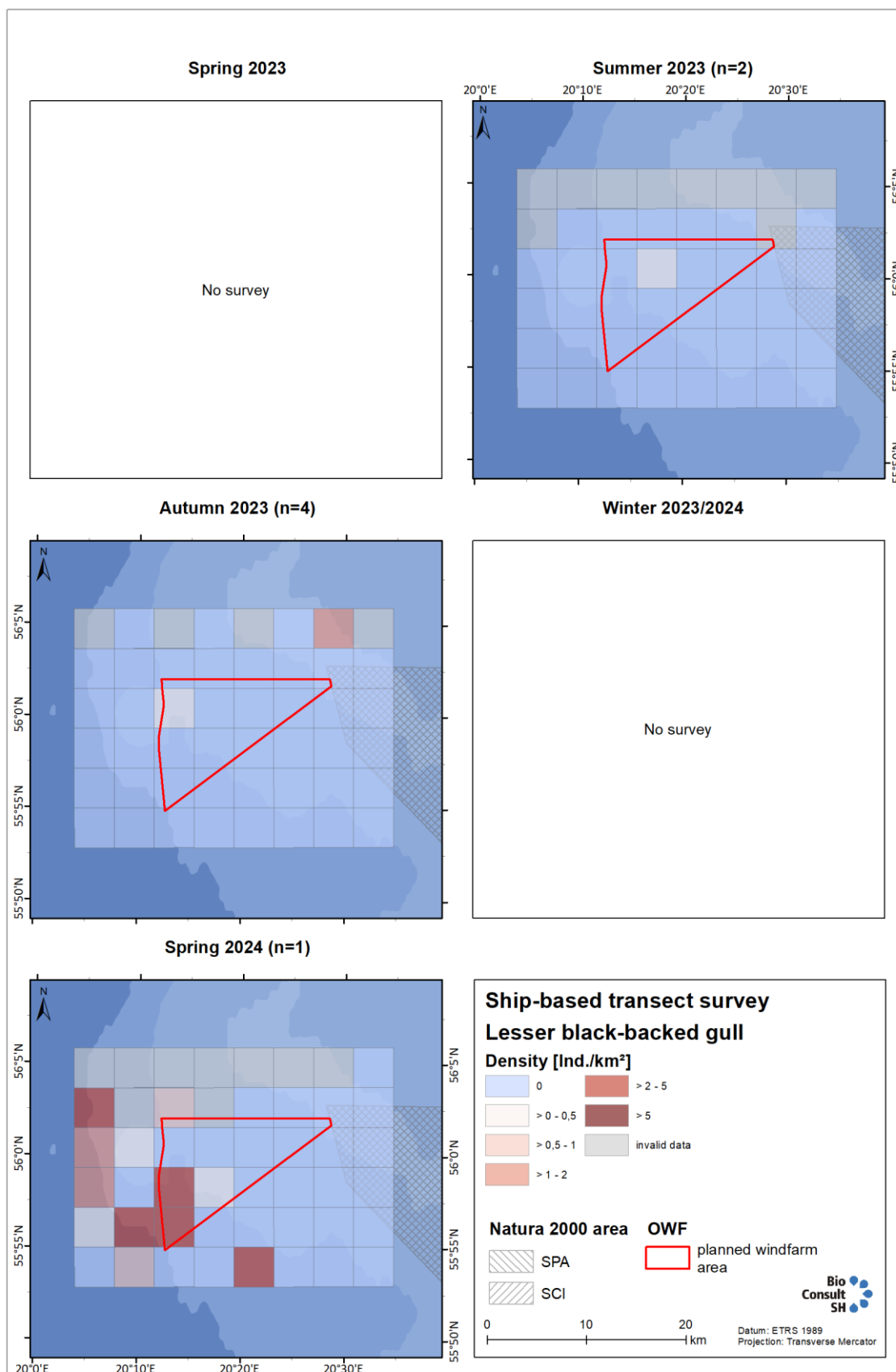


Figure 3.50 Distribution of Lesser Black-backed Gull in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

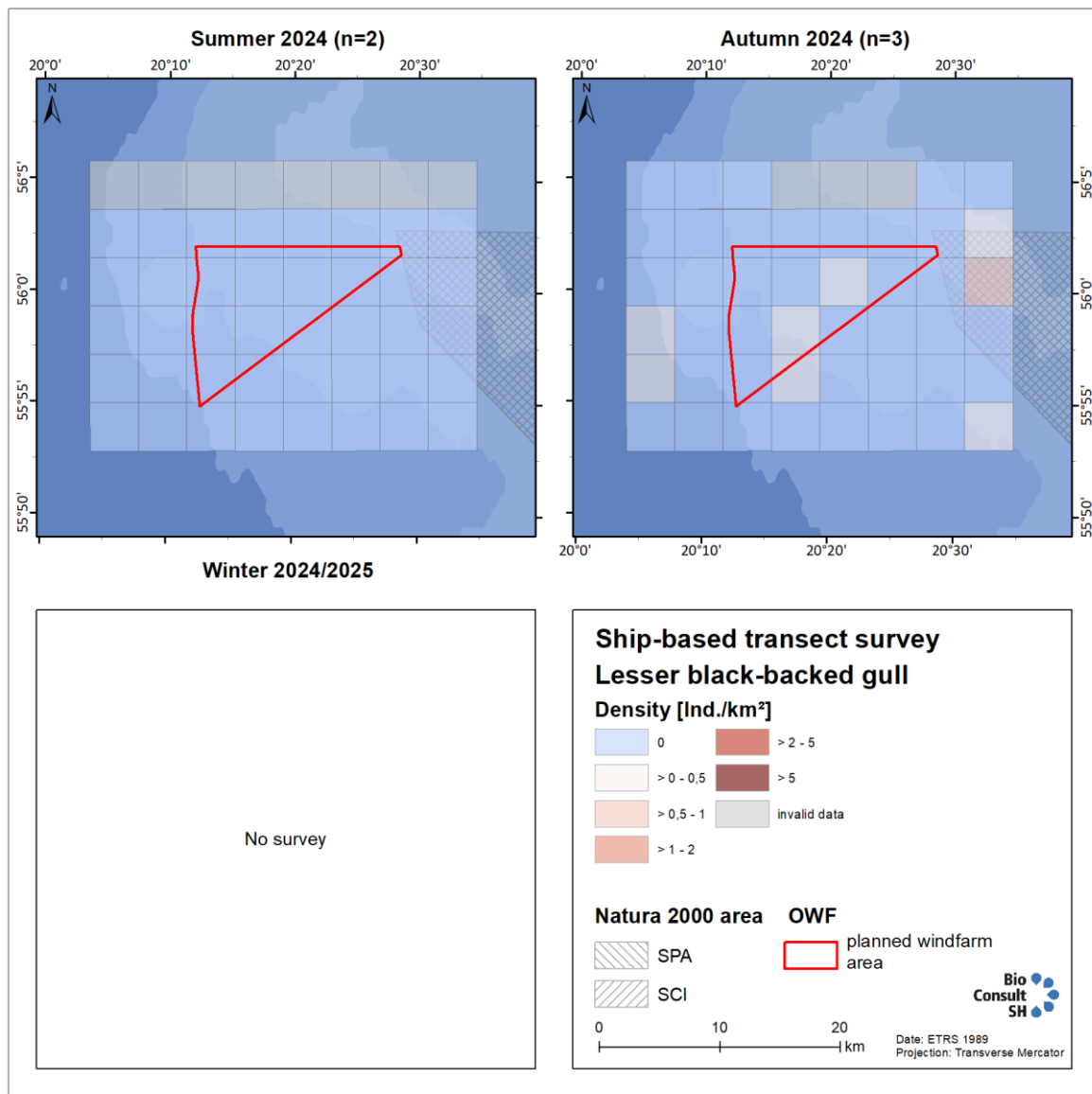


Figure 3.51 Distribution of Lesser Black-backed Gull in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.10 Herring Gull

Herring Gull – <i>Larus argentatus</i>	LI: Sidabrinis kiras
Biogeographic population: <i>argentatus</i>, North & North-west Europe* Breeding range: Denmark & Fenno-Scandia to E Kola Peninsula Wintering / core non-breeding range: N & W Europe Global population size: >18,000,000 individuals European population size: 860,000 – 1,000,000 individuals 1% value: 9,300 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: SPEC 2 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Decreasing Trend quality: Reasonable Key food: various food sources, including fish or molluscs	 © Rodrigo A. Martinez Catalan Bioconsult SH Impact Offshore windfarms ✓ Collision risk: Very high ✓ Displacement risk: Very low

The Herring Gull is a very widespread species in the Northern hemisphere. There are two subspecies and the nominate form is the one occurring in the survey area. It breeds from Fennoscandia and Denmark to Svalbard. The other subspecies is distributed west from *L. a. argentatus* and its distribution range reaches Iceland. The species is partly migratory with birds occurring further North migrating and birds occurring further South being resident. Their diet is opportunistic and diverse, but their main prey are invertebrates. They are also ship-followers feeding on fish discards (MENDEL ET AL. 2008).

The population size has been decreasing in the recent years and is currently estimated at 860,000 to 1 million individuals, but it is currently classified as “Least Concern” by the IUCN – Red List.

Major threats affecting this species include habitat loss, depletion of resources or pollution. Studies have shown that European Herring Gulls are prone to exposure of pollutants like Polycyclic Aromatic Hydrocarbons (PAHs), especially in urban areas, which can lead to Deoxyribonucleic Acid (DNA) and genetic damage (SKARPHEDINSDOTTIR ET AL. 2010). Herring Gulls have been found to be attracted to offshore windfarms and hypothesized the use of these man-made offshore structures as roosting places where enhanced feeding opportunities are available, but implies a higher collision risk (VANERMEN ET AL. 2015).

Density and distribution of Herring Gulls in the survey area

Herring Gulls were spotted during every survey for the two years monitoring period. The highest numbers were recorded during the ship-based surveys, in which this species was the third most common resting bird registered (Figure 3.4 and Figure 3.5). For 2023, they represented 22.2 % (n= 445) of all resting birds while during 2024, their frequency dropped to 17.8 % (n= 306) of the total. The months with highest detections were October 2023 (n= 172) and July 2024 (n= 124).

During aerial surveys, Herring Gulls represented 4.8 % (n= 317) and 5.3 % (n= 301) of all resting birds detected, respectively for 2023-2024 and 2024-2025 campaigns (Figure 3.1 and Figure 3.2). November was the month with the highest numbers registered for both periods (2023-2024; n= 98 and 2024-2025; n= 138).

Their densities varied and the highest was recorded in August 2023 with 1.98 ind./km², while the lowest in May 2024 (0.14 ind./km²; Table 3.5, Figure 3.52) for ship-based surveys. During aerial surveys, minimum and maximum densities of 0.07 ind./km² in April 2024 and 1.05 ind./km² in December 2024 were registered (Figure 3.53).

In general, Herring Gulls were widely spread across the surveyed area. However, the highest concentration of individuals was found within or in the vicinity of the OWF during the summer months (Figure 3.55 and Figure 3.56) and closer to shore during the winter period (Figure 3.54).

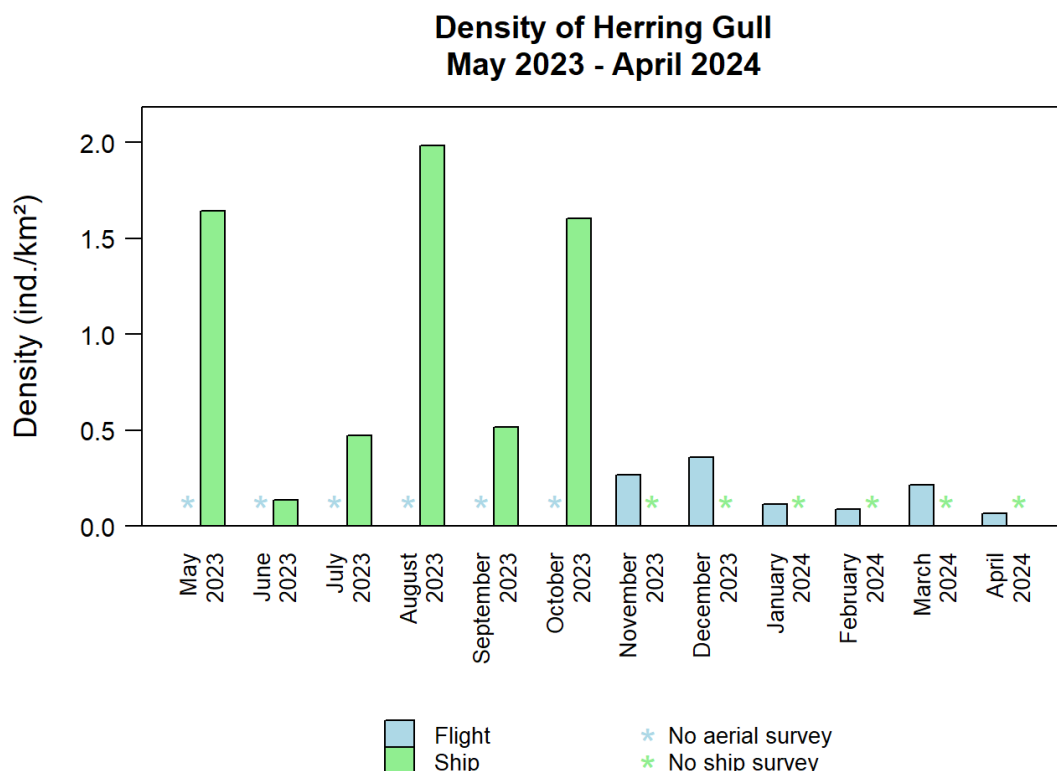


Figure 3.52 Monthly densities of Herring Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

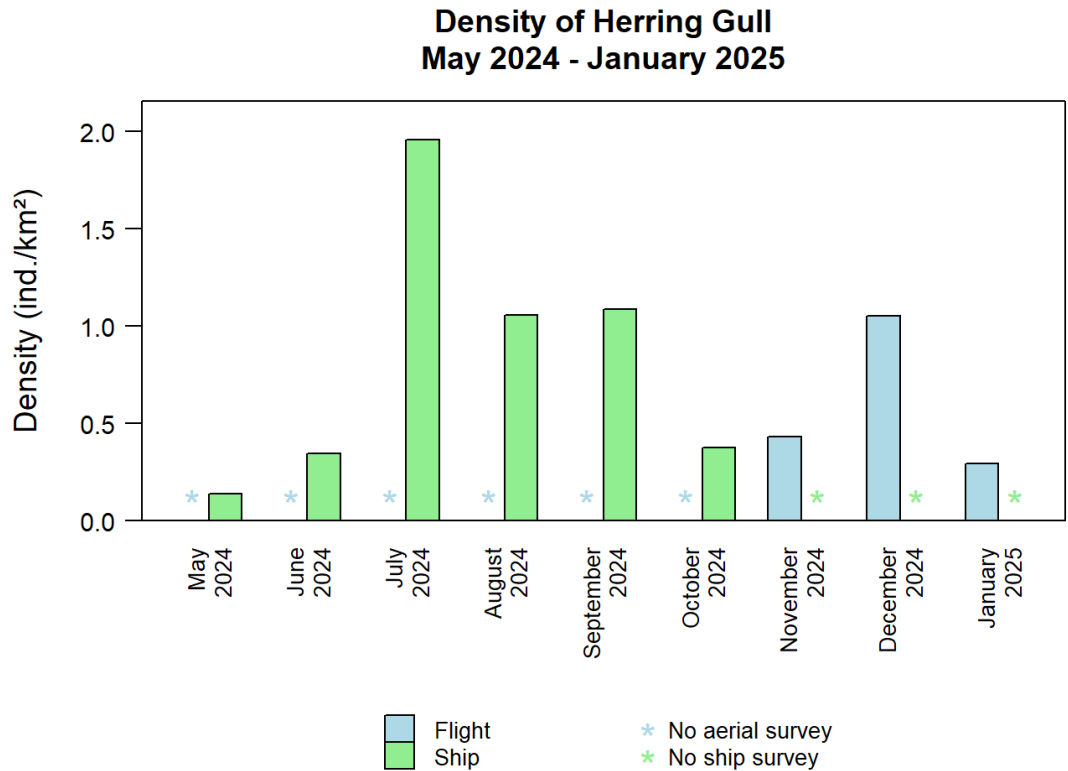


Figure 3.53 Monthly densities of Herring Gulls during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

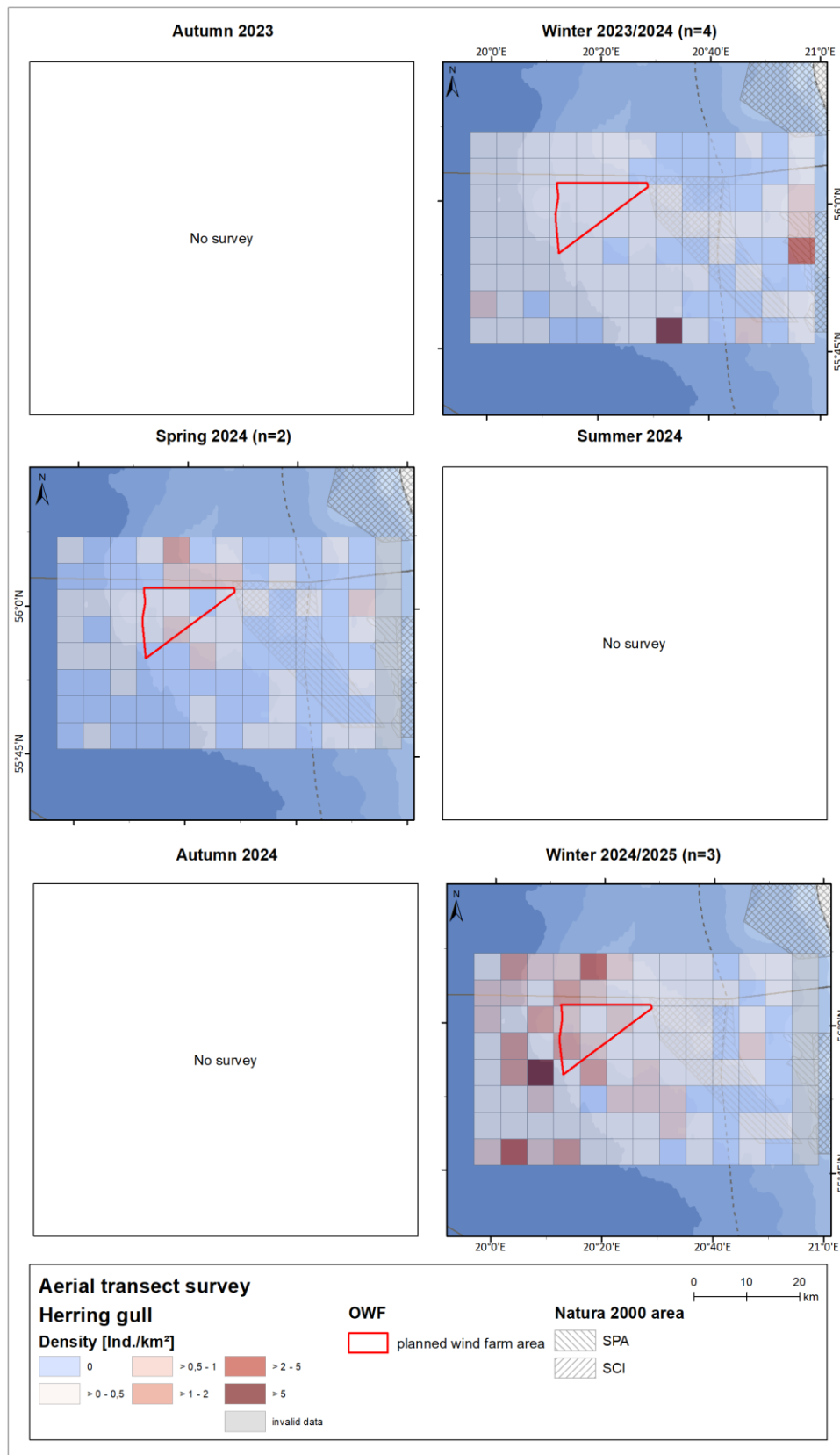


Figure 3.54 Distribution of Herring Gulls in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

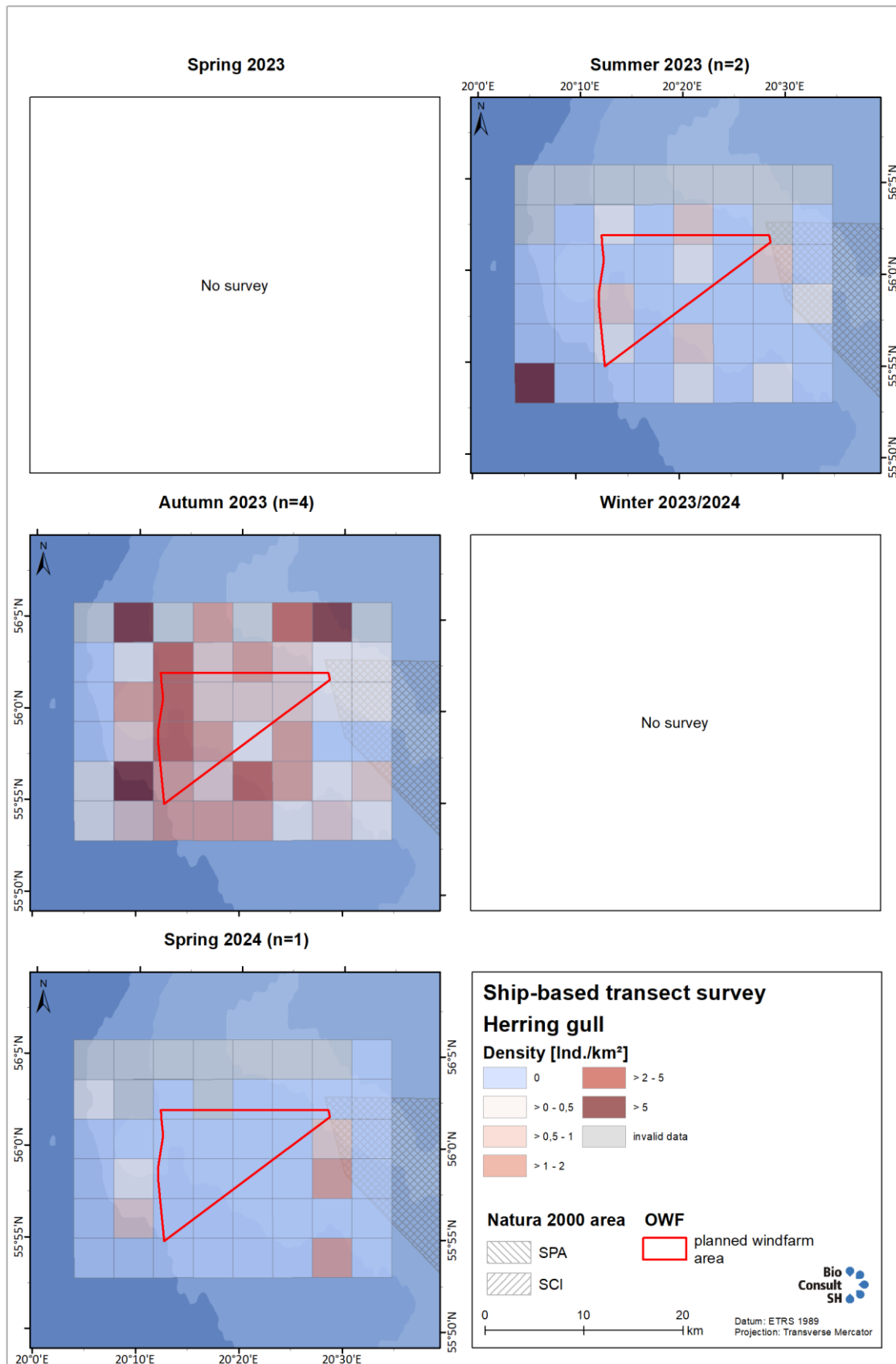


Figure 3.55 Herring Gull distribution in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

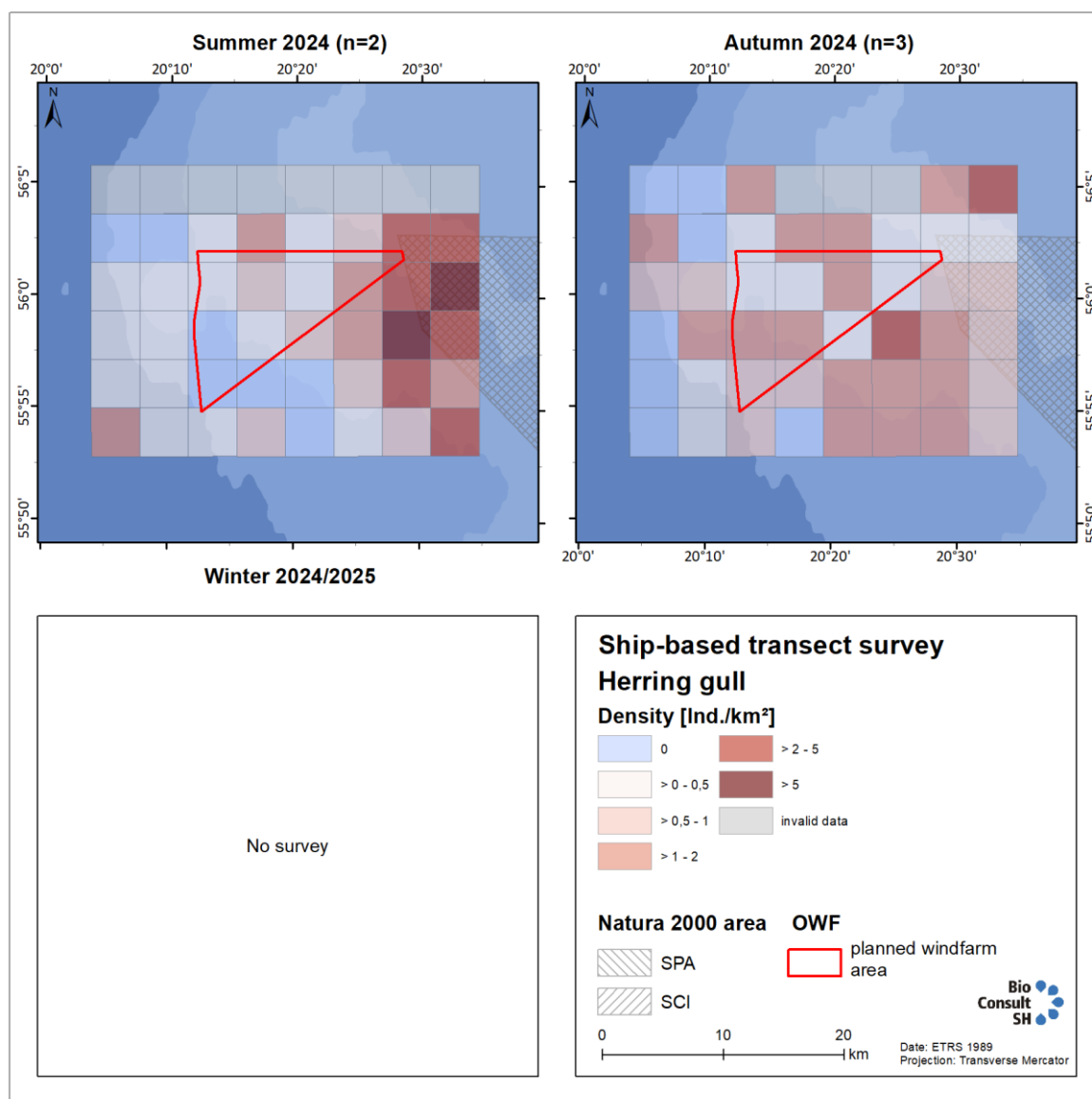


Figure 3.56 Herring Gull distribution in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.11 Common Guillemot

Common Guillemot – <i>Uria aalge</i>	LI: Laibasnapis narunelis
Biogeographic population: Baltic Sea* Breeding range: Sweeden, Denmark, Finland Wintering / core non-breeding range: Baltic Sea Global population size: >18,000,000 individuals European population size: 2,3850,000 – 3,060,000 individuals Baltic population size: 77,000 – 100,000 individuals 1% value: 880 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: SPEC 3 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Increasing Trend quality: Good Key food: fish	 © Rodrigo A. Martinez Catalan - BioConsult SH Impact Offshore windfarms ✓ Collision risk: Very low ✓ Displacement risk: Low

For Common Guillemots it is somewhat unclear to which extent, the North Atlantic flyway populations can be divided into sub-populations. MENDEL ET AL. (2008) used an estimate for the Baltic Sea breeding population of 50,000 individuals (latest estimates suggest a population size of 77,000 - 100,000 individuals).

During winter, the highest densities in the Danish Baltic Sea are found in the central Kattegat (PETERSEN & NIELSEN 2011) with about 76,500 individuals for the year 2008. These birds are assumed to mostly originate from breeding colonies in the North Sea or Atlantic (MENDEL ET AL. 2008). Although the main breeding colony in the Baltic Sea (SARZO ET AL. 2019) is located at Stora Karlsö (Sweden), approximately 200 km west from the planned OWF.

This species is classified as “Least Concern” by IUCN – Red List and it is not included within the red list of birds for HELCOM – Baltic Sea region. This species has experienced a continuous increase in its population, especially in Stora Karlsö in which an annual increase of 5.1 % has been reported (OLSSON & HENTATI-SUNDBERG 2017).

Common Guillemots have been found to avoid OWF, but responses varied from weak avoidance to strong avoidance in some cases (DIERSCHKE ET AL. 2016; PESCHKO ET AL. 2020). However, recent studies have confirmed the strong reduction of 65-76 % in the presence of this species around OWF within a distance of 1 km (SZOSTEK ET AL. 2024). Current distribution models in the German North Sea site in which cumulative effects of offshore windfarms are considered, predict a reduction of their winter distribution area at sea due to the impact of OWF, which adds pressure to the population (PESCHKO ET AL. 2024).

Density and distribution of Common Guillemots in the survey area

Common Guillemots were the second most recorded and common species among the resting bird community, both in the aerial and ship-based surveys. For ship-based surveys, Common guillemots represented 23.3 % (n= 469) and 25.0 % (n= 430) of all detected resting birds up to species level, for 2023 and 2024 respectively (Figure 3.4 and Figure 3.5). The months with highest counts were September 2023 (n= 378) and August 2024 (n= 149).

For ship-based surveys, their representation was 11.1 % (n= 736) and 15.5 % (n= 880) among resting birds, for the periods 2023-2024 and 2024-2025 respectively (Figure 3.1 and Figure 3.2). Months with highest counts were both Novembers, with 167 and 634 individuals recorded respectively for 2023-2024 and 2024-2025.

The highest density was observed in September 2023 at 9.09 ind./km² and the lowest in June 2023 at 0.06 ind./km² (Table 3.5, Figure 3.57) for ship-based surveys. During the winter period, the densities found during aerial surveys were lower, with a maximum of 2.00 ind./km² in November 2024 (Figure 3.58).

Common Guillemots were widely distributed across the study area (Figure 3.59, Figure 3.60 and Figure 3.61). The highest densities were mainly found at some distance from the coast, in deeper waters, and individuals were also recorded inside the planned OWF, at relatively high densities. During the ship survey in September, the overall highest densities were found within the limits of the planned OWF, while during the aerial surveys, highest densities were found close to shore or south of the OWF.

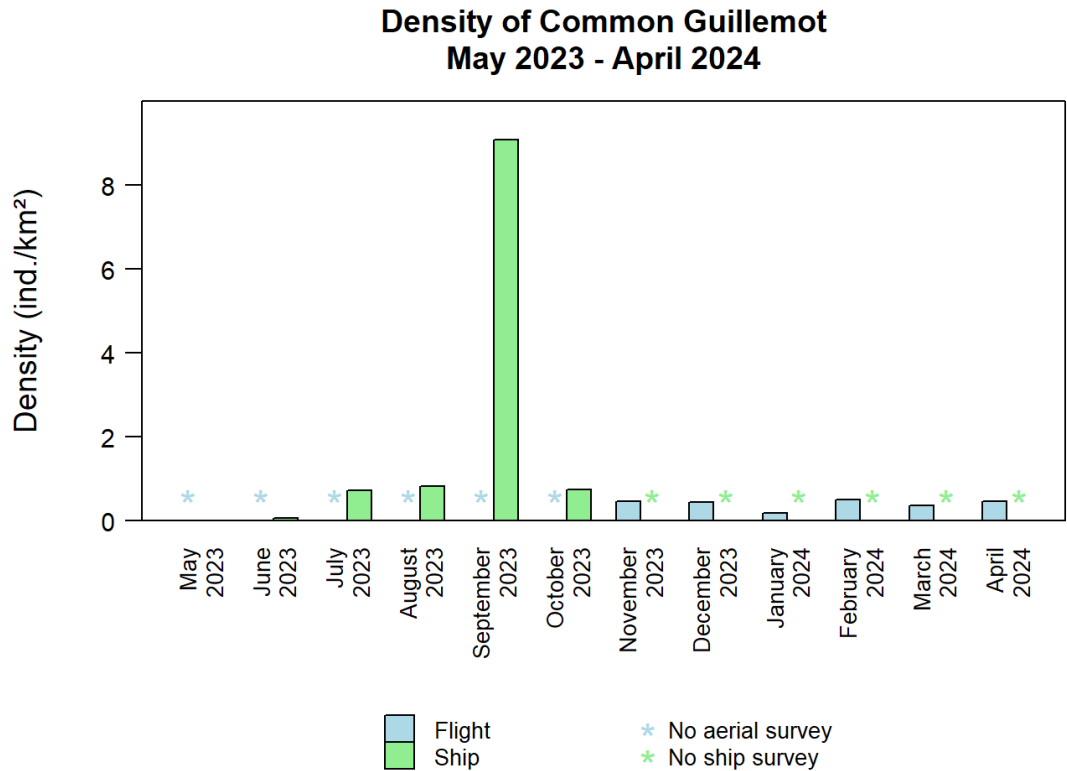


Figure 3.57 Monthly densities of Common Guillemots during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

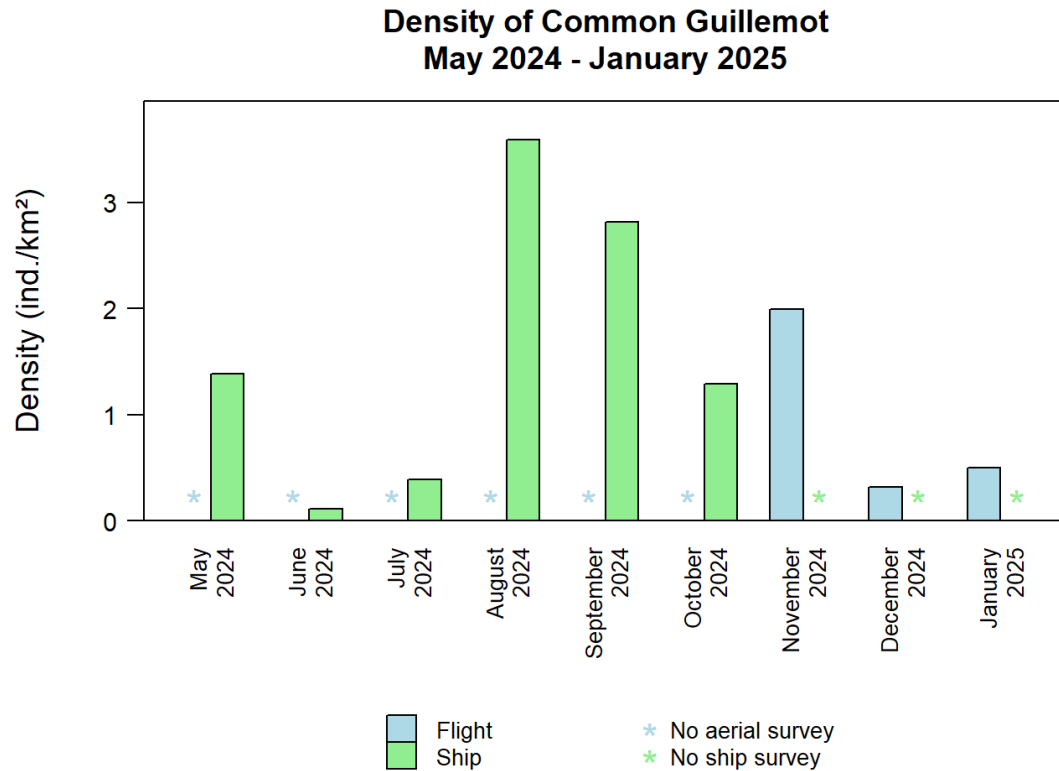


Figure 3.58 Monthly densities of Common Guillemots during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

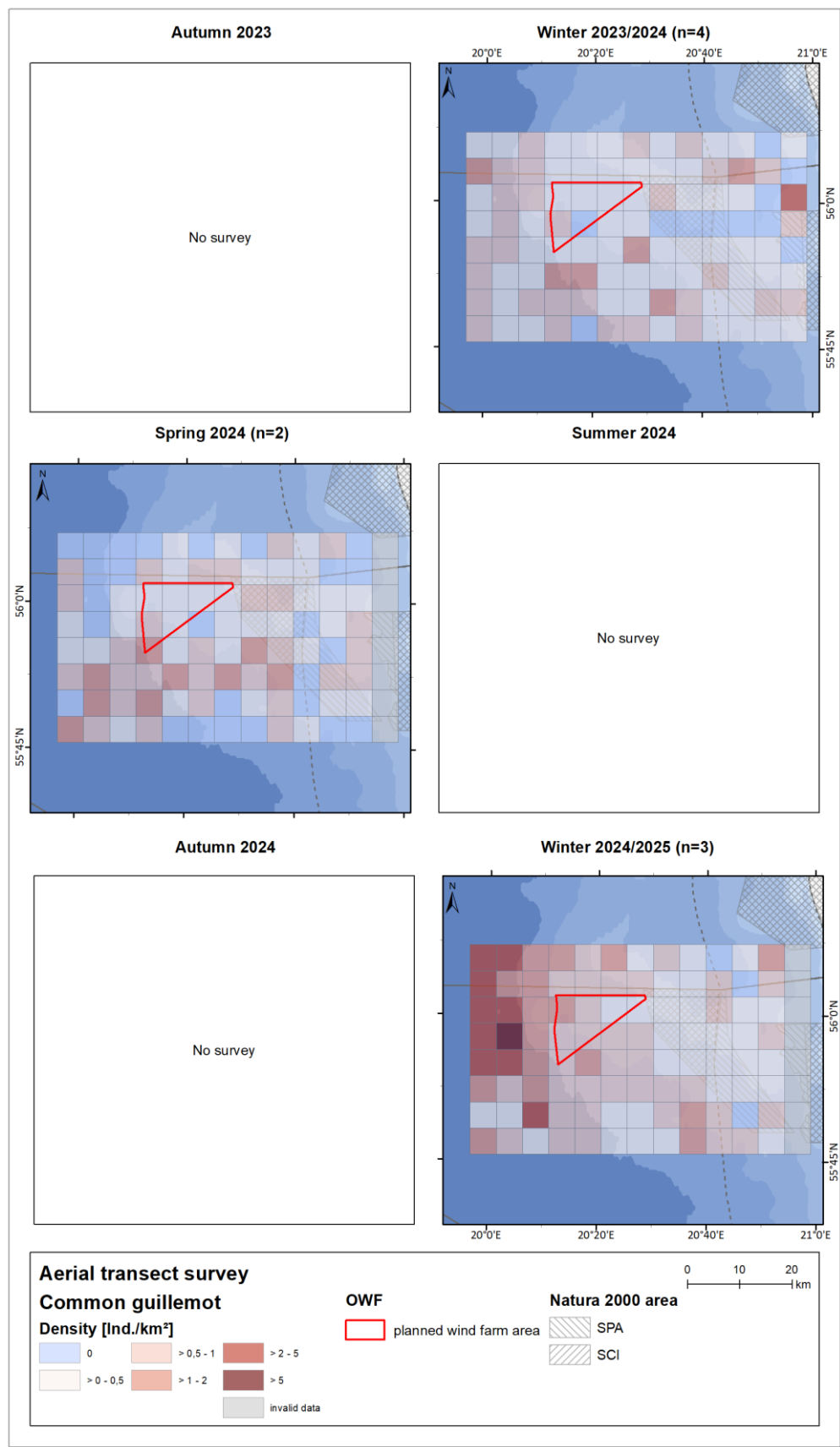


Figure 3.59 Distribution of Common Guillemot in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

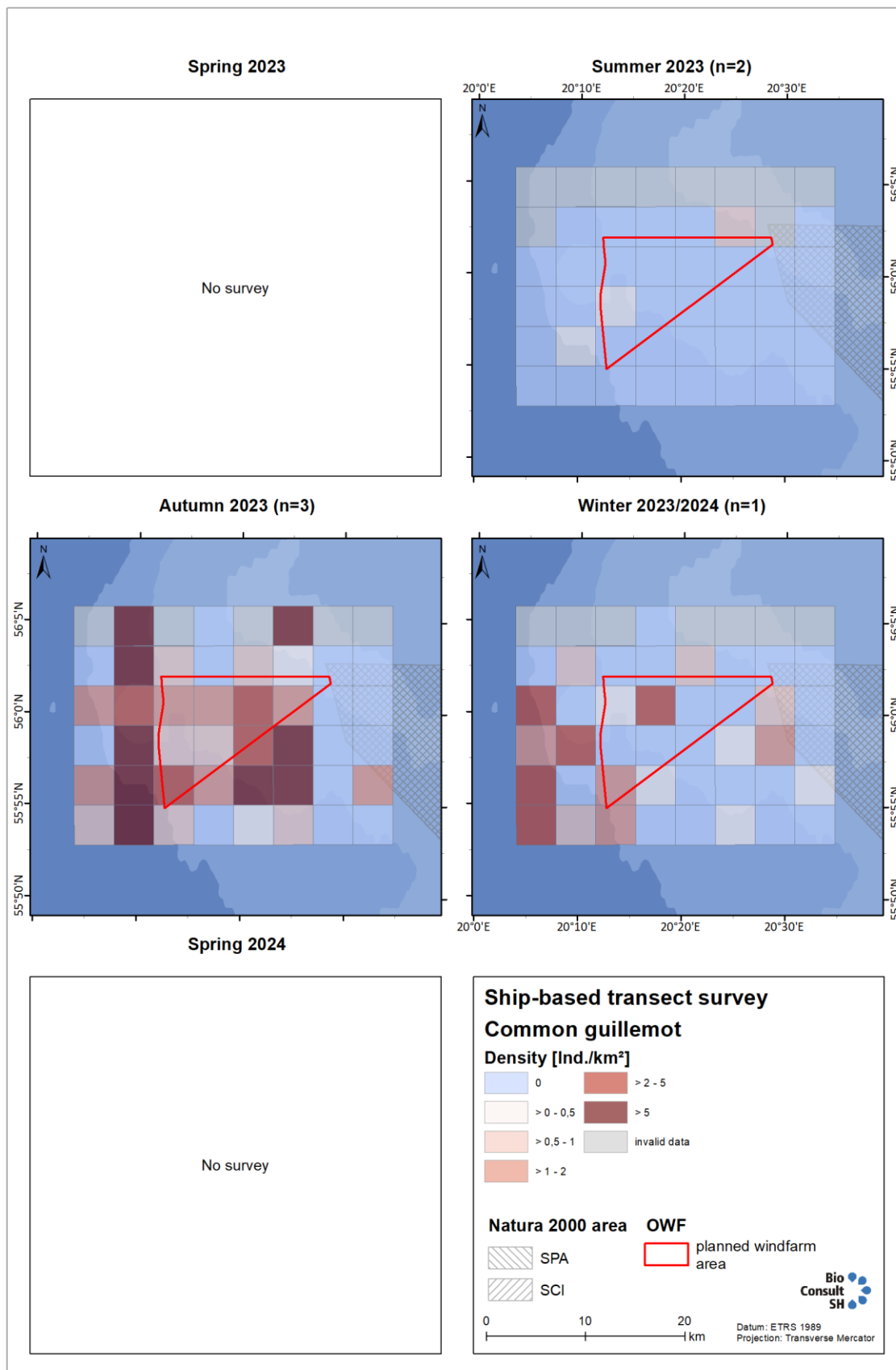


Figure 3.60 Distribution of Common Guillemot in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

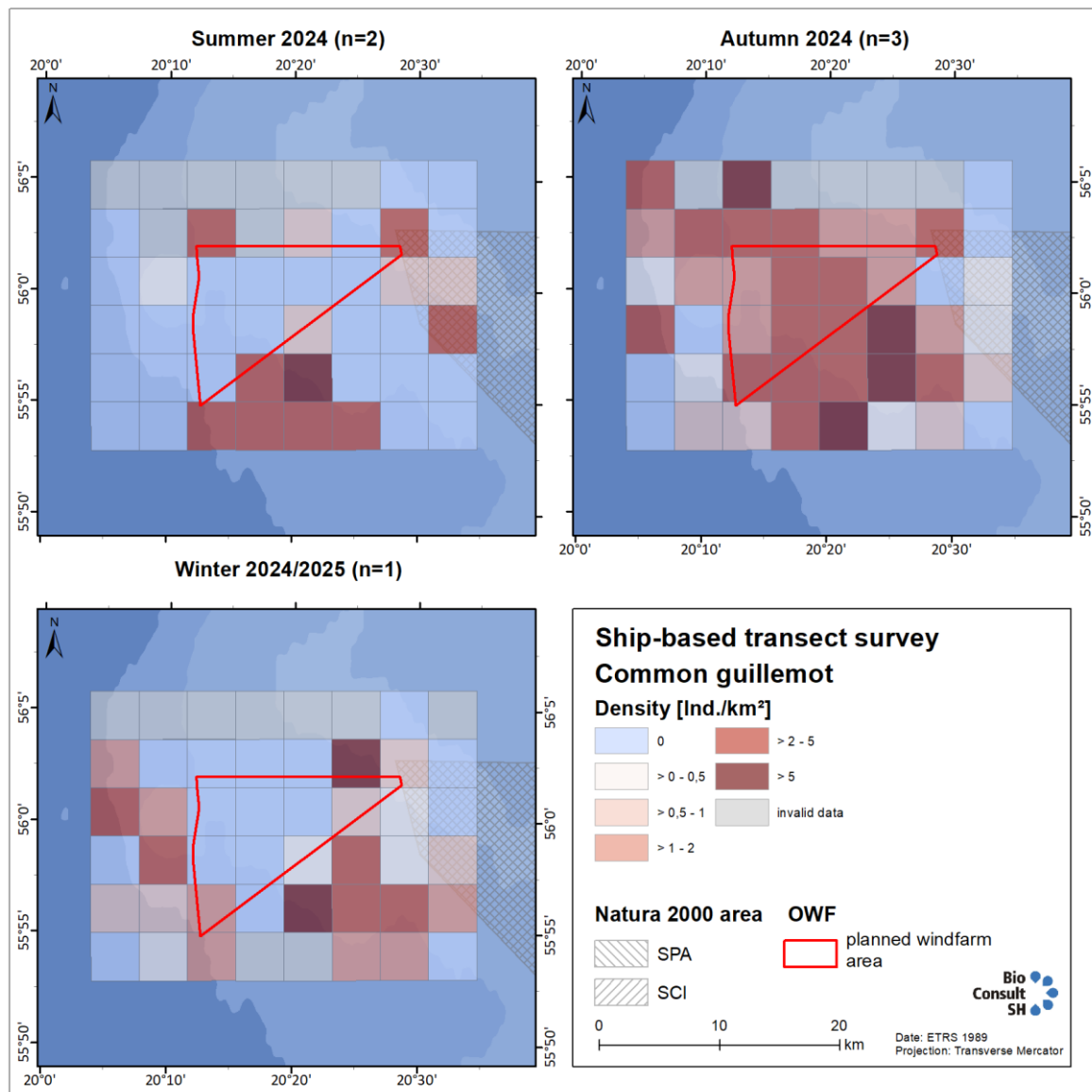


Figure 3.61 Distribution of Common Guillemot in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

3.2.12 Razorbill

Razorbill – <i>Alca torda</i>	LI: Alka
Biogeographic population: E Atlantic Breeding range: - Wintering / core non-breeding range: at sea Global population size: 940,000 – 2,070,000 individuals European population size: 290,000 – 350,000 1% value: 3,200 Conservation status: ✓ EU Birds Directive, Annex I: not listed ✓ EU SPEC Category: SPEC 1 ✓ IUCN Red List Category, Global & Europe: Least Concern Trend: Increasing Trend quality: Reasonable Key food: mainly fish	 © Rodrigo A. Martinez Catalan - BioConsult SH Impact Offshore windfarms ✓ Collision risk: Very low ✓ Displacement risk: Low

Razorbills are distributed in the Holarctic from North Europe to the East and West coasts of the Atlantic. They are adapted to life at sea and spend their whole life in the marine environment (like the Common Guillemot). They breed mainly on edges of steep cliffs or on small isolated islands and most often in large colonies (MENDEL ET AL. 2008). There are two subspecies of Razorbills and three populations. The subspecies *torda* is the one that occurs in the survey area.

The size of the breeding 'East Atlantic' biogeographical population is estimated at 290,000 - 350,000 individuals. In total, however, the European population might range between 519,000 - 1,070,000 individuals (BIRDLIFE INTERNATIONAL 2021).

The diet of Razorbills is dominated by fish, especially sprats which also constitutes the major component of the diet of its chicks (LYNGS 2001). Razorbills breed in the Baltic Sea, being Stora Karlsö (Sweden) the biggest colony where they share habitat with the other auk species subject of this report. During the chick rearing period, the foraging bouts can span up to 72.7 km although their mean foraging range from the colony is approximately 13 km (ISAKSSON ET AL. 2019). Their non-breeding distribution is located offshore, including the Baltic Sea, where maximum densities of 1.4 ind./km² off Lithuanian coast have been found (DURINCK ET AL. 1993). The current trend of the population is increasing and therefore classified as "Least Concern", without being included in the Red List of Birds by HELCOM.

Like Common Guillemots, Razorbills have been found to avoid OWF, but the extent of avoidance varied (DIERSCHKE ET AL. 2016). In the Belgian North Sea area, a decrease of their presence after six years of post-construction period of OWF was registered, with a decline in the numbers detected of 75 – 80 % when compared to prior construction (DEGRAER ET AL. 2019). In the German EEZ, the decline in abundance of Razorbills in operating OWFs have been established at values of approximately -50 % in the buffer zones of 1 to 5 km from the OWF, with significant lower densities

at distances of 0 to 3 km from OWF (PESCHKO ET AL. 2020; SZOSTEK ET AL. 2024). In the northern Baltic Sea, Razorbills have not shown clear trends of avoidance when OWFs have been built, keeping their breeding populations stable (TANSKANEN 2012; TANSKANEN ET AL. 2022).

Density and distribution of Razorbill in the survey area

Razorbills were the second most common auk species detected during the monitoring period. However, their presence was not detected during all the months in which the surveys were conducted (Figure 3.4 and Figure 3.5). During the ship-based surveys, Razorbills represented 2.4 % (n= 48) and 2.6 % (n= 44) of all resting birds, being October 2023 (n= 39) and May 2024 (n= 26) the months with the highest counts.

The presence of Razorbills was documented at higher numbers during aerial surveys (Figure 3.1 and Figure 3.2). For the 2023-2024 period, they represented 7.9 % (n= 520) of all resting birds while for 2024-2025, razorbills represented 4.4 % (n= 249). The months with highest counts were March 2024 (n= 222) and January 2025 (n= 136).

The highest densities were observed during March 2024 with 0.70 ind./km² for aerial surveys (Figure 3.62), and October 2023 with 0.47 ind./km² for ship-based surveys. The lowest densities detected during the ship-based surveys were in June 2024, with 0.01 ind./km² (Figure 3.63). For aerial surveys, January 2024 was the month with lowest densities at 0.03 ind./km².

Spatially, they were scattered across the surveyed area with no clear pattern in the survey area in the seasons (Figure 3.64, Figure 3.65 and Figure 3.66). They were detected within and outside the planned OWF and the highest densities were found close to the coast during the winter months.

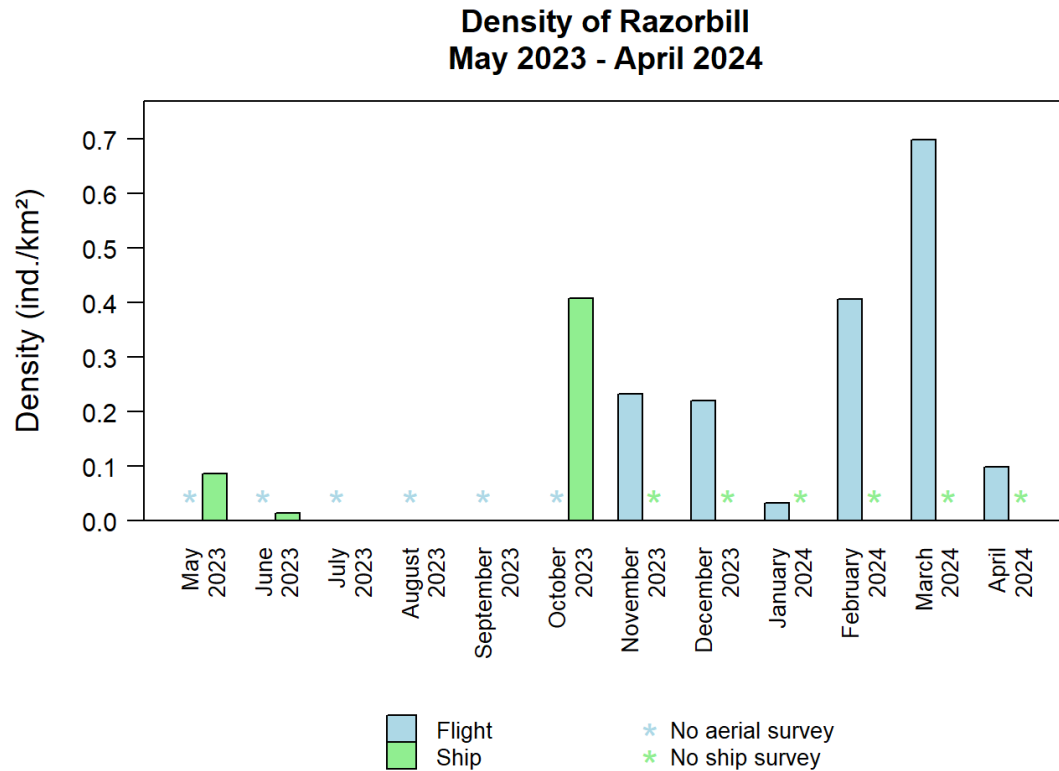


Figure 3.62 Monthly densities of Razorbills during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2023 and April 2024. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

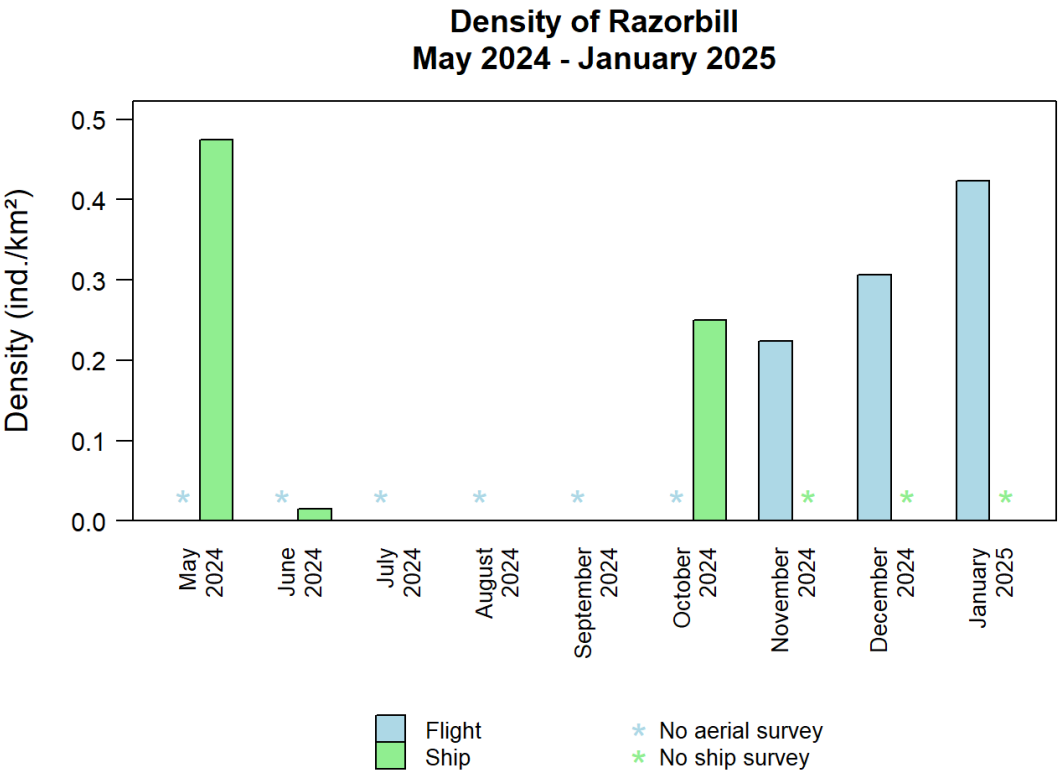


Figure 3.63 Monthly densities of Razorbills during aerial (blue) and ship-based (green) transect surveys in the surveyed area between May 2024 and January 2025. The asterisks (*) show where no survey was conducted (blue = aerial, green = ship).

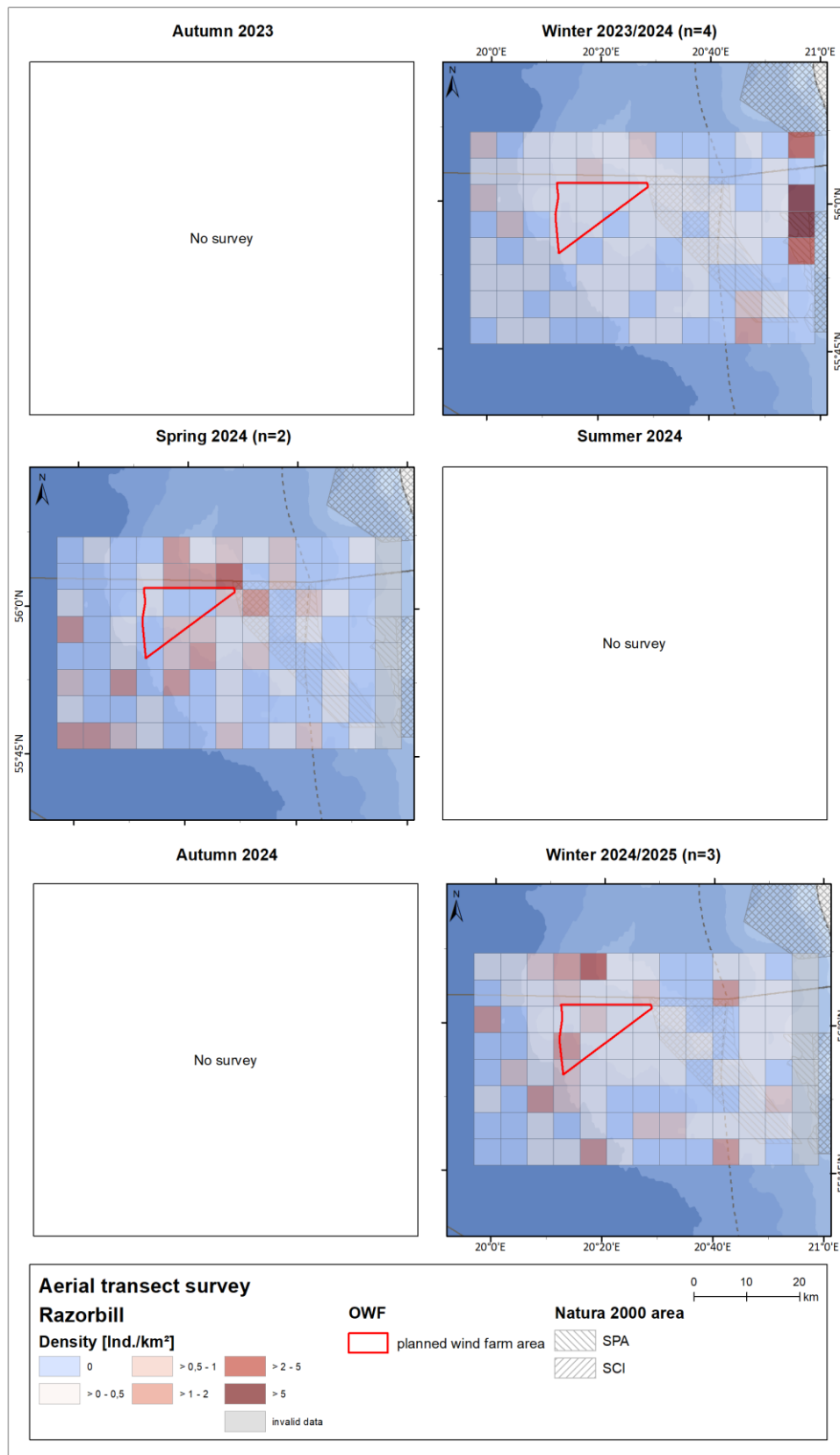


Figure 3.64 Distribution of Razorbills in the survey area per season during the aerial-based transect surveys between November 2023 and January 2025. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

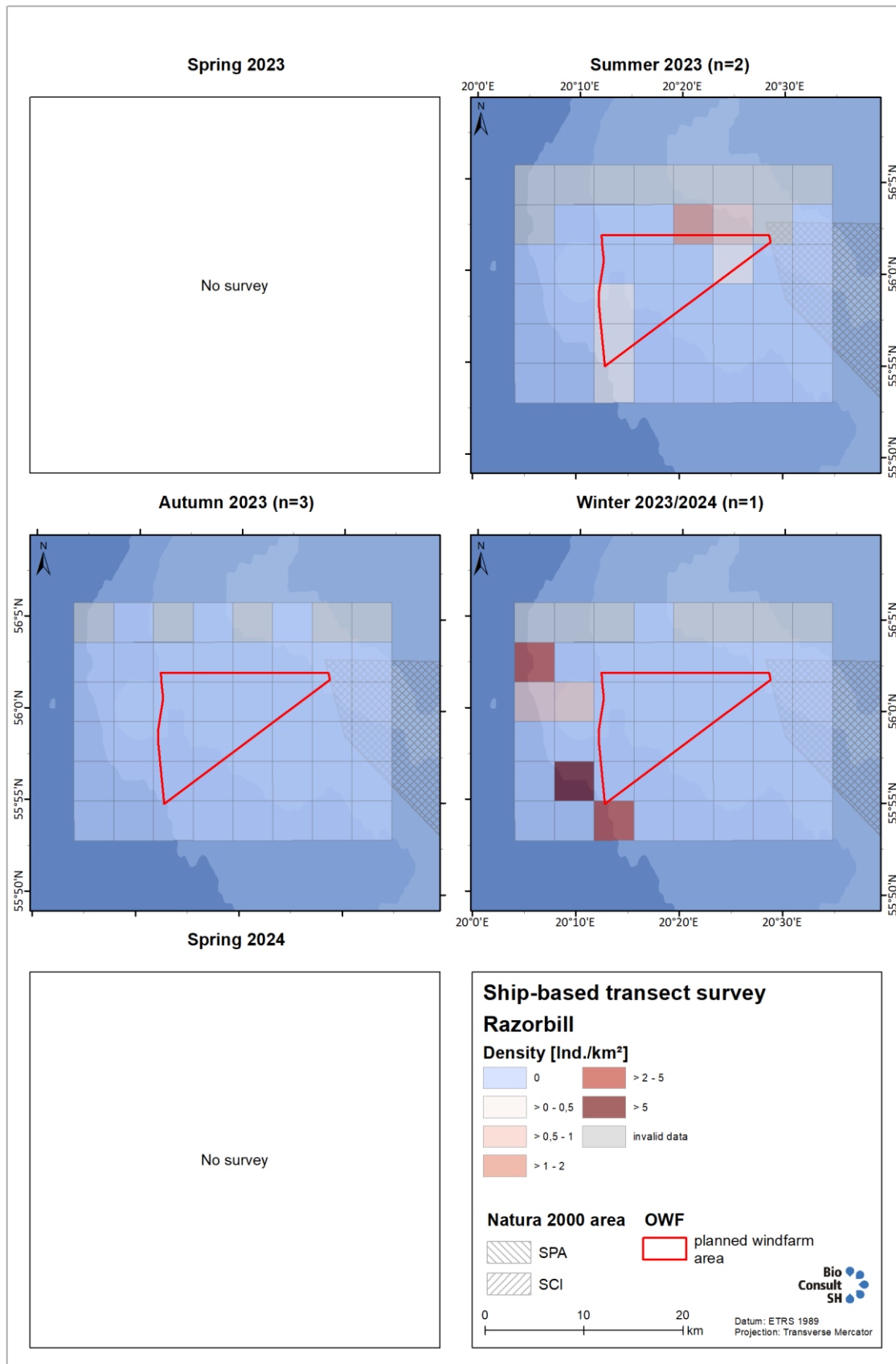


Figure 3.65 Distribution of Razorbills in the survey area per season during the ship-based transect surveys between May 2023 and May 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

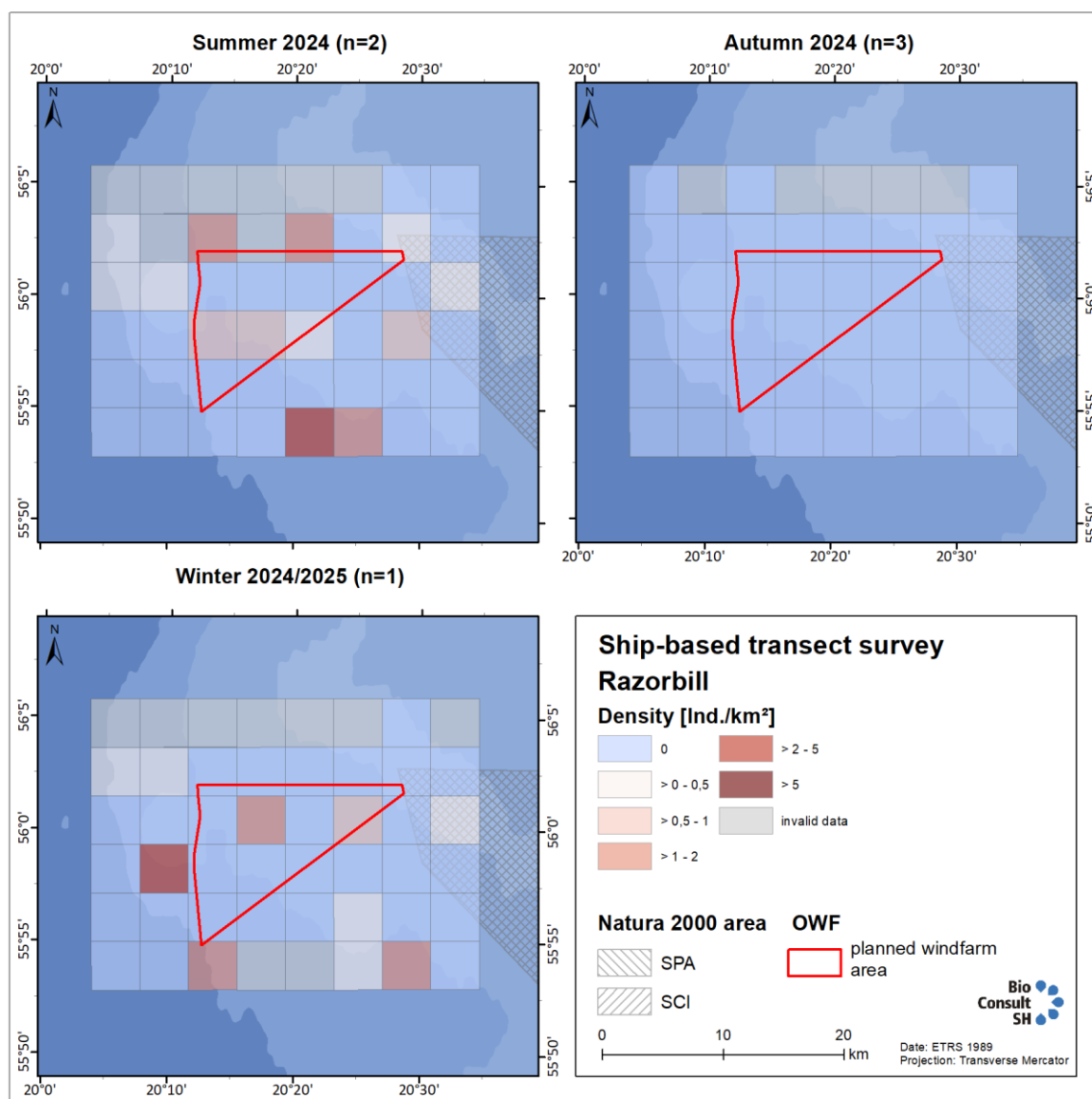


Figure 3.66 Distribution of Razorbills in the survey area per season during the ship-based transect surveys between May 2024 and October 2024. Seasons are classified according to the definitions provided by GARTHE ET AL. (2007) with the number of surveys conducted in each season indicated in parentheses (n).

4 DISCUSSION

4.1 Critique of methods

The data collection has been achieved through two methods: digital aerial surveys and ship-based transect surveys. Many factors can influence the distribution and the seasonal occurrence of resting birds. These include environmental factors such as season, local weather conditions during the collection date and preceding days, feeding resources and anthropogenic factors such as fishing and shipping.

Furthermore, each survey is conducted over a short period of time and over a relatively small area, when compared to the Baltic Sea as a whole. It only represents a snapshot of what is currently happening, and a high degree of temporal and spatial variability is expected. Consequently, any short-term population shift away from or into the survey area can lead to considerable fluctuations in the population estimates of the species under consideration.

4.2 Species abundance and distribution

The study area partly included the SPA “Klaipėdos–Ventspilio plynaukštė”, which extends to the east of the planned OWF area (EUROPEAN ENVIRONMENT AGENCY, 2015). The SPA was designated for the protection of reefs, and as a place of regular wintering aggregations of Long-tailed Ducks, Velvet Scoters and Razorbills. The standard data form also gives site evaluations for the species Red-throated Diver and Common Guillemot. The baseline monitoring spanning 21 months, prior to the construction of the OWF, offered an overview of the expected spatio-temporal distribution of the species and group of species composition in the surveyed area.

In the studied location, **divers** represented the 3rd and 4th most common group of resting birds identified for ship-based and aerial surveys, respectively. The main species within this group were Red-throated Divers, which were residual during the ship-based surveys representing <0.1% (n= 1) and 0.5% (n= 8) of all resting birds for 2023 and 2024, respectively. Nonetheless, Black-throated Divers were more present in terms of abundance, representing up to 4.4% (n= 88) and 4.6% (n= 79) of resting birds.

During aerial surveys, Red-throated Divers represented up to 9.0% (n= 599) of resting birds during 2023-2024 with a peak in abundance during March (n=337), which suggests a strong temporal preference of this species in the studied area during spring, likely linked to the migratory route of this species. The representativeness of this species for the second year of monitoring was lower, achieving 4.4% (n= 249) of abundance among resting birds for 2024-2025 monitoring period. However, this data should be interpreted considering the monitoring period, as the second year included only three months (November to January). Contrary to the ship-based monitoring period, Black-throated Divers abundance was residual, reaching 0.2% (2023; n= 11 and 2024; n= 12) of abundance among resting birds for both years of monitoring.

Divers are considered winter visitors and migrants in the Baltic Sea (MENDEL ET AL. 2008). In Lithuanian waters, a key wintering area for the Red-throated Diver is located off the coast extending further north, with a core area in Lithuanian offshore areas (SKOV ET AL. 2011). The SPA standard

data form considers the species as rare and provides low densities ranging between 0.06 and 0.16 ind./km² at the site. However, previous studies in the Baltic have revealed mean densities of 0.27 ind./km² and highlighted the importance for the wintering population of this species along the Lithuanian-Latvian-Estonian coast. Notably, up to 45.5 % of the resting population in the Baltic Sea remains there to overwinter (SKOV ET AL. 2011). The reported mean density values during the extension of this monitoring project align with published information regarding abundance and distribution of this species in the coasts of Lithuania, however peaks of high density were registered with up to 1.21 ind./km² during March 2024 for aerial surveys and 1.28 ind./km² and 1.27 ind./km² during May 2023 and 2024 for ship-based surveys.

Nonetheless, given the well-known high sensitivity of divers towards marine traffic (JARRETT ET AL. 2021), the observed densities of these species with this method are probably somewhat underestimated. Furthermore, ship-based surveys were only conducted during summer and early autumn, when divers are in their breeding grounds and are not expected to occur within the study area in high numbers.

The study area does not seem to be of high importance for this species or for Black-throated Divers given the maximum density found was 1.28 ind./km² in May 2023 (ship-based surveys). However, during the rest of the observation period densities were <0.1 ind./km². The spike detected in May might correspond to foraging activity due to breeding grounds present in nearby areas, such as Labanoras Regional Park (BIRDLIFE INTERNATIONAL 2025). Most of the detections during this period were concentrated along the boundary between the planned offshore wind farm (OWF) and the SCI Klaipėdos–Ventspilio plynaukštė, a region known for its reefs and abundant prey resources that attract species like divers (EUNIS 2014).

Nonetheless, as divers are very sensitive to anthropogenic disturbances like ships or OWF, producing displacement at distances of up to 10-15 km (DIERSCHKE ET AL. 2016; MENDEL ET AL. 2019; HEINÄNEN ET AL. 2020), even individuals resting within the nearby SPA will likely be affected by the planned OWF.

Great Cormorants were observed at relatively medium-high densities at one single grid cell during ship-based surveys in September 2024. Otherwise, they occurred at low numbers. Sightings occurred primarily during March (aerial surveys) and May (ship-based surveys). However, a single event was recorded in which 40 Great Cormorant were spotted at once (October), which represented 78.4 % of the total observations for the ship-based surveys conducted during 2024 for this species. This unique event could partially represent part of the annual migratory cycle in which Baltic populations tend to migrate south-westwards towards their wintering grounds (FREDERIKSEN ET AL. 2018). Cormorants represented the fourth most common group of birds sighted during ship-based surveys, with 1.0 % (n= 21) and 3.0 % (n= 51) of representation among resting birds for the periods 2023 and 2024, respectively. However, their presence was barely noted during the aerial surveys, being practically not present during the winter months in the studied area.

This species might be an occasional visitor of this area. Due to its known attraction towards man-made structures, especially for roosting and the possibility that wind turbines may enhance the availability of fish prey for these opportunistic birds (DIERSCHKE ET AL. 2016), it is possible, however that larger numbers of these birds may be attracted to the OWF.

Sea ducks were the first and fifth most common group sighted during aerial and ship-based surveys, respectively, comprising four different species. Sea ducks were mainly recorded during aerial surveys (5,942 observations vs 64 during ship-based surveys, for the 21 months of monitoring period).

Among sea duck species, **Velvet Scoters** were the most abundant species along with **Long-tailed Ducks**. In general, the coasts of Lithuania are important wintering areas for these species. Velvet Scoters are found in high densities offshore from the Curonian Spit, while Long-tailed Ducks are abundant along the Hoburgs Bank – Midsjö Banks (SKOV ET AL. 2011). The SPA standard data form reflects a population size for these species of 10,000 - 28,700 individuals for Velvet Scoters and 2,000 – 7,400 individuals for Long-tailed Ducks at the site (EUROPEAN ENVIRONMENT AGENCY 2015). As expected, most birds were recorded within the SPA, located in shallower waters, but partly also within the borders of the planned OWF. Long-tailed Ducks have been shown to avoid wind farms and are sensitive to ship traffic, which might lead to habitat loss (DIERSCHKE ET AL. 2016). Although displacement distances vary somewhat, some habitat loss within the SPA can be expected with the currently planned OWF.

Velvet Scoter was the most abundant species among sea ducks during aerial surveys. Velvet Scoters have, in the SPA standard data form, a density of between 31.29 and 89.82 ind./km² (EUROPEAN ENVIRONMENT AGENCY 2015) and thus, the highest densities in this study would be expected near the SPA, which coincides with the densities observed in aerial surveys during winter and spring, when they are resting at sea. The low densities detected for sea ducks are sensible with the ecology and phenology of the species as they use as resting ground offshore waters during the wintertime rather than summer, the breeding period. Therefore, aerial surveys in winter are more suitable to detect this group of birds. Similar to Long-tailed Ducks, Velvet Scoters are sensitive to anthropogenic disturbances (DIERSCHKE ET AL. 2016), and are therefore expected to be displaced from the area of the planned OWF as well as from parts of the SPA, which borders the planned OWF area.

Gulls were the most abundant group of birds during the ship-based surveys and the 3rd during aerial surveys. The most common species spotted was the **Little Gull** and it represented 39.2% (n= 787) and 33.6% (n= 577) of all ship-based sightings, for 2023 and 2024 respectively. The abundance of this species accounted for almost double number of sightings reported for the second most common gull, the **Herring Gull**. Along with **Common Gulls**, these three species dominated the reported sightings of gulls. In general, the abundance percentages were similar per species when compared with aerial surveys.

The maximum density for Little Gull was 6.65 ind./km² in July 2024. The area has not been identified as an important area by DURINCK ET AL. (1994) for this species, however its presence suggest that it might be an important resting area for this gull species due to its high densities. Moreover, as this species shows weak avoidance behaviour towards OWF, some displacement from the planned OWF area can be expected.

Common Gulls and **Herring Gulls** were observed frequently all over the year, at comparable densities. They shared also similar spatial distribution, occurring all over the study area. Of the two species, Herring Gulls were more abundant, reaching a maximum density of 1.98 ind./km² during ship-based surveys in August 2023, compared with a maximum density of 0.67 ind./km² in October 2023 for Common Gulls with the same survey method. Maximum densities for the gulls' group from

ship surveys ranged from 2.28 to 2.72 ind./km², during aerial surveys, the maximum densities ranged 0.52 – 1.32 ind./km².

Lesser Black-backed Gull occurred unfrequently but they reached mid densities during ship-based surveys (maximum density at 0.58 ind./km² during May 2024) becoming the 6th most sighted bird during the ship-based surveys in 2024.

The auks were the second most numerous species group detected, with both methodologies. Two species composed it: **Common Guillemot** and **Razorbill**. The disparity in observations was skewed towards Common Guillemots as they represented 23.3 % (n= 469) and 25.0 % (n= 430) of all observed resting birds during the ship-based surveys, in 2023 and 2024 respectively. They were clearly more abundant when compared to Razorbills. However, this trend was not repeated during the aerial surveys as they were similarly abundant and followed a likewise presence in the area from November to April. Together, these two species were widely distributed across the whole study area, with lower numbers closer to the coast and higher numbers far offshore in the western part of the study area. In the SPA standard data form, both species are listed to occur with a maximum number of 100 individuals and thus a density of 0.30 ind./km². The maximum densities found during ship surveys for Common Guillemots were 9.09 ind./km² in September 2023, which were much higher than the suggested by the SPA standard data form (EUROPEAN ENVIRONMENT AGENCY 2015). The maximum densities observed for aerial surveys were 2.00 ind./km².

Razorbills were neither frequent nor abundant from ship-based surveys during the period of study, representing 2.4 % (n= 48) and 2.6% (n= 44) of all resting bird sightings, for 2023 and 2024 respectively. Nonetheless, and although densities can vary strongly from year to year, results from aerial surveys suggest that the study area is indeed of importance for these auks. Durinck et al. (1994) also listed the Lithuanian coast as an important location for Razorbills (but not for Common Guillemots) with densities ranging between 0.10 and 0.99 ind./km². As both species show avoidance of OWF, with varying distances, birds are expected to be displaced from the area of the planned OWF as well as parts of the SPA at the border the planned OWF area.

4.3 Temporal comparison with previous years

As part of the baseline monitoring, aerial and ship-based surveys were conducted between November 2023 and January 2025 in the targeted area. Data collected during this period helped to better understand the distribution of the main species observed in the planned OWF location.

The main groups found in the surveyed area were **sea ducks**, **auks** and **gulls** for aerial surveys, while **gulls**, **auks** and **divers** were the main groups found during ship-based surveys. The most observed group of birds during aerial surveys was **sea ducks** (Figure 3.3) whereas during the ship-based surveys, **gulls** were the main group (Figure 3.6). Interannual variations were observed in the detected species and bird groups, potentially reflecting underlying population dynamics influencing their presence or absence in the area, as well as variability in detection associated with the survey methodology employed (see section 4.1 for more details). **Auks** represented the second largest group during both methodologies and showed similar proportionalities in terms of the overall detections. During aerial surveys, there was less temporal variability in the detections of this group of birds as they showed in similar proportions except for the January, July and October 2024, when they represented less than 10% of all sightings both during aerial and ship-based surveys. Notably, November 2024 showed the highest number of sightings, and this group represented up to 50 % of all sightings, which is in resonance with the ecology and distribution of this species at sea during the non-breeding season.

5 CONCLUSION

The planned construction of the Curonian Nord LT11 offshore wind farm required a comprehensive assessment of local wildlife composition and abundance, with particular attention to the resting bird community. In compliance with the EIA process, this monitoring effort included a series of carefully coordinated nine digital aerial and twelve ship-based surveys, conducted from May 2023 to January 2025. These surveys not only focused on the designated wind farm site but also extended to surrounding areas to thoroughly evaluate potential conflicts with wildlife.

The pre-construction monitoring revealed a rich diversity of bird species frequenting the area. Key groups observed included sea ducks, auks, gulls, divers, and cormorants. The spatial and seasonal distribution of these species varied throughout the two years of monitoring, with winter bringing an influx of Velvet Scoters, Long-tailed Ducks, Razorbills and Red-Throated Divers, while the warmer summer months saw an increase in species' abundance such as the Little Gull and Herring Gull.

The spatial distribution of observed species displayed notable variation, with some species exhibiting distinct preferences for specific habitats. Certain birds, such as the Velvet Scoter, showed a marked affinity for shallower waters or areas with pronounced depth gradients, particularly in the vicinity of or within the SPA- "Klaipėdos–Ventspilio plynaukštė". This habitat specialization contrasted with other species, such as gulls and auks, which were more widely dispersed across the entire study area, demonstrating greater flexibility in habitat selection.

These patterns of spatial preference highlight the ecological diversity within the region and underscore the importance of habitat-specific considerations in the planning and management of the offshore environment. These findings provide an essential baseline for understanding the seasonal presence and habitat use of birds in the region, helping to inform strategies that balance renewable energy development with wildlife conservation.

Continued research will be instrumental in deepening the understanding of both seasonal and interannual variations in the presence and timing of resting bird communities within and around the proposed offshore wind farm area. By expanding the scope of these studies, researchers can capture critical patterns in bird migration, habitat use, and population dynamics, providing invaluable insights into how these avian communities may interact with the wind farm over time. This ongoing investigation will not only enhance ecological knowledge but also support more effective, wildlife-sensitive planning and conservation strategies in the region.

6 SUMMARY

This report describes the results of the vessel-based transect surveys for the survey area around the planned wind farm located 37 km off the coast of Lithuania. The planned OWF borders to the west with the SPA “Klaipėdos–Ventspilio plynaukštė”, which was designated for the protection of offshore boulder reef habitats and considered important for several species including Red-throated Diver (*Gavia stellata*), Long-tailed Duck (*Clangula hyemalis*), Velvet Scoter (*Melanitta fusca*), Common Guillemot (*Uria aalge*) and Razorbill (*Alca torda*).

The surveys spanned 21 months, including nine aerial surveys (November 2023 – January 2025) and six ship-based surveys (May – October 2023 and 2024). Survey methodologies did not overlap, ensuring year-round data collection.

6.1 Results of the digital aerial surveys

The aerial digital surveys recorded a total of 12,831 birds from 24 different species during the nine surveys conducted. The number of resting birds detected was 12,307 from which 8 species dominated the community with 86.7 % (n=10,684) of all sightings recorded. The bird's main groups identified were two species of sea ducks, Velvet Scoter and Long-tailed Duck, two species of auks, Common Guillemot and Razorbill, one species of Diver, Red-throated Diver, and three species of gulls, Little Gull, Herring Gull and Common Gull.

The highest observed density during aerial surveys was for Velvet Scoter (7.16 ind./km² in January 2025, with the main distribution southeast of the OWF) with the greatest concentration of this species found eastwards, towards shallower waters. Common Guillemots (2.00 ind./km²) and Red-throated Divers (1.06 ind./km²) followed in terms of highest densities, both species more present during November 2024 and March 2024.

Three gull species—Little, Herring, and Common Gull—were frequently observed, representing of 15.2 % (n=1,869) all sightings. Little Gulls were the most abundant gull species; however Herring Gull showed the highest densities. Lesser Black-backed Gulls were sporadic, accounting for 0.1 % (n=13) of all resting birds. All gulls had a preference for offshore areas and showed mid-densities near the planned wind farm, with maximum densities for Herring Gulls (1.05 ind./km² in December 2024), Little Gulls (0.93 ind./km² in December 2023), and Common Gulls (0.17 ind./km² in December 2024) during aerial surveys.

Among auks, Common Guillemots were more abundant (13.1 %; n=1,616) than Razorbills (6.3 %; n=769). The highest density of Common Guillemots occurred in November 2024 (2.00 ind./km²), while Razorbills peaked in March (0.70 ind./km²). Both species were mainly distributed offshore but were also observed within the planned OWF area.

Although two types of divers were recorded, Red-throated Divers were the most commonly occurring of both species, accounting for 6.3 % (n=777) of all sightings in contrast with Black-throated Divers (0.2 %; n=23). Their highest density (1.10 ind./km²) was recorded in March for Red-throated Divers, primarily within and north of the OWF.

Great Cormorants were barely present in the area during the winter period, with a detection peak of five individuals in March, therefore their density was low.

Sea ducks were the most abundant group of birds detected. Velvet Scoters accounted for 37.6 % (n=4,632) of all resting birds and Long-tailed Ducks were the third most common species during the aerial surveys (8.3 %; n=1,021). Their distribution was oriented towards shallower waters in the close vicinity of the adjacent SPA. Their densities varied but Velvet Scoters had their highest densities between January 2025, with values up to 7.16 ind./km² and 1.04 ind./km², respectively for Velvet Duck and Long-tailed Duck.

6.2 Results of the ship-based surveys

The ship-based surveys recorded a total of 3,727 resting birds from up to 18 species and 7 different bird groups. For the first year of monitoring, five species made up to 95.1 % (n= 1,911) of all resting birds detected within transect. These species were Little Gull (39.2 %, n= 787), Common Guillemot (23.3 %, n= 469), Herring Gull (22.2 %, n= 445), Common Gull (6.1 %, n= 122) and Black-throated Diver (4.4 %, n= 88). The second year of monitoring reflected a similar composition as these species reached up to 87.3 % (n= 1,499) of all resting birds. Their representation was as follows: Little Gull (33.6 %, n= 577), Common Guillemot (25.0 %, n= 430), Herring Gull (17.8 %, n= 306), Common Gull (6.2 %, n= 107) and Black-throated Diver (4.6 %, n= 79).

Two diver species were recorded: Red-throated Divers were rare, making up for <0.1 % (n= 1) and 0.5 % (n= 8) of observed resting birds, for 2023 and 2024 respectively. This species occurred at very low densities, while Black-throated Divers were more common (4.4 %, n= 88 for 2023 and 4.6 %, n= 79 for 2024). Their highest density (1.28 ind./km²) was recorded in May 2023, primarily within and north of the OWF.

Great Cormorants were seen sporadically, with a notable peak in September 2024 when 40 individuals (78.4 % of sightings for this species) were observed in one event. Their maximum density, however, remained low (0.52 ind./km² in September 2024, towards the west of the survey area).

Sea ducks were scarce, and they represented the fifth most common group of resting birds detected, with 16 and 48 individuals detected within transect, for 2023 and 2024 respectively. Velvet and Common Scoters were the only species exceeding 0.5 % of abundance among resting birds, though this report only covers a limited period when sea ducks are less likely to be present due to their seasonal patterns.

Three gull species—Little, Herring, and Common Gull—were frequently observed, representing 67.4 % (n= 1354) and 57.6 % (n= 990) of all resting birds detected for 2023 and 2024, respectively. Little Gulls were the most abundant and denser species found during ship-based survey, reaching 39.2 % (n= 787) and 33.6 % (n= 577) of all resting birds detected for 2023 and 2024, respectively. The gull species detected had a preference for offshore areas and medium densities were recorded near the planned wind farm, with maximum densities for Little Gulls (6.65 ind./km² in July 2024), Herring Gulls (1.98 ind./km² in August 2023), and Common Gulls (0.75 ind./km² in July 2024). The highest density was observed for Little Gulls (6.65 ind./km² in July 2024), followed by Common Guillemots (3.57 ind./km² in August 2024, west of the OWF).

Among auks, Common Guillemots were far more abundant (23.3 %, n= 469 for 2023 and 25.0 %, n= 430 for 2024) than Razorbills (2.4 %, n= 48 for 2023 and 2.6 %, n= 44 for 2024). The highest density for Common Guillemots occurred in September 2023 (9.09 ind./km²), while Razorbills peaked in October 2023 (0.41 ind./km²). Both species were mainly distributed offshore but were also observed within the planned OWF area, especially when densities were higher.

6.3 Conclusion

The combined results of the aerial and vessel-based surveys provide a comprehensive overview of the avian community in the area surrounding the planned offshore wind farm off the Lithuanian coast. Key species of conservation concern, particularly sea ducks, divers, gulls, and auks, were consistently recorded across both survey types, with notable seasonal and spatial variations in abundance and distribution. Velvet Scoters, Little Gulls, Long-tailed Ducks, Red-throated Divers, and Common Guillemots emerged as particularly prominent within the vicinity of the OWF and adjacent SPA, especially during winter and migration periods. While aerial surveys captured large-scale seasonal trends, ship-based observations offered valuable detail during the summer and early autumn months. Together, these findings highlight the ecological relevance of the area, emphasizing the need for careful planning and ongoing monitoring to mitigate potential impacts of the wind farm development on sensitive bird populations.

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A APPENDIX

A.1 Species lists

Table A 1 Overview of the total number of registered species in the aerial survey area from November 2023 to April 2025, including number of individuals and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU28-Gef.: EU28 Red List Category (Status: 2021); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2023); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadde924aa85003>, accessed 04.06.2024).

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	VSchRL	Eu28 Cat.	EUR Cat.	AEWA	Red List Lithuania
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	Divers	R/M	599	I	LC	LC	B 2e	
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras		R/M	11	I	LC	LC	B 2c	*
unidentified diver	<i>Gavia sp.</i>			R/M	59					
Great Crested Grebe	<i>Podiceps cristatus</i>	Ausuotasis kragas	Grebes	R/M	9		LC	LC	C 1	
unidentified grebe	<i>Podicipedidae sp.</i>			R/M	4					
Great Cormorant	<i>Phalacrocorax carbo</i>	Didysis kormoranas	Cormorants	R/M	7		LC	LC	C 1	
Mute Swan	<i>Cygnus olor</i>	Gulbe nebyle	Swams	M	1		LC	LC	C 1	
unidentified swan	<i>Cygnus sp.</i>			M	1					
Eurasian Wigeon	<i>Mareca penelope</i>	Eurazine cyple	Dabbling ducks	M	14		VU	LC	B 2c	
Common Eider	<i>Somateria mollissima</i>	Paprastoji gaga	Sea ducks	R/M	5		VU	EN	A 4	
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledine antis		R/M	640		LC	LC	A 1b	*
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis		R/M	33		N/A	LC	B 2a	
Common Scoter / Velvet Scoter	<i>Melanitta sp.</i>			R/M	201					
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegule		R/M	2,073		VU	VU	A 1b	*
Goosander	<i>Mergus merganser</i>	Didysis danciasnapis	Mergansers	M	1		LC	LC	C 1	
unidentified duck	<i>Anatinae sp.</i>		Ducks	M	41					
Common Crane	<i>Grus grus</i>	Pilkoji gerve	Cranes	M	1	I	LC	LC	C 1	
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	Gulls	R/M	514	I	LC	LC	A (3c 3e)	
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Rudagalvis kiras		R/M	2		VU	LC	B 2c	
Common Gull	<i>Larus canus</i>	Paprastasis kiras		R/M	93		LC	LC	B 2c	
unidentified small gull	<i>Larus small sp.</i>			R/M	25					
Lesser Black-backed Gull	<i>Larus fuscus</i>	Silkinis kiras		R/M	13		LC	LC	A 3c / B 2e / C1	
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras		R/M	317		VU	LC	B 2c 2e /C1	

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	VSchRL	Eu28 Cat.	EUR Cat.	AEWA	Red List Lithuania
Common/Herring Gull	<i>Larus canus / Larus argentatus</i>			R/M	42					
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras		R/M	10		NT	LC	B 2c	
unidentified large gull	<i>Larus (magnus) sp.</i>			R/M	23					
Great / Lesser Black-backed Gull	<i>Larus fuscus/Larus marinus</i>			R/M	1					
unidentified gull	<i>Laridae sp.</i>			R/M	18					
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narunelis	Auks	R/M	736	I *	LC	LC	C 1 / B 1	
Common Guillemot/Razorbill	<i>Uria aalge / Alca torda</i>			R/M	664					
Razorbill	<i>Alca torda</i>	Alka		R/M	520		LC	LC	C 1	
unidentified auk	<i>Alcidae sp.</i>			R/M	6					
unidentified bird	<i>Aves sp</i>		Birds	M	348					
unidentified songbird	<i>Passerine sp</i>		Songbirds	M	17					
Total					7,049					

Table A 2 Overview of the total number of registered species in the aerial survey area from November 2024 to January 2025, including number of individuals and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU28-Gef.: EU28 Red List Category (Status: 2021); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2023); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadde924aa85003>, accessed 13.10.2024).

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	VSchRL	Eu28 Cat.	EUR Cat.	AEWA	Red List Lithuania
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	Divers	R/M	178	I	LC	LC	B 2e	
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras		R/M	12	I	LC	LC	B 2c	*
unidentified diver	<i>Gavia sp.</i>			R/M	35					
Great Crested Grebe	<i>Podiceps cristatus</i>	Ausuotasis kragas	Grebes	R/M	6		LC	LC	C 1	
unidentified grebe	<i>Podicipedidae sp.</i>			R/M	2					
Mallard	<i>Anas platyrhynchos</i>	Didžioji antis	Dabbling ducks	M	15		LC	LC	C 1	
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledine antis	Sea ducks	R/M	381		LC	LC	A 1b	*
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis		R/M	4		N/A	LC	B 2a	
Common Scoter / Velvet Scoter	<i>Melanitta sp.</i>			R/M	46					
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegule		R/M	2,559		VU	VU	A 1b	*
Red-breasted Merganser	<i>Mergus serrator</i>	Vidutinis danciasnapis	Mergansers	M	3		NT	NT	B 2c	*
unidentified duck	<i>Anatinae sp.</i>		Ducks	M	3					
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	Paukštvanagis	Birds of prey	M	1	I *	LC	LC		

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	VSchRL	Eu28 Cat.	EUR Cat.	AEWA	Red List Lithuania
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	Gulls	R/M	578	I	LC	LC	A (3c 3e)	
Common Gull	<i>Larus canus</i>	Paprastasis kiras		R/M	66		LC	LC	B 2c	
unidentified small gull	<i>Larus small sp.</i>			R/M	17					
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras		R/M	301		VU	LC	B 2c 2e /C1	
Common/Herring Gull	<i>Larus canus / Larus argentatus</i>			R/M	21					
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras		R/M	7		NT	LC	B 2c	
Herring/Common Gull	<i>Larus argentatus/Larus canus</i>			R/M	1					
unidentified large gull	<i>Larus (magnus) sp.</i>			R/M	6					
unidentified gull	<i>Laridae sp.</i>			R/M	1					
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narunelis	Auks	R/M	880	I *	LC	LC	C 1 / B 1	
Common Guillemot / Razorbill	<i>Uria aalge / Alca torda</i>			R/M	332					
Razorbill	<i>Alca torda</i>	Alka		R/M	249		LC	LC	C 1	
Common Chaffinch	<i>Fringilla coelebs</i>	Paprastasis kikilis	Songbirds	M	16	I *	LC	LC		
unidentified finch_unidentified Fringilla finch	<i>Fringilla sp.</i>			M	1					
unidentified bird	<i>Aves sp</i>		Birds	M	20					
unidentified songbird	<i>Passerine sp</i>		Songbirds	M	7					
no animal sighting	<i>no animal sighting</i>		Birds	M	34					
Total					5,782					

Table A 3 Overview of the total number of registered species in the ship-based survey area from May to October 2023, including number of individuals (total and within transect) and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU28-Gef.: EU28 Red List Category (Status: 2021); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2022); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadd924aa85003>, accessed 27.09.2024).

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	Ind. within transect	VSchRL	EUR Cat.	EU28 Cat.	AEWA	Red List Lithuania
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	Divers	R/M	1	1	I	LC	LC	B 2e	
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras		R/M	153	88	I	LC	LC	B 2c	*
Great Crested Grebe	<i>Podiceps cristatus</i>	Ausuotasis kragas	Grebes	R/M	1	1	NA	LC	LC	C 1	
Great Cormorant	<i>Phalacrocorax carbo</i>	Didysis kormoranas	Cormorants	R/M	25	21	NA	LC	LC	C 1	

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	Ind. within transect	VSchRL	EUR Cat.	EU28 Cat.	AWEA	Red List Lithuania
Mute Swan	<i>Cygnus olor</i>	Gulbe nebyle	Swams	M	2	2	NA	LC	LC	C 1	
Whooper Swan	<i>Cygnus cygnus</i>	Gulbe giesmininke		M	4	4	I	LC	LC	C 1	
Bean Goose	<i>Anser fabalis</i>	Želmenine žasis	Geese	M	2	2	NA	VU	LC	A 3c*	
Greylag Goose	<i>Anser anser</i>	Pilkoji žasis		M	58	26	NA	LC	LC	C 1 / B 1	
Barnacle Goose	<i>Branta leucopsis</i>	Baltaskruoste bernikle		M	14	14	I	LC	LC	C 1	
Eurasian Wigeon	<i>Mareca penelope</i>	Eurazine cyple	Dabbling ducks	M	37	23	NA	VU	LC	B 2c	
Mallard	<i>Anas platyrhynchos</i>	Didžioji antis		M	3	3	NA	LC	LC	C 1	
Tufted Duck	<i>Aythya fuligula</i>	Kuoduotoji antis	Diving ducks	M	24		NA	VU	NT	B (2c)	
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledine antis	Sea ducks	R/M	12	11	NA	LC	LC	A 1b	*
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis		R/M	2		NA	N/A	LC	B 2a	
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegule		R/M	18	5	NA	VU	VU	A 1b	*
Dunlin	<i>Calidris alpina</i>	Juodakrutis begikas	Waders	M	3	1	I *	LC	LC	C1	*
Eurasian Curlew	<i>Numenius arquata</i>	Didžioji kuolinga		M	13	13	NA	NT	NT	A 4	*
Arctic Skua	<i>Stercorarius parasiticus</i>	Smailiauodegis plešikas	Skuas	R/M	3	1	NA	EN	EN		
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	Gulls	R/M	847	787	I	LC	LC	A (3c 3e)	
Common Gull	<i>Larus canus</i>	Paprastasis kiras		R/M	127	122	NA	LC	LC	B 2c	
Lesser Black-backed Gull	<i>Larus fuscus</i>	Silkinis kiras		R/M	5	5	NA	LC	LC	A 3c / B 2e / C1	
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras		R/M	504	445	NA	VU	LC	B 2c 2e / C1	
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras		R/M	4	2	NA	NT	LC	B 2c	
Sandwich Tern	<i>Thalasseus sandvicensis</i>	Margasnapė žuvedra	Terns	R/M	1	1	I	LC	LC	C 1	
Common Tern	<i>Sterna hirundo</i>	Upinė žuvedra		R/M	3	2	I	LC	LC	C 1	
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narūnelis	Auks	R/M	534	469	I *	LC	LC	C 1 / B 1	
Razorbill	<i>Alca torda</i>	Alka		R/M	49	48	NA	LC	LC	C 1	
Short-eared Owl	<i>Asio flammeus</i>	Balinė peleda	Owls	M	1	1	I	LC	LC		*
Common Swift	<i>Apus apus</i>	Juodasis ciurlys	Swifts	M	1	1	NA	NT	NT		
Eurasian Skylark	<i>Alauda arvensis</i>	Dirvinis vieversys	Songbirds	M	103	103	NA	LC	LC		
Barn Swallow	<i>Hirundo rustica</i>	Šelmeninė kregždė		M	5	5	NA	LC	LC		
Western Yellow Wagtail	<i>Motacilla flava</i>	Geltonoji kiele		M	1	1	NA	LC	LC		
White Wagtail	<i>Motacilla alba alba</i>	Songbirds			16	NA					
European Robin	<i>Erithacus rubecula</i>	Liepsnėle		M	1	1	NA	LC	LC		
Common Redstart	<i>Phoenicurus phoenicurus</i>	Paprastoji raudonuodegė		M	1	1	NA	LC	LC		
Great Tit	<i>Parus major</i>	Didžioji zylė		M	62	62	NA	LC	LC		

Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	Ind. within transect	VSchRL	EUR Cat.	EU28 Cat.	AEWA	Red List Lithuania
Eurasian Bullfinch	<i>Pyrrhula pyrrhula</i>	Juodagalve sniegena		M	2	2	NA	LC	LC		
Total					2,644	2,292					

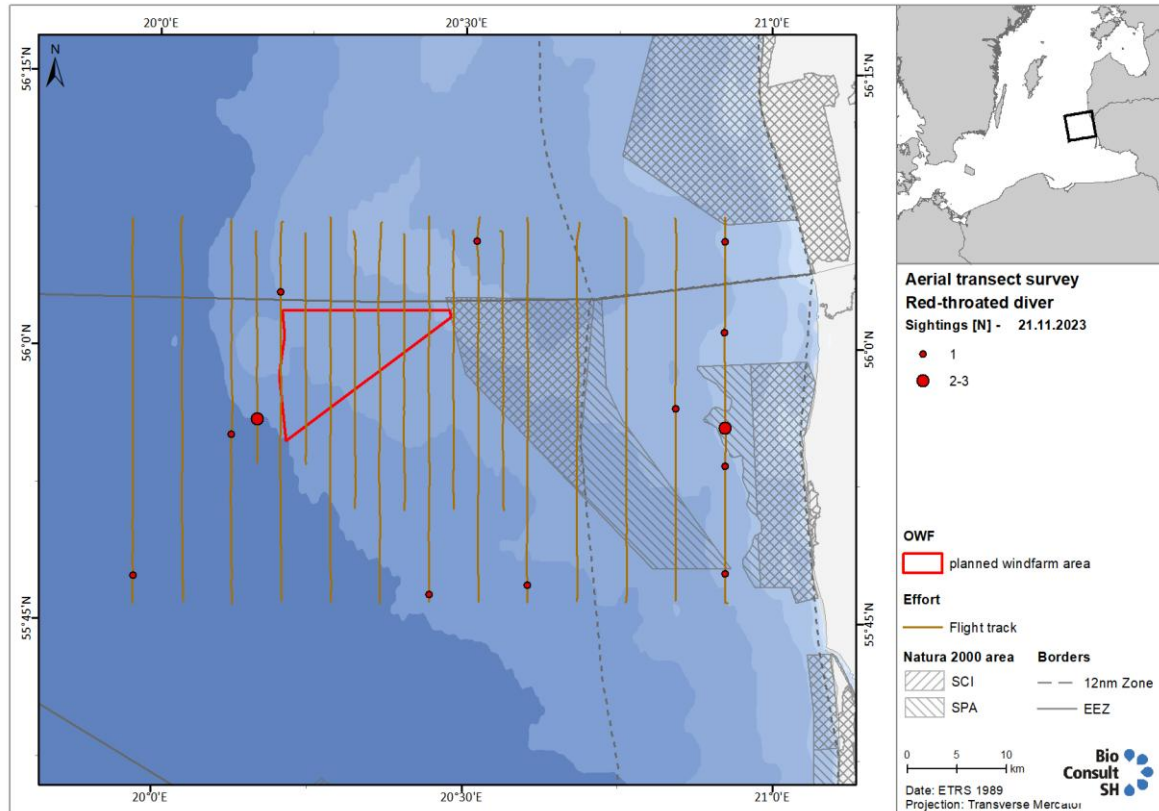
Table A 4 Overview of the total number of registered species in the ship-based survey area from May to October 2024, including number of individuals (total and within transect) and indications of the status of the species in the area (Resting/Migration [R/M]: Species that can occur as resting and migrating birds in the survey area; Migration [M]: Species, that occur as migrating birds only) as well as conservation or hazard categories (VSchRL: EU Bird Directive, Annex I; EUR-Gef: European Red List Category; EU28-Gef.: EU28 Red List Category (Status: 2021); AEWA: Categories of the Agreement on the Conservation of African-Eurasian Migrants (Status: 2022); Red List Lithuania: *indicates that the species is listed (<https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/9f3de7d2aa8811ea8aadde924aa85003>, accessed 27.09.2024).

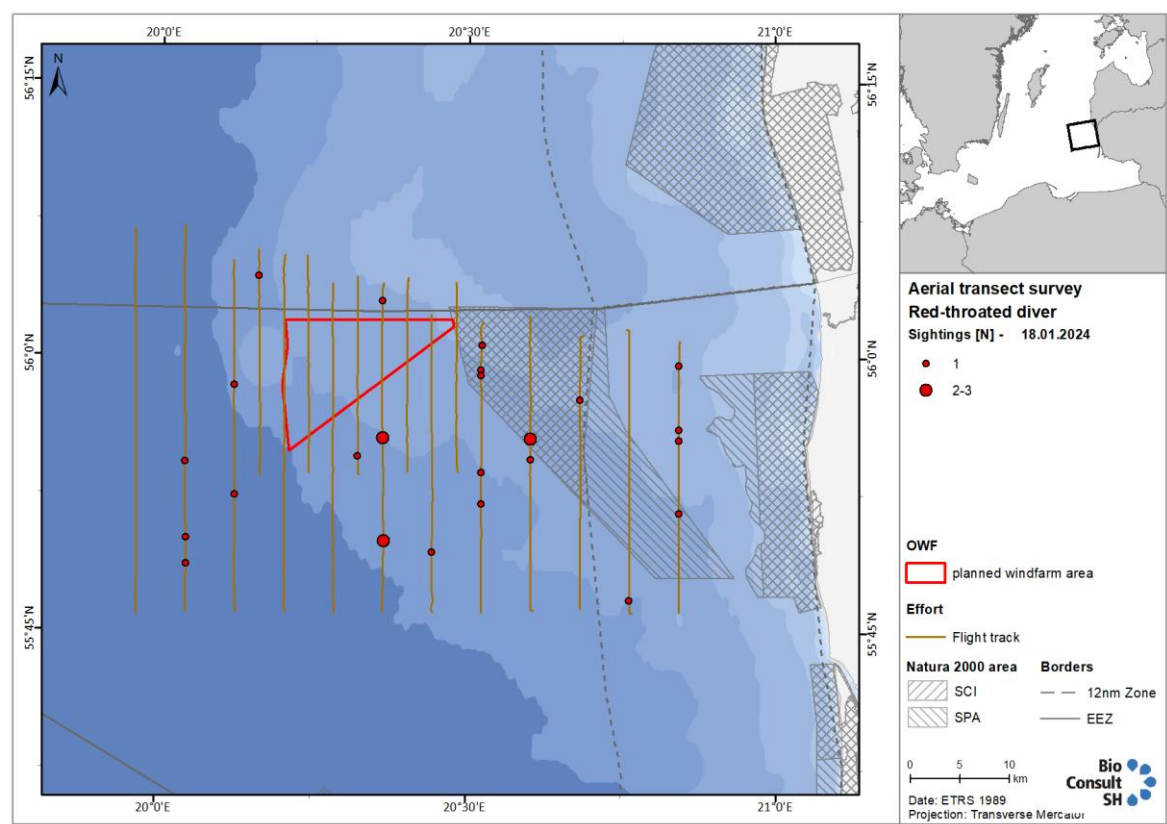
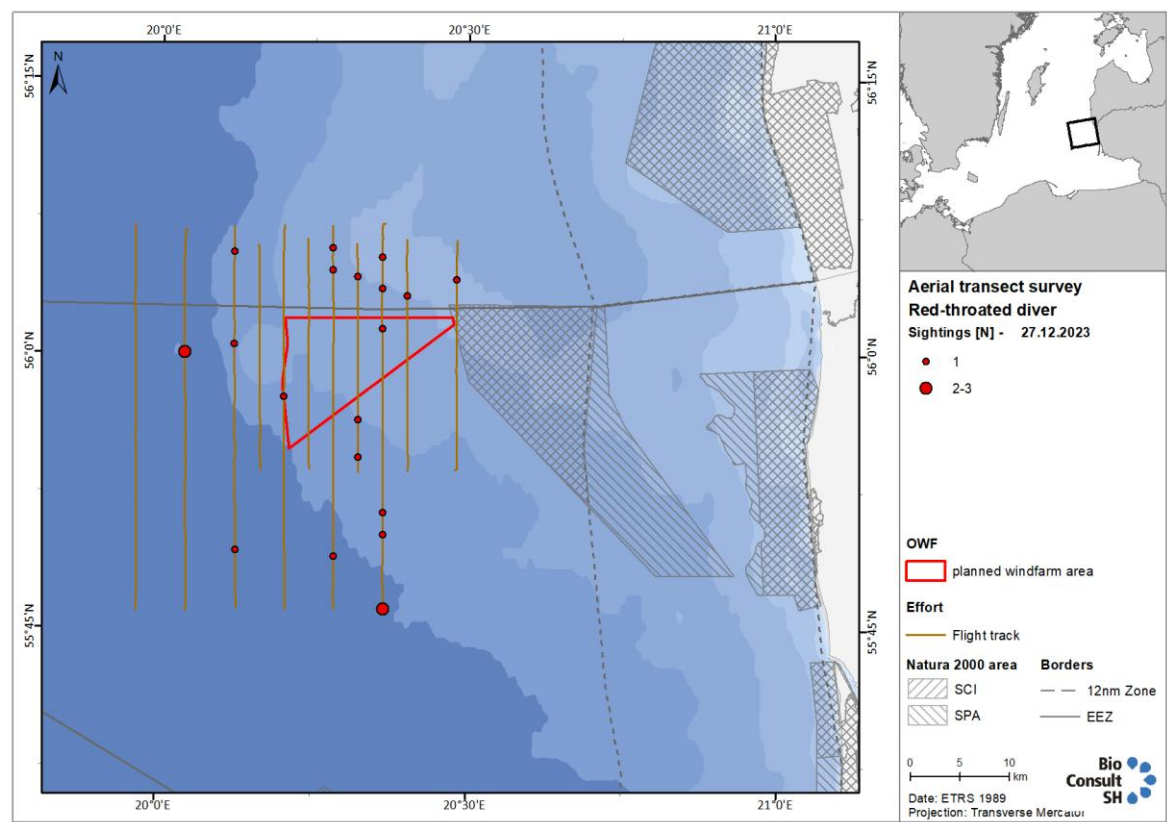
Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	Ind. within transect	VSchRL	EUR Cat.	EU28 Cat.	AEWA	Red List Lithuania
Red-throated Diver	<i>Gavia stellata</i>	Rudakaklis naras	Divers	R/M	8	8	I	LC	LC	B 2e	
Black-throated Diver	<i>Gavia arctica</i>	Juodakaklis naras		R/M	87	79	I	LC	LC	B 2c	*
Great Cormorant	<i>Phalacrocorax carbo</i>	Didysis kormoranas	Cormorants	R/M	54	51		LC	LC	C 1	
Great White Egret	<i>Ardea alba</i>	Didysis baltasis garnys	Hérons	M	1	1	I	LC	LC	C 1	
Whooper Swan	<i>Cygnus cygnus</i>	Gulbe giesmininke	Swans	M	2	1	I	LC	LC	C 1	
Greater White-fronted Goose	<i>Anser albifrons</i>	Baltakakte žasis	Geese	M	905	905	I *	LC	LC	C 1	
Eurasian Wigeon	<i>Mareca penelope</i>	Eurazine cyple	Dabbling ducks	M	38	35		LC	VU	B 2c	
Gadwall	<i>Mareca strepera</i>	Pilkoji antis		M	4	4		LC	LC	C 1	
Mallard	<i>Anas platyrhynchos</i>	Didžioji antis		M	2	2		LC	LC	C 1	
Northern Shoveler	<i>Spatula clypeata</i>	Å aukštasnape antis		M	39	1		LC	NT	B 1	
Common Eider	<i>Somateria mollissima</i>	Paprastoji gaga	Sea ducks	R/M	1	1		EN	VU	A 4	
Long-tailed Duck	<i>Clangula hyemalis</i>	Ledine antis		R/M	2	2		LC	LC	A 1b	*
Common Scoter	<i>Melanitta nigra</i>	Juodoji antis		R/M	19	13		LC	N/A	B 2a	
Velvet Scoter	<i>Melanitta fusca</i>	Paprastoji nuodegule		R/M	35	32		VU	VU	A 1b	*
unidentified harrier	<i>Circus sp.</i>		Birds of prey	M	1						
Curlew Sandpiper	<i>Calidris ferruginea</i>	Riestasnapis begikas	Waders	M	1	1		VU	VU		
Ruff	<i>Calidris pugnax</i>	Gaidukas		M	1		I	NT	NT	B 2c	*
Eurasian Curlew	<i>Numenius arquata</i>	Didžioji kuolinga		M	1	1		NT	NT	A 4	*
Arctic Skua	<i>Stercorarius parasiticus</i>	Smailiauodegis plešikas	Skuas	R/M	8	7		EN	EN		
Little Gull	<i>Hydrocoloeus minutus</i>	Mažasis kiras	Gulls	R/M	736	577	I	LC	LC	A (3c 3e)	*
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	Rudagalvis kiras		R/M	6	6		LC	VU	B 2c	

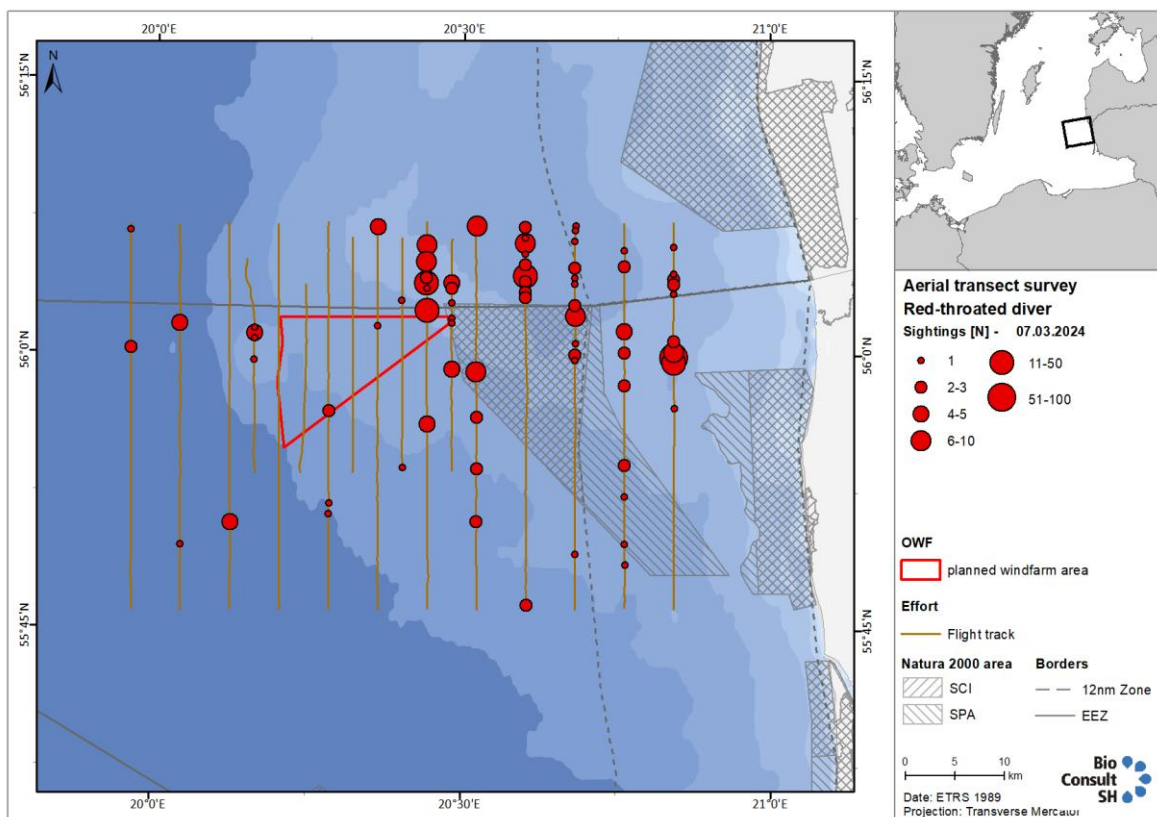
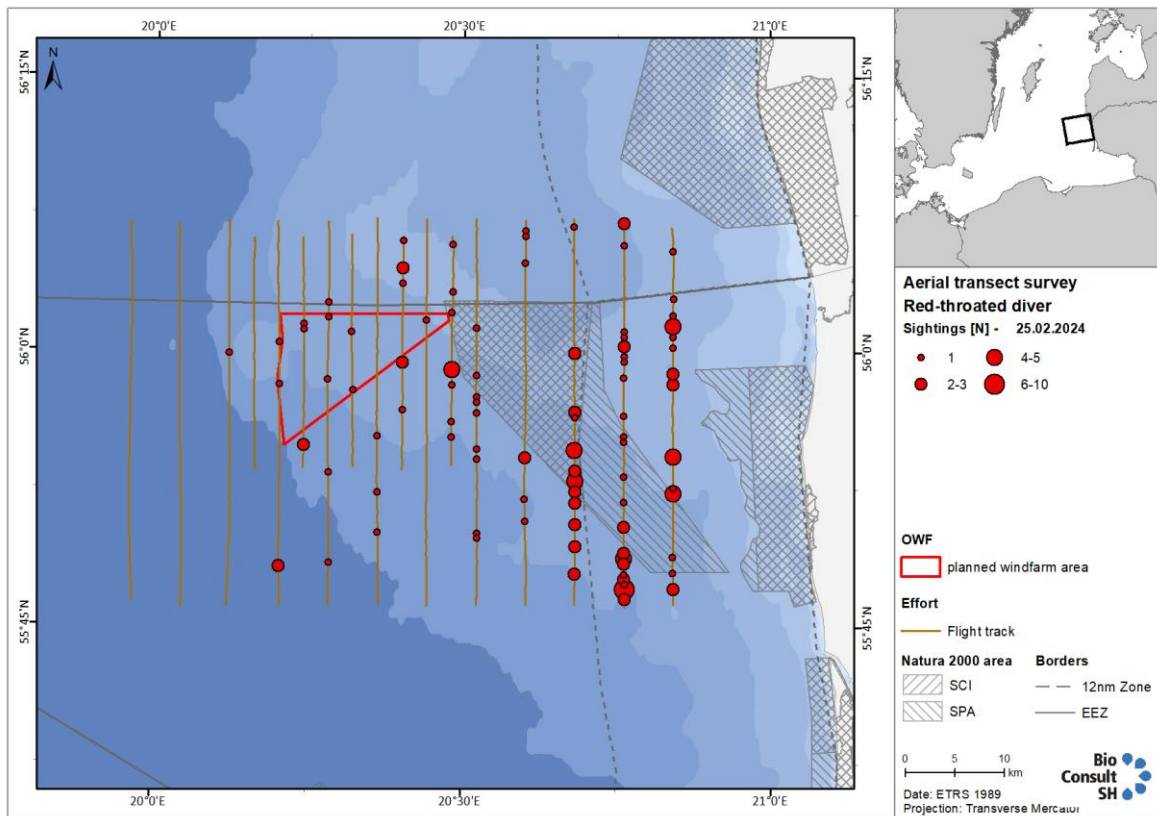
Species	Scientific name	Lithuanian	Group	Status	Ind. Σ	Ind. within transect	VSchRL	EUR Cat.	EU28 Cat.	AEWA	Red List Lithuania
Common Gull	<i>Larus canus</i>	Paprastasis kiras		R/M	112	107		LC	LC	B 2c	
Lesser Black-backed Gull	<i>Larus fuscus</i>	Silkinis kiras		R/M	53	51		LC	LC	A 3c / B 2e / C1	
Herring Gull	<i>Larus argentatus</i>	Sidabrinis kiras		R/M	329	306		LC	VU	B 2c 2e / C1	
Great Black-backed Gull	<i>Larus marinus</i>	Balnotasis kiras		R/M	2	2		LC	NT	B 2c	
Sandwich Tern	<i>Thalasseus sandvicensis</i>	Margasnapė žuvedra	Terns	R/M	1	1	I	LC	LC	C 1	
Common Tern	<i>Sterna hirundo</i>	Upinė žuvedra		R/M	1	1	I	LC	LC	C 1	
Common Guillemot	<i>Uria aalge</i>	Laibasnapis narūnelis	Auks	R/M	444	430	I *	LC	LC	C 1 / B 1	
Razorbill	<i>Alca torda</i>	Alka		R/M	44	44		LC	LC	C 1	
Short-eared Owl	<i>Asio flammeus</i>	Balinė peleda	Owls	M	1	1	I	LC	LC		
Common Swift	<i>Apus apus</i>	Juodasis ciurlys	Swifts	M	5	5		NT	NT		
Barn Swallow	<i>Hirundo rustica</i>	Å elmeninė kregždė	Songbirds	M	2			LC	LC		
White Wagtail	<i>Motacilla alba alba</i>			M	17	17					
Eurasian Wren	<i>Troglodytes troglodytes</i>	Karetaitė		M	3	2	I *	LC	LC		
European Robin	<i>Erithacus rubecula</i>	Liepsnė		M	7	6		LC	LC		
Black Redstart	<i>Phoenicurus ochruros</i>	Dūminė raudonuodegė		M	1	1		LC	LC		
Whinchat	<i>Saxicola rubetra</i>	Paprastoji kiauliukė		M	1	1		LC	VU		
Song Thrush	<i>Turdus philomelos</i>	Strazdas giesmininkas		M	1	1		LC	LC		
Common Chiffchaff	<i>Phylloscopus collybita</i>	Pilkoji pėcialindė		M	1	1		LC	N/A		
Willow Warbler	<i>Phylloscopus trochilus</i>	Ankstyvoji pėcialindė		M	1	1		LC	LC		
Goldcrest	<i>Regulus regulus</i>	Paprastasis nykštukas		M	4	4		LC	LC		
Eurasian Treecreeper	<i>Certhia familiaris</i>	Miškinis liputis		M	1	1		LC	LC		
Great Grey Shrike	<i>Lanius excubitor</i>	Plešrioji medšarke		M	1	1		LC	VU		
Common Starling	<i>Sturnus vulgaris</i>	Varnė		M	30	30		LC	LC		
Common Chaffinch	<i>Fringilla coelebs</i>	Paprastasis kikiilis		M	1	1	I *	LC	LC		
Total					3,014	2,742					

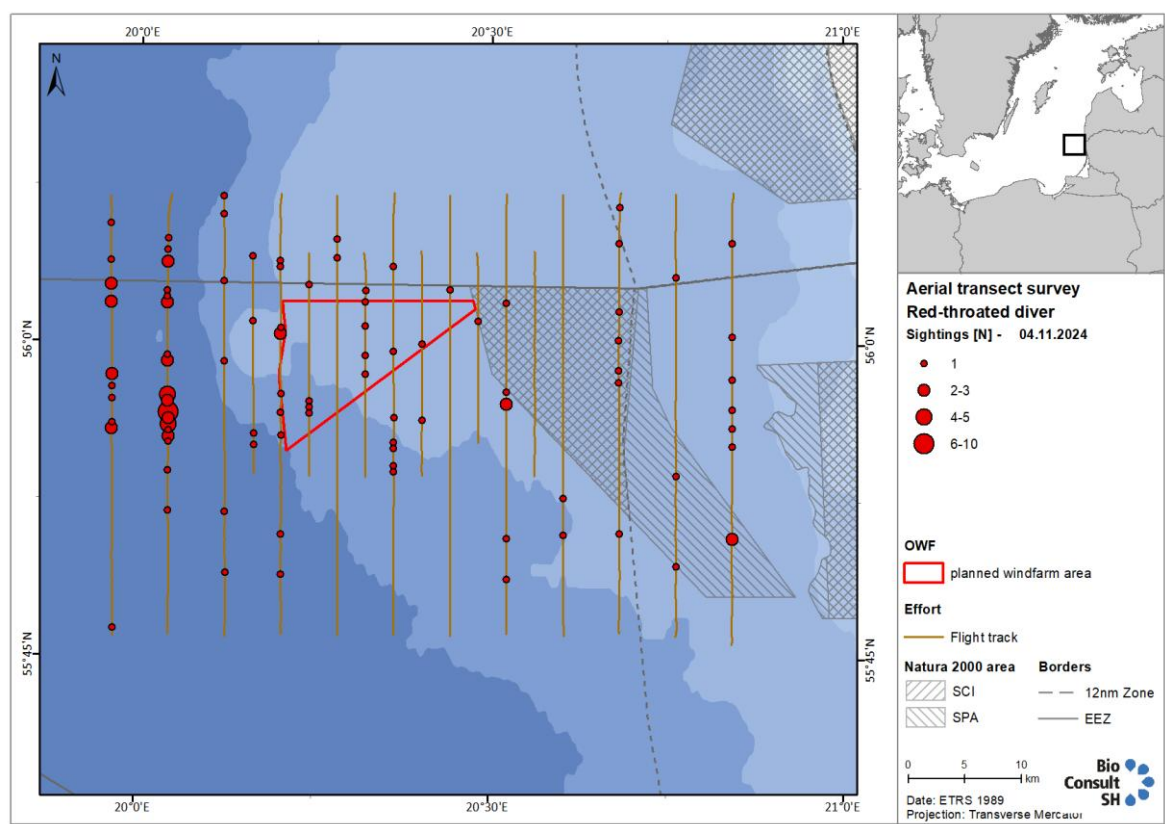
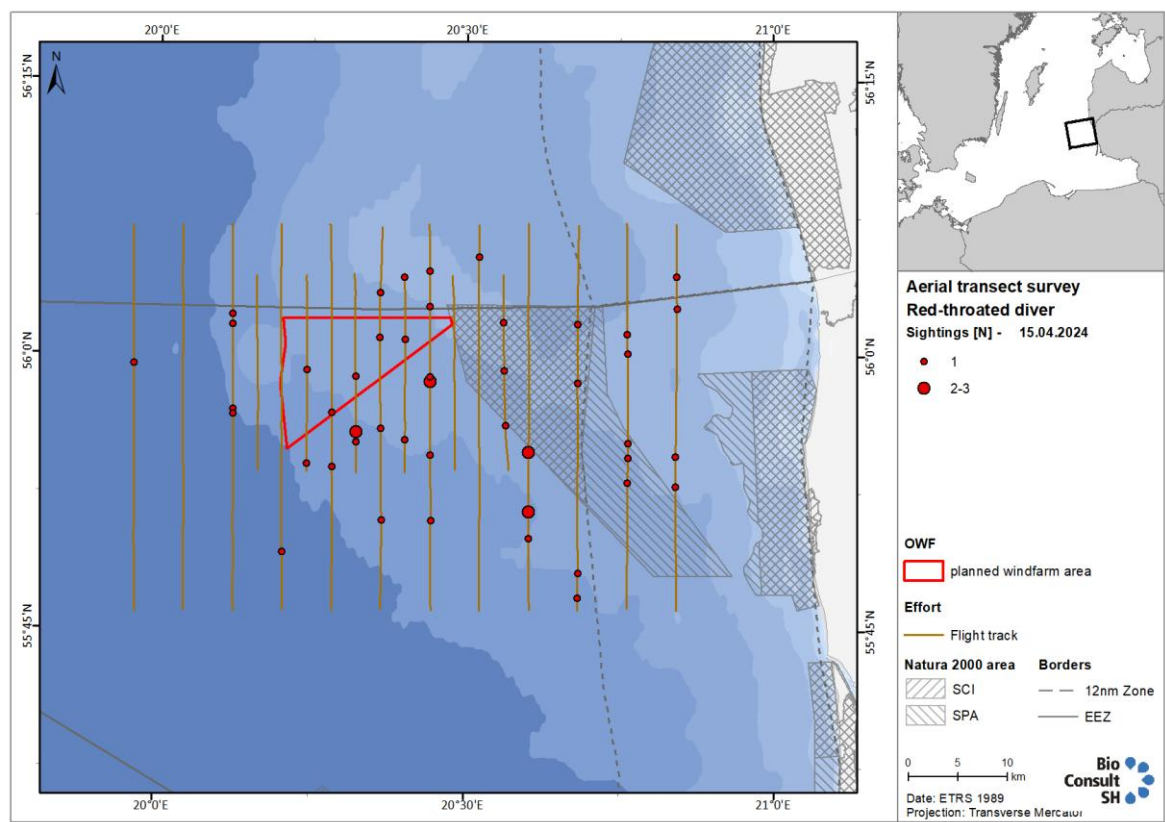
A.2 Species distribution maps from aerial surveys

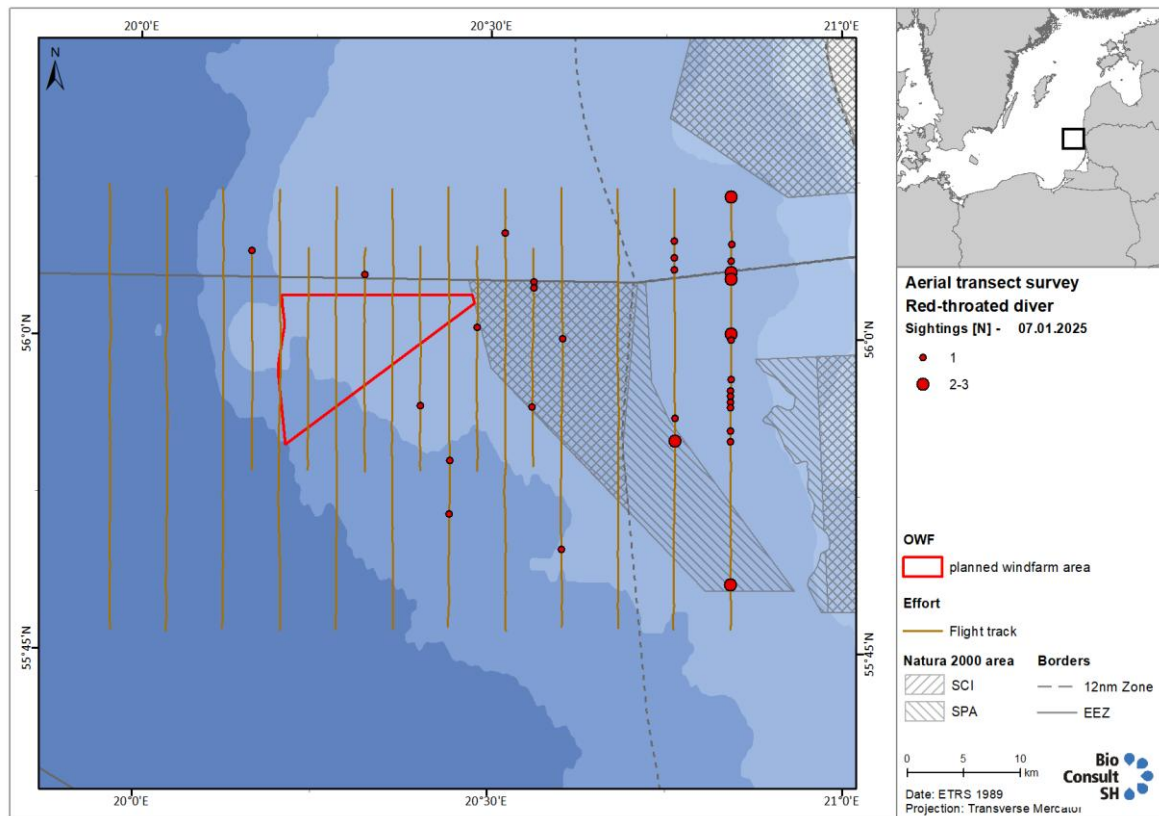
A.2.1 Red-throated Diver (*Gavia stellata*)



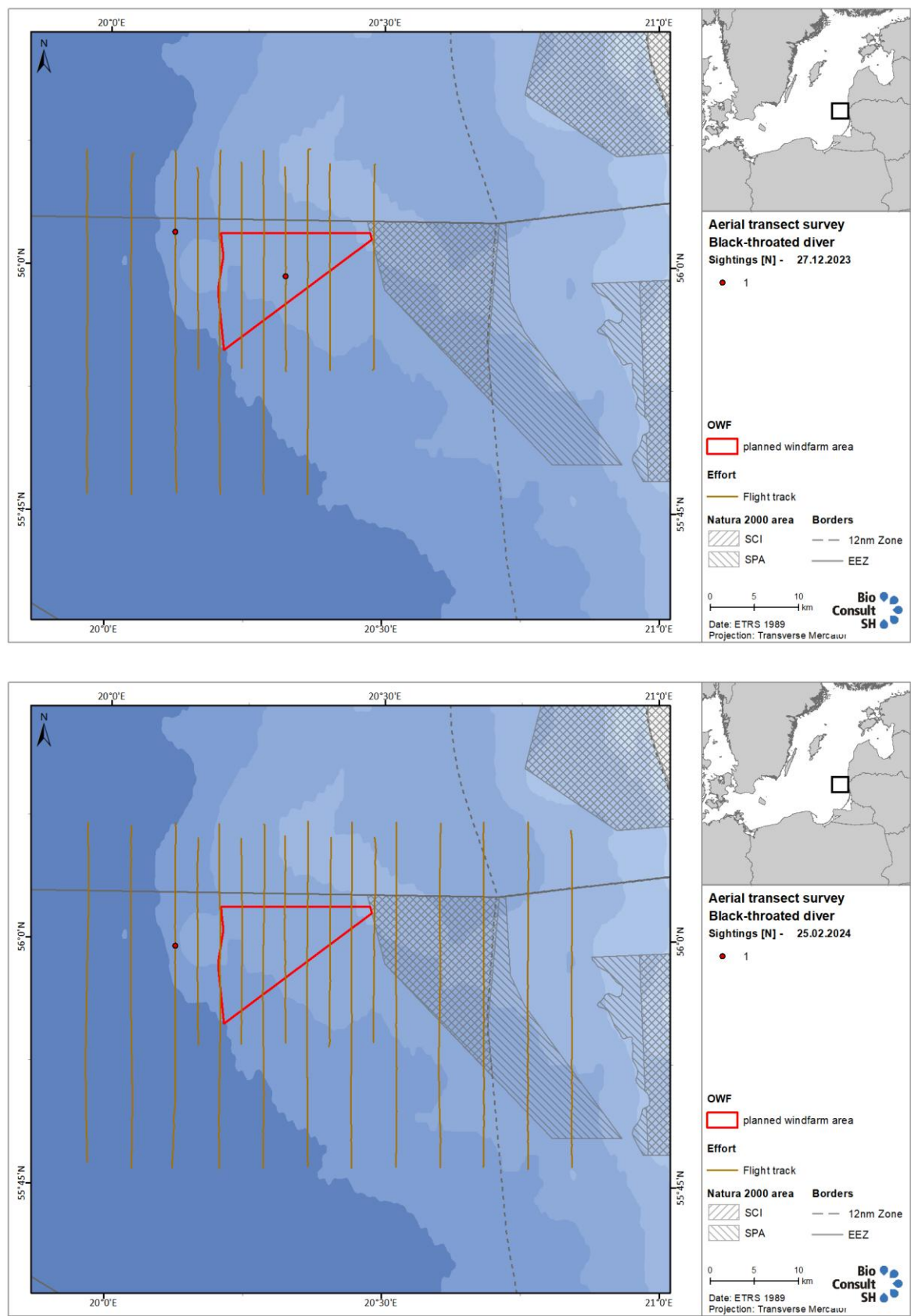


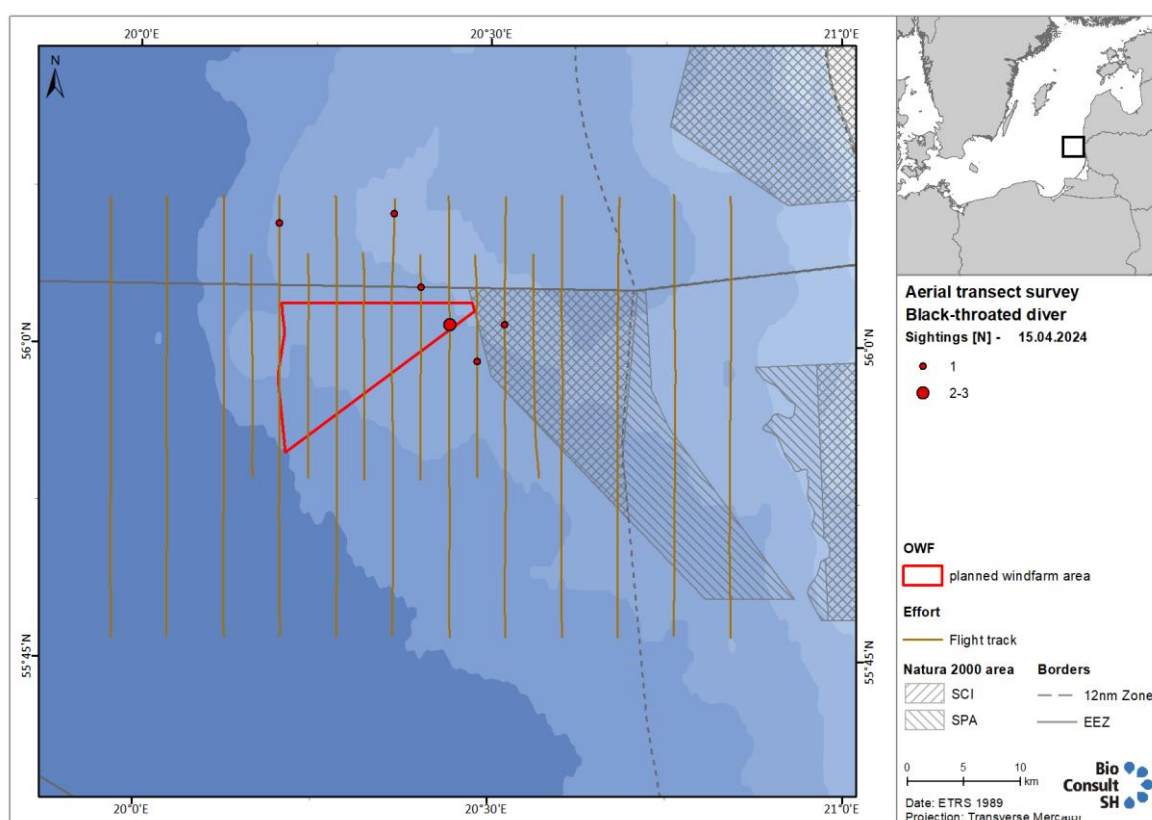
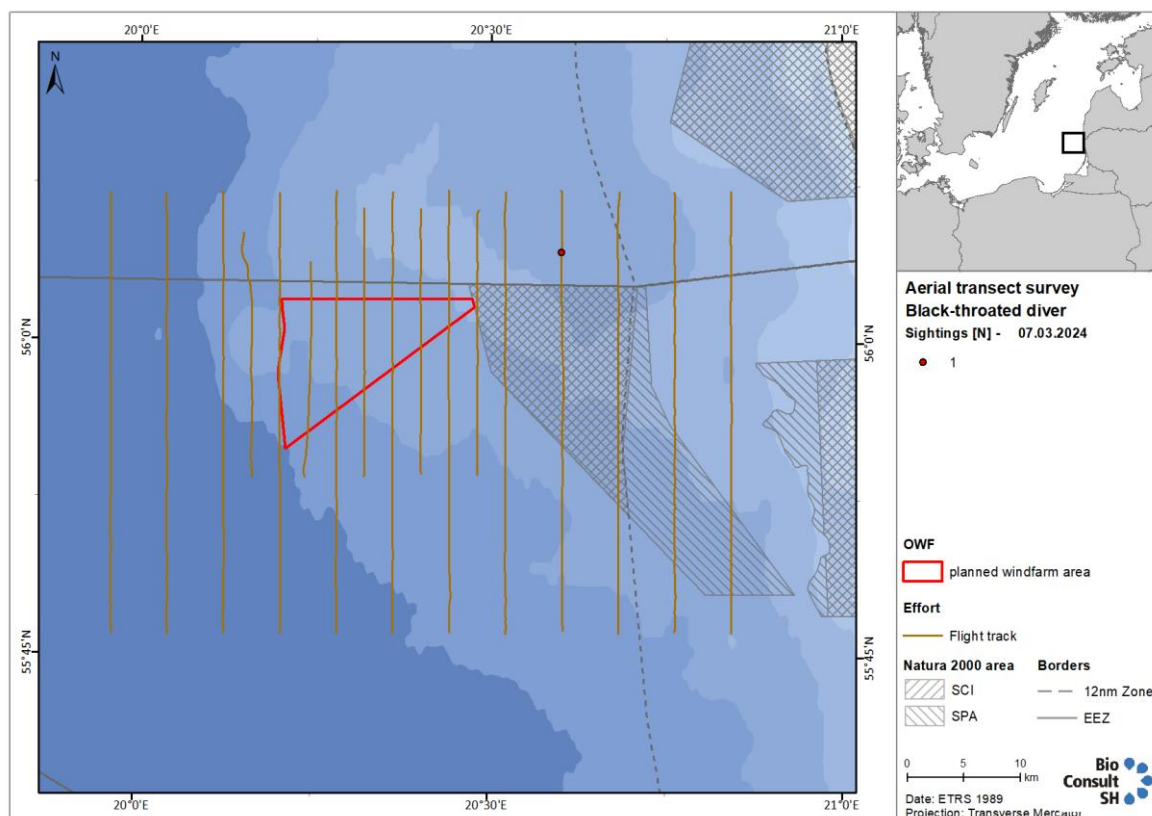


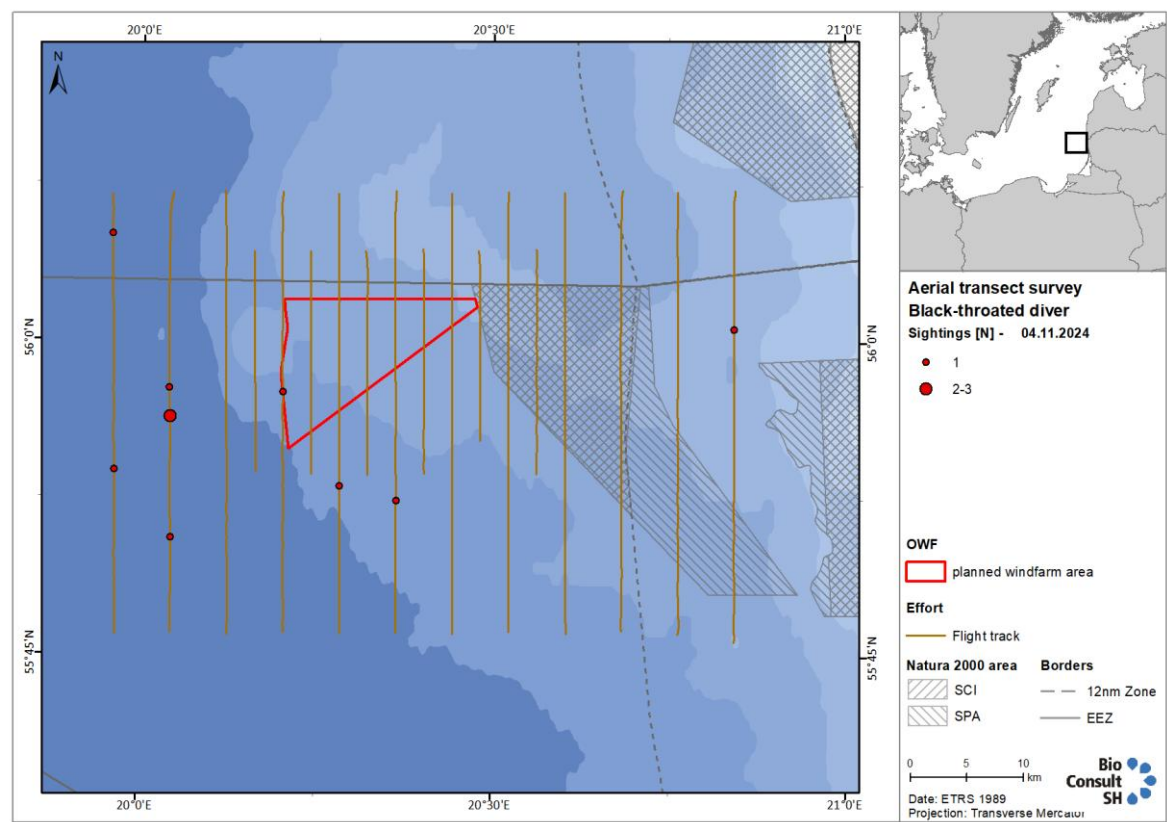




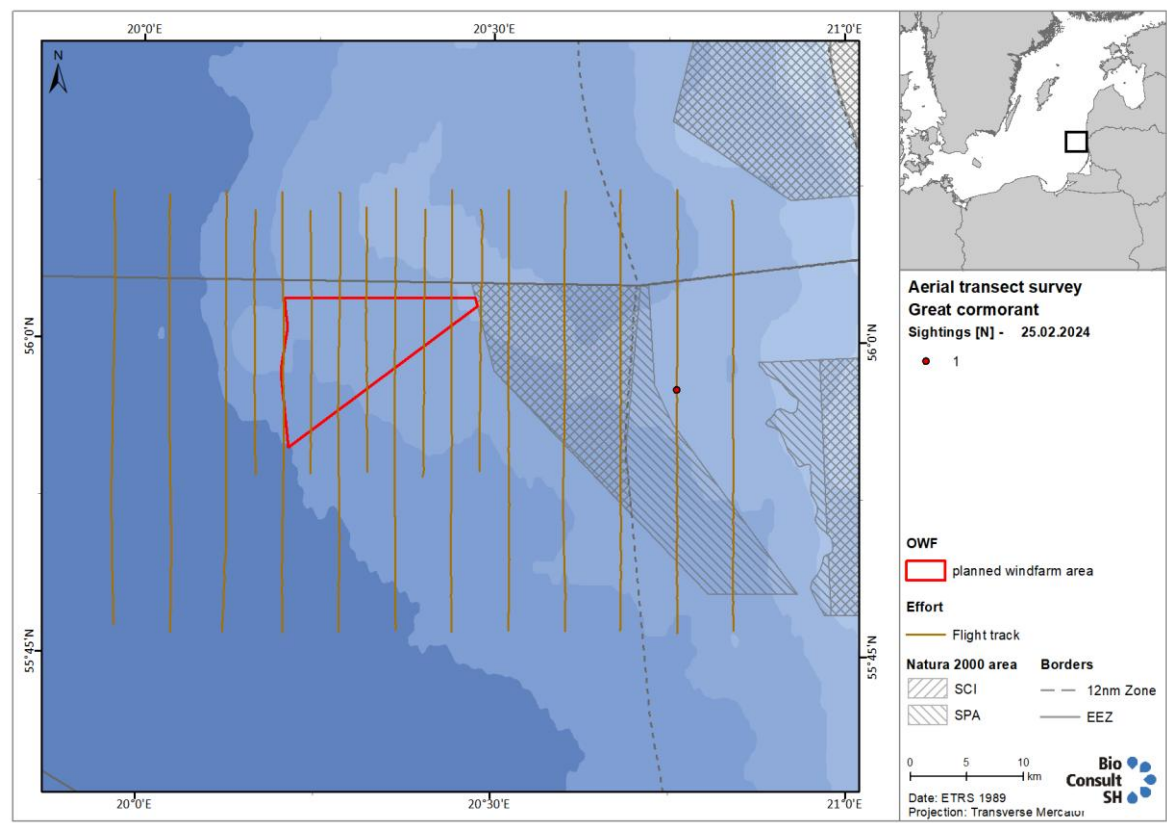
A.2.2 Black-throated Diver (*Gavia arctica*)

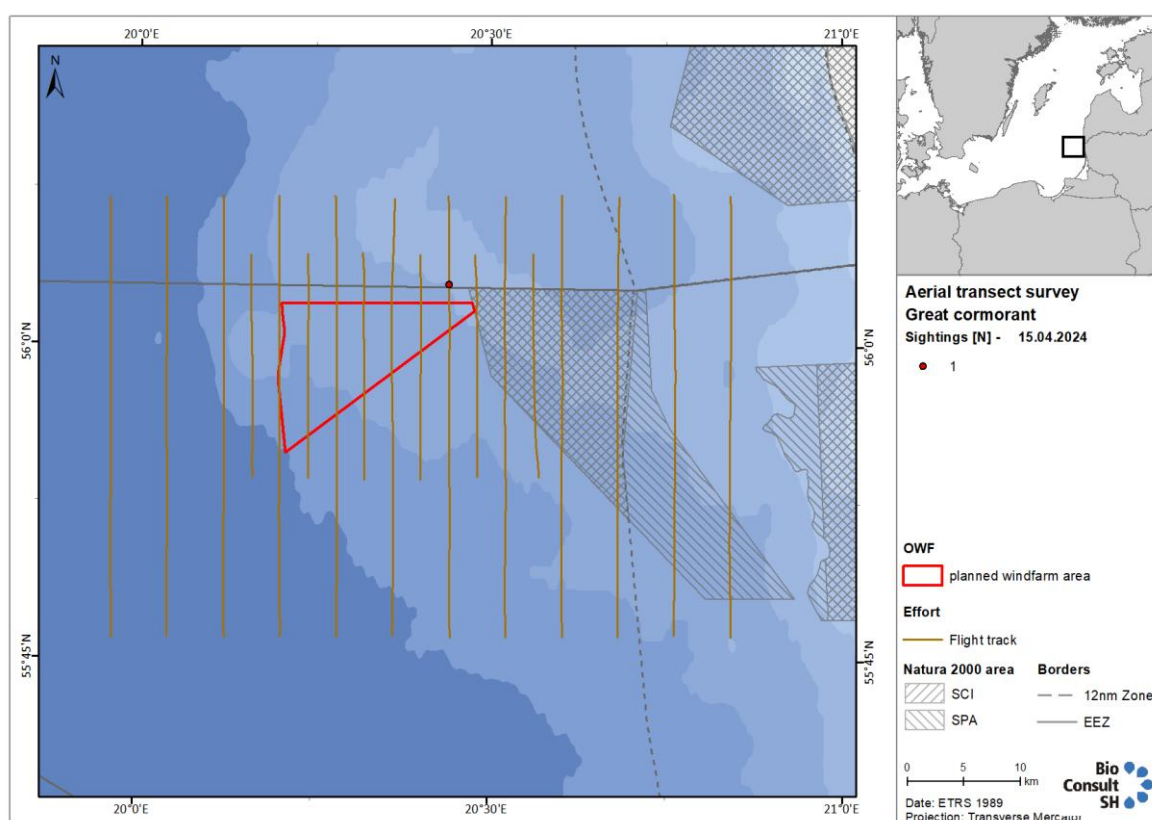
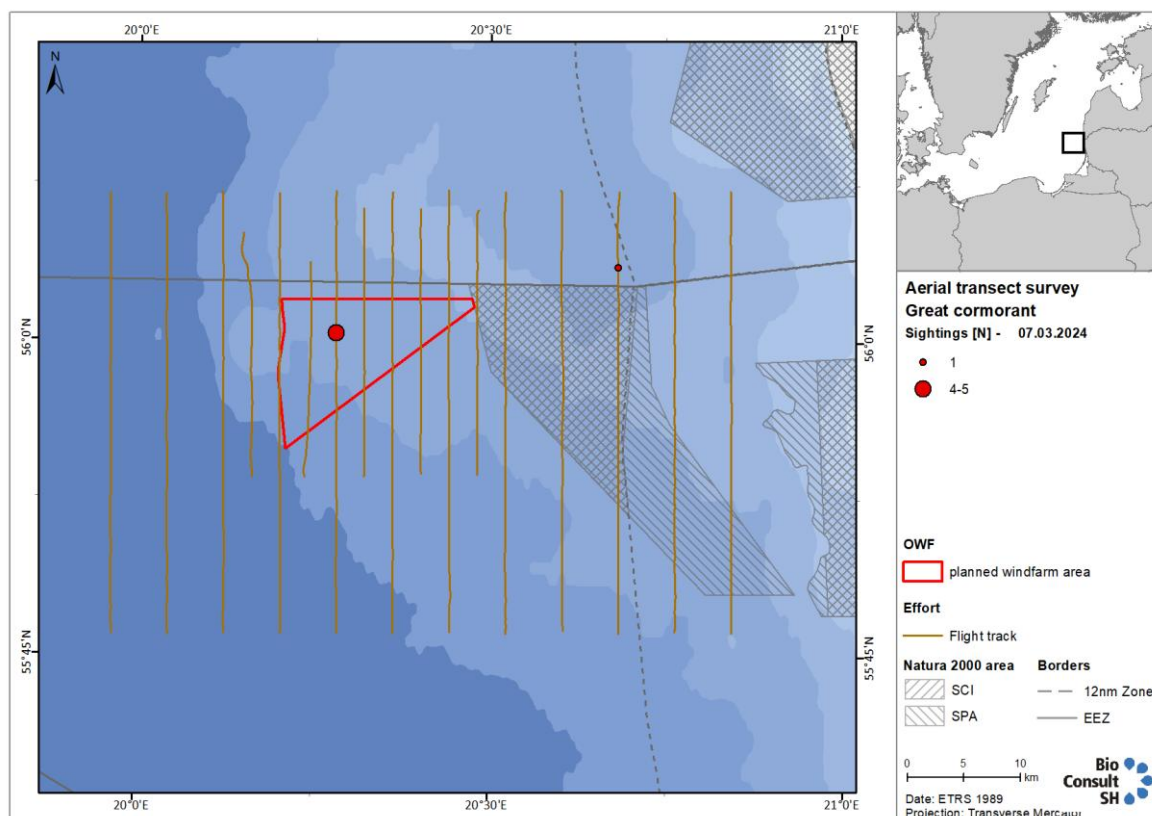




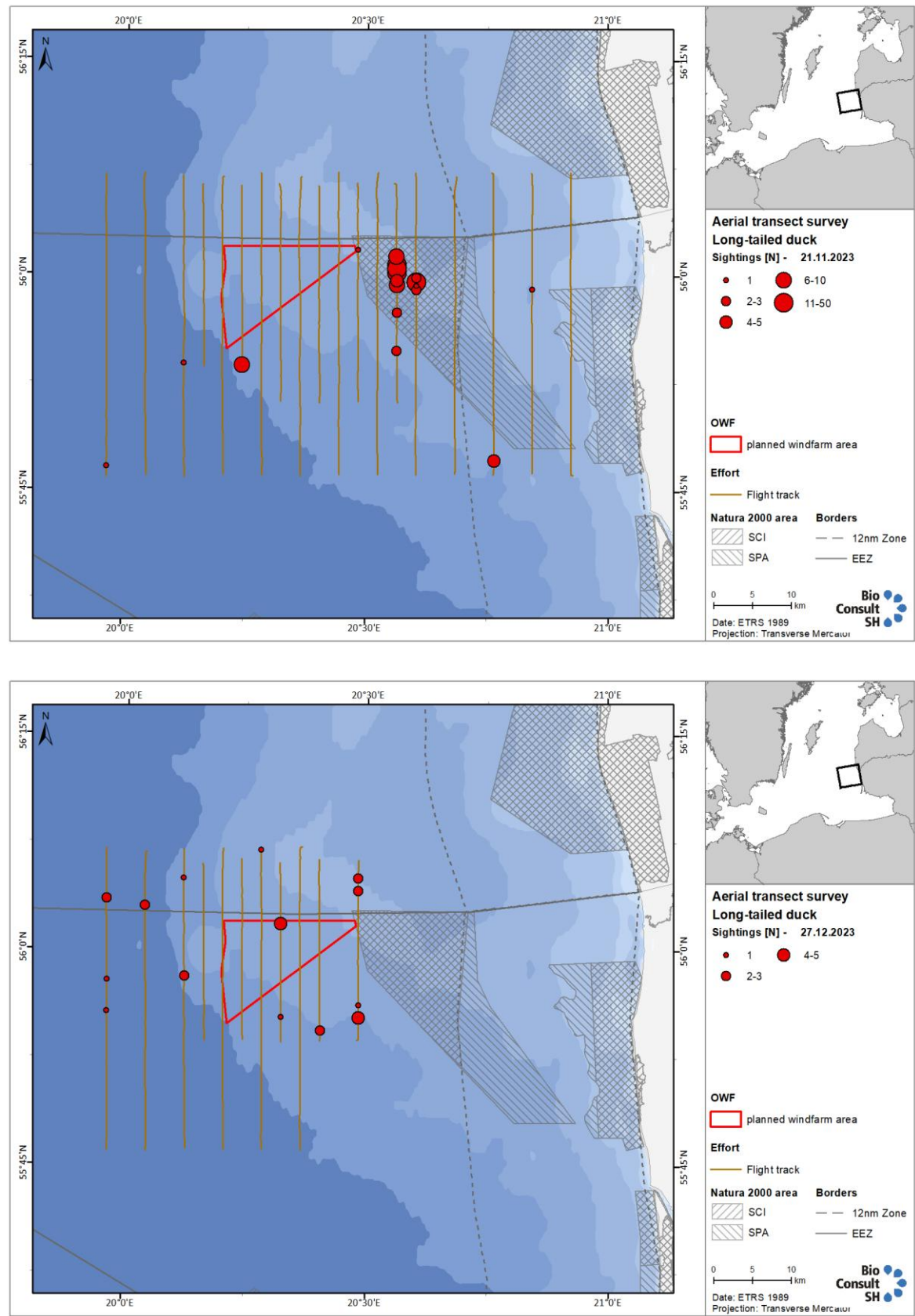


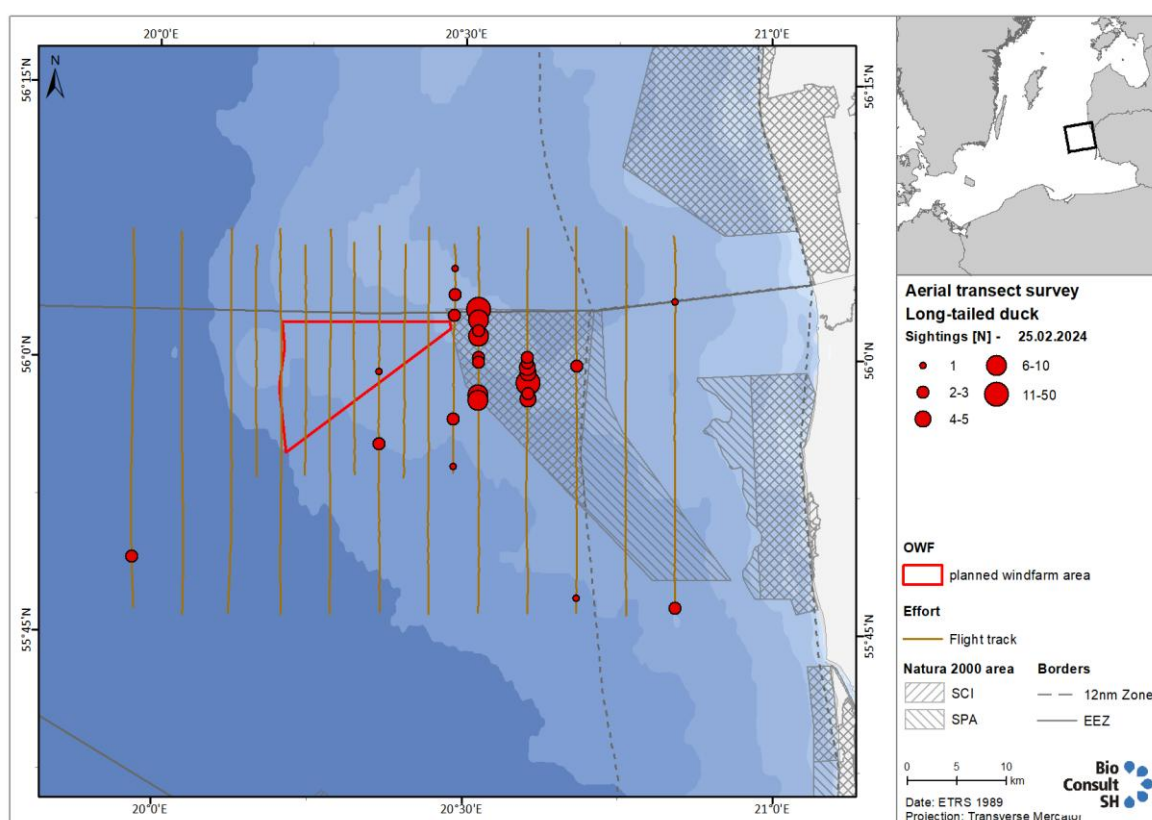
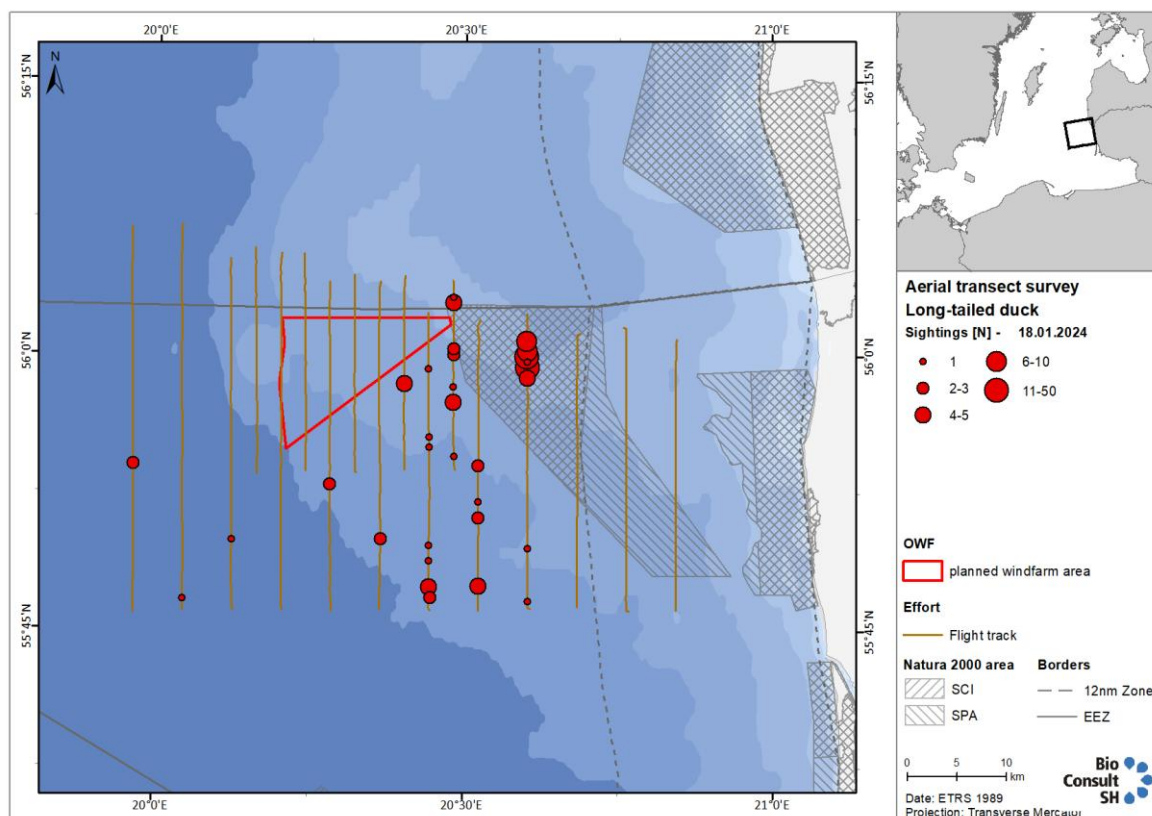
A.2.3 Great Cormorant (*Phalacrocorax carbo*)

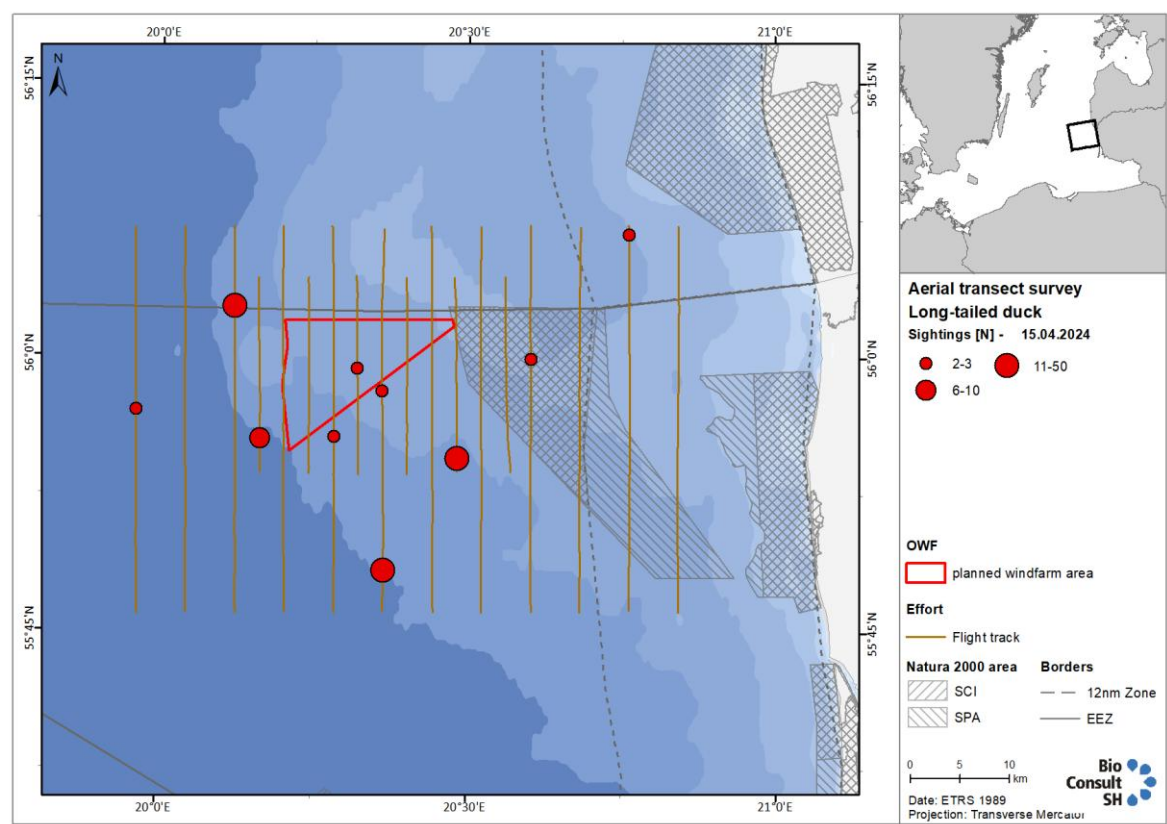
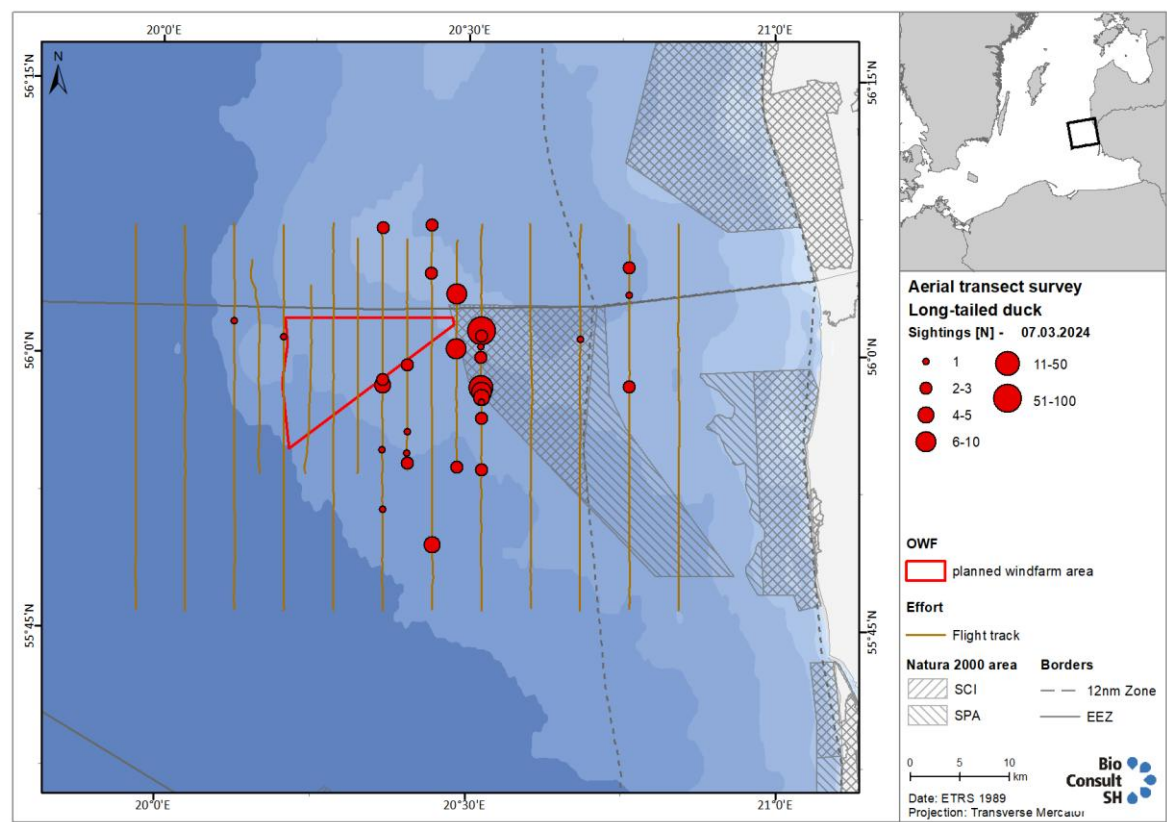


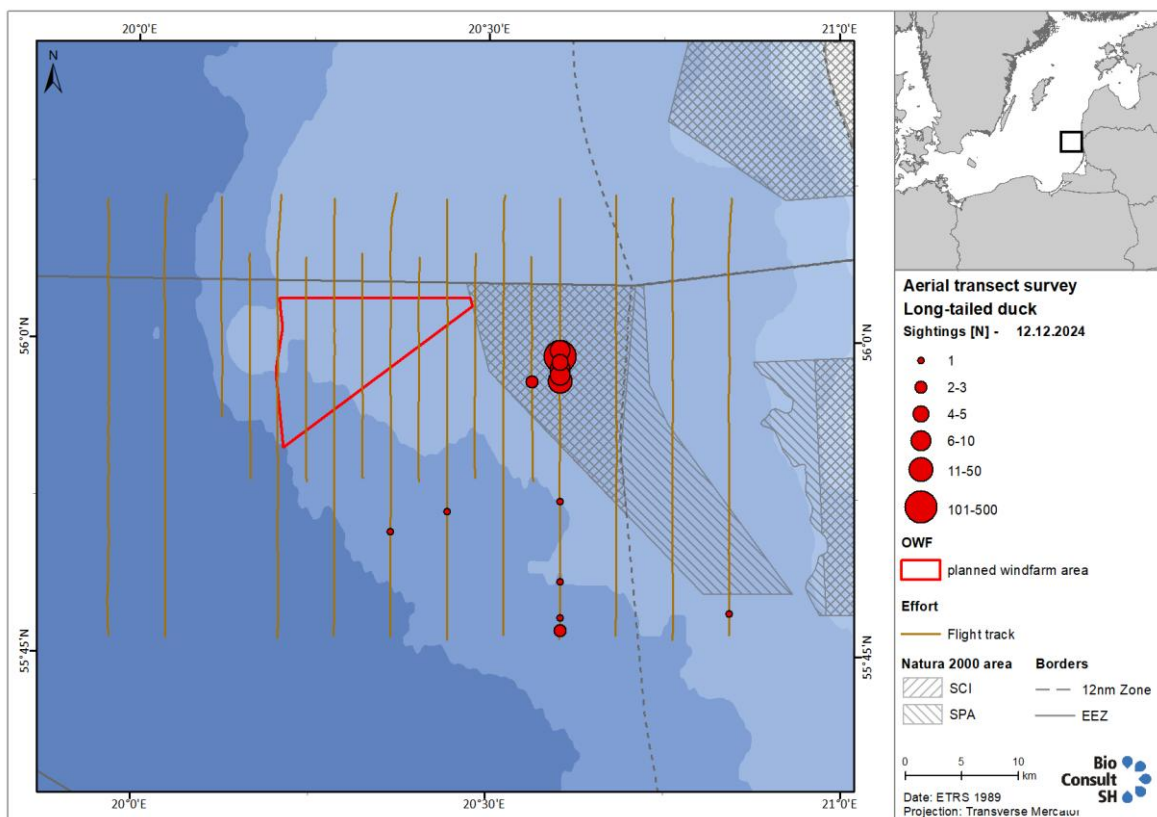
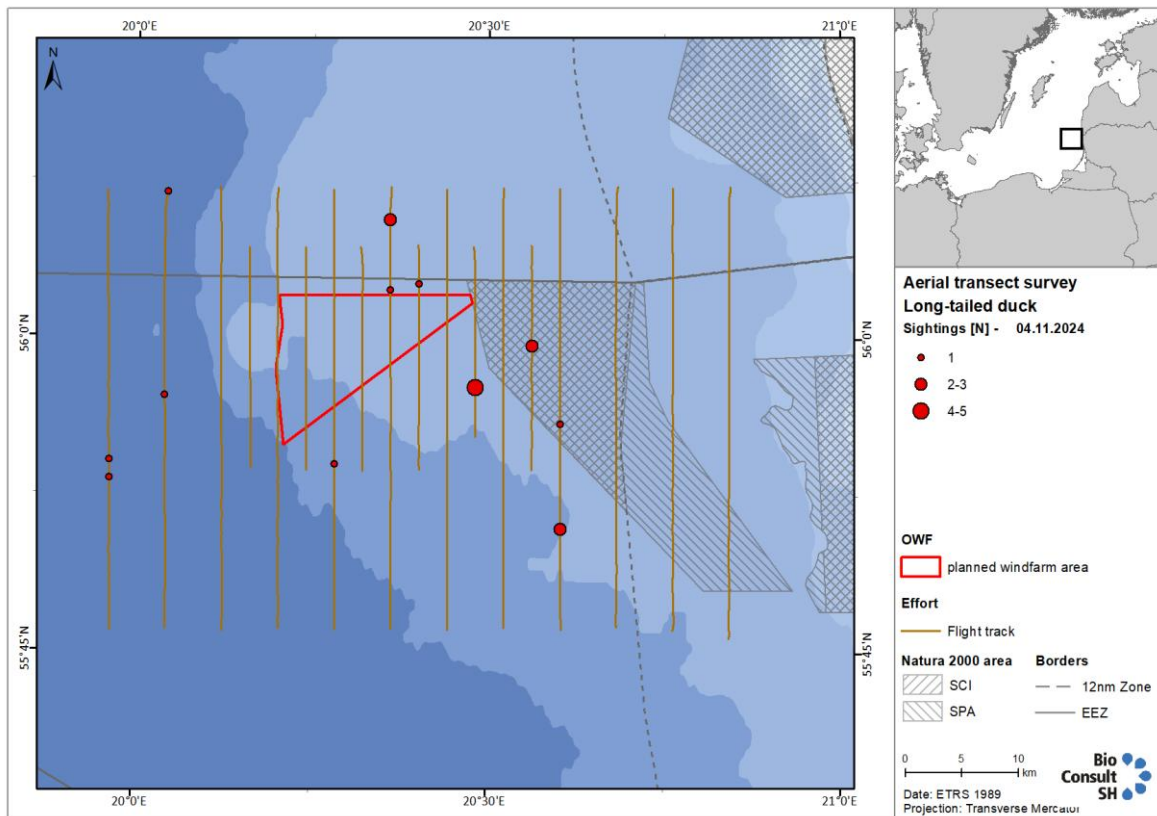


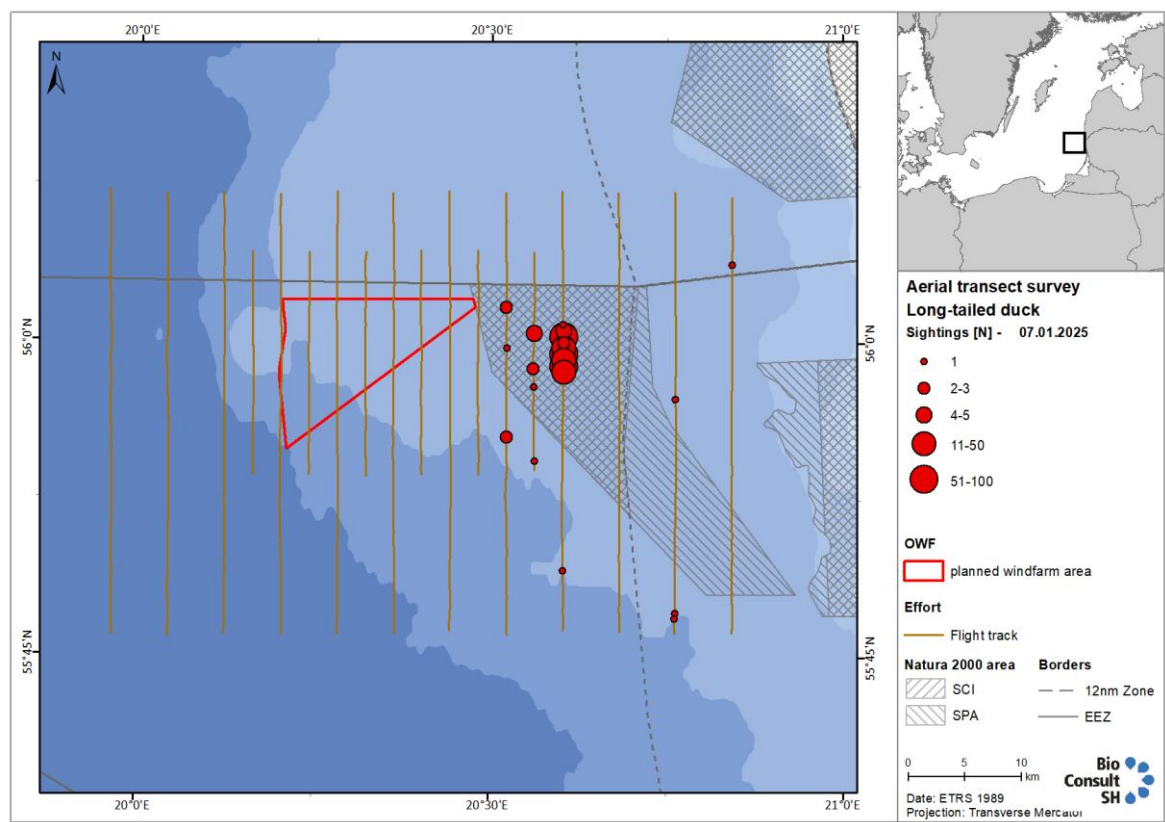
A.2.4 Long-tailed Duck (*Clangula hyemalis*)



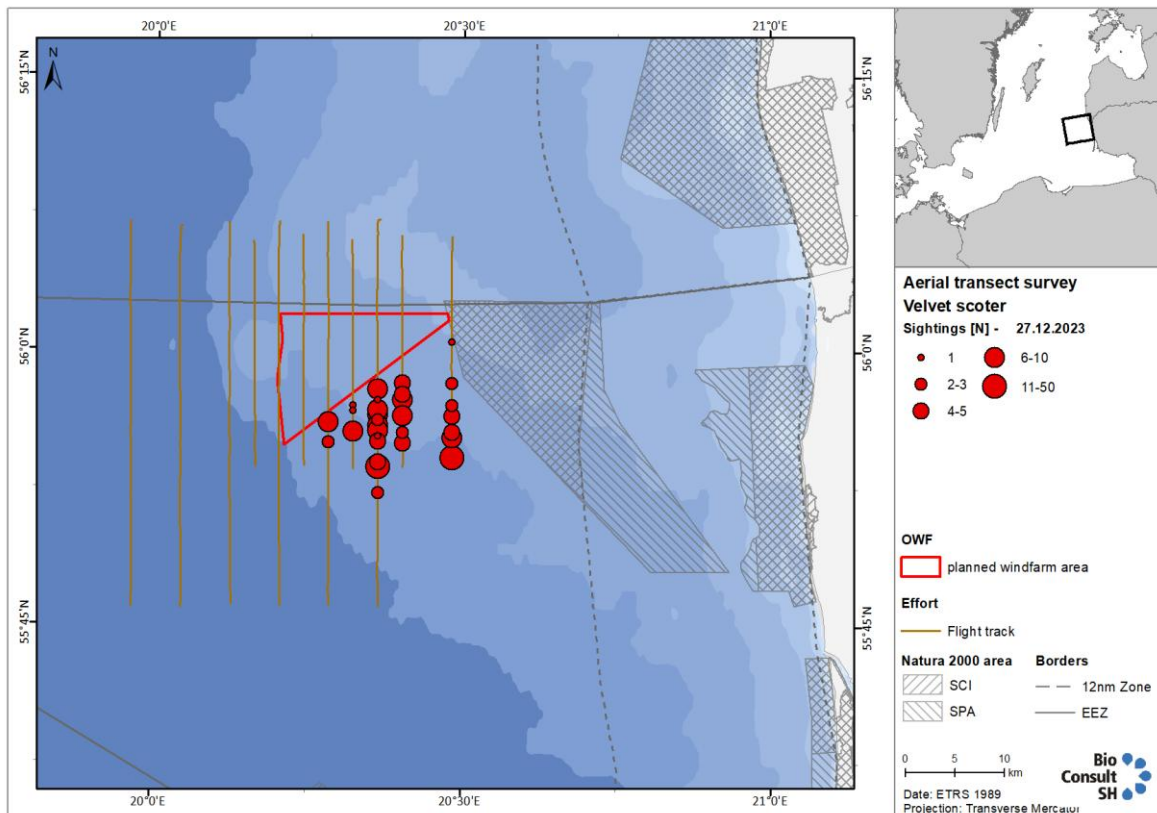
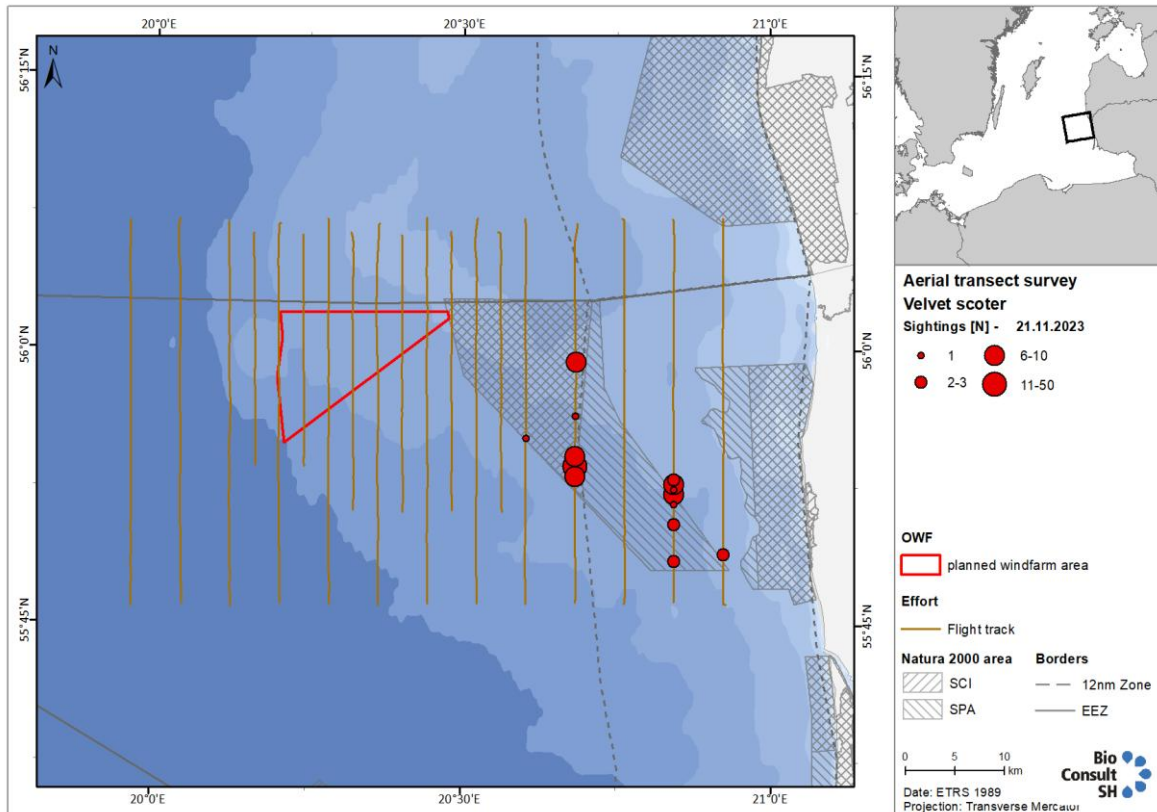


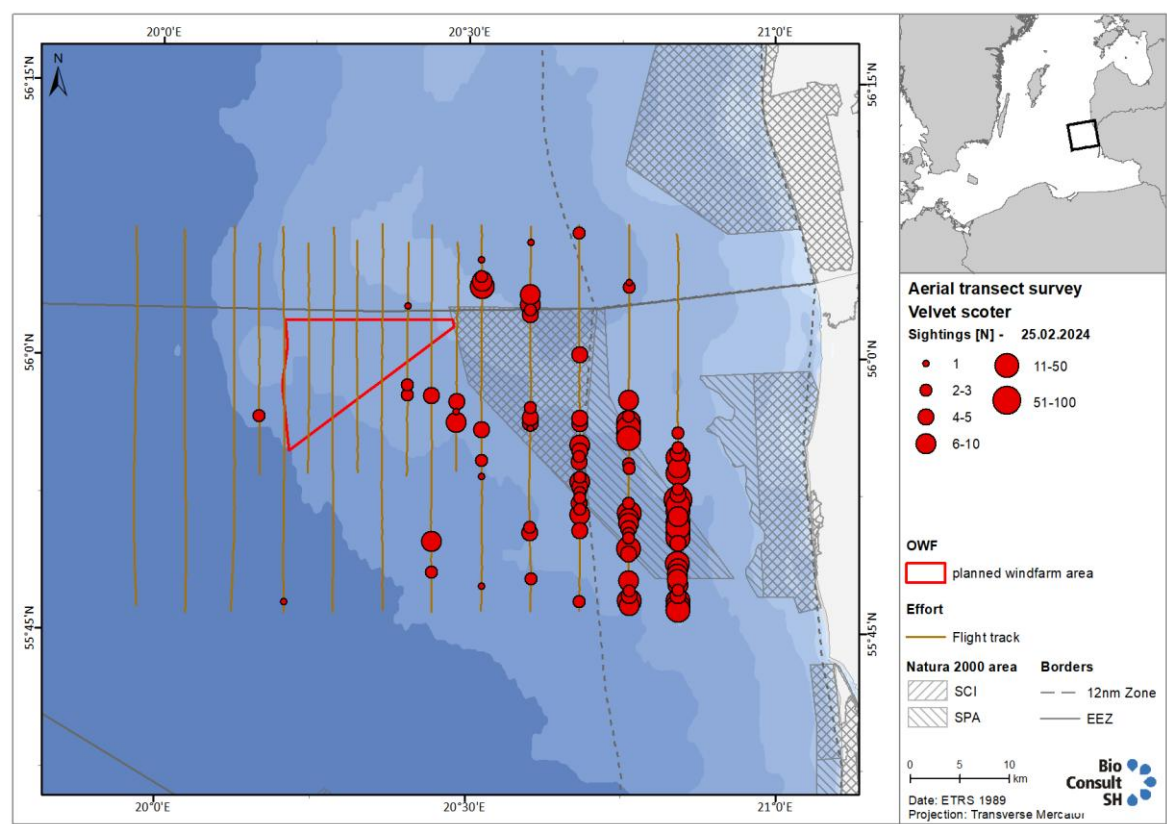
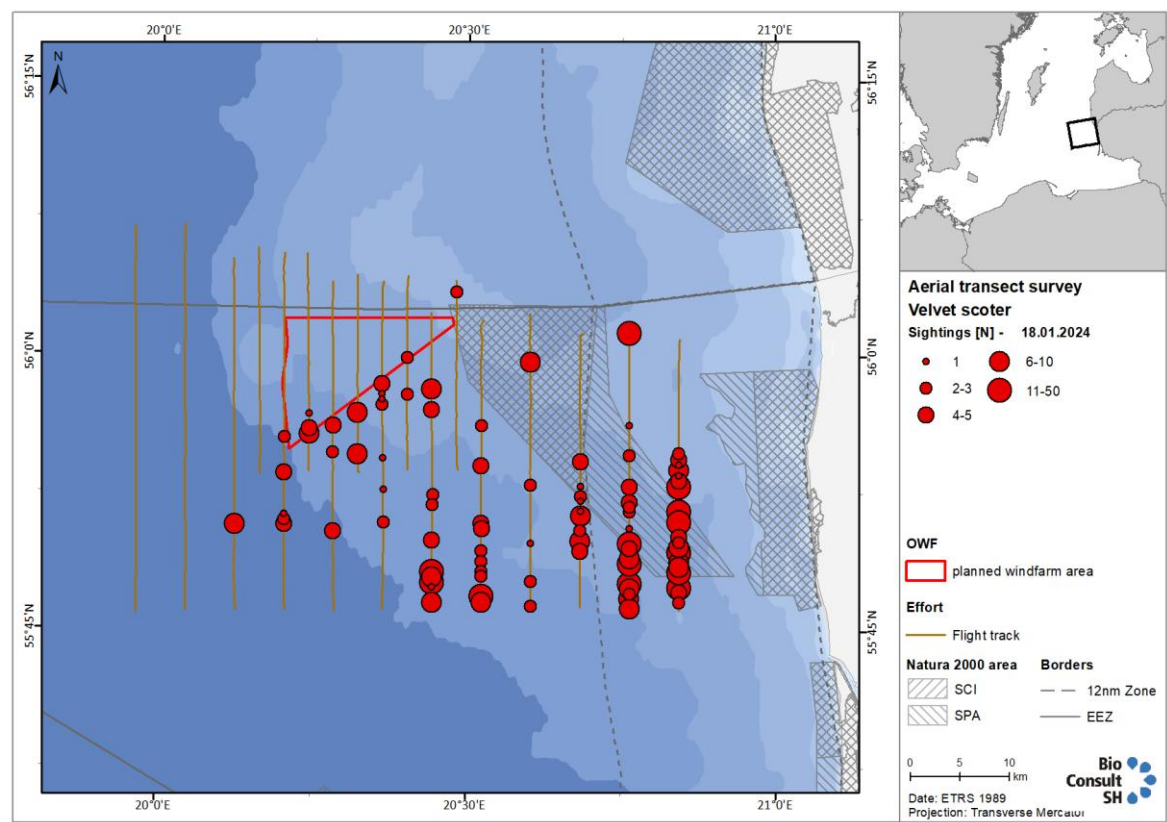


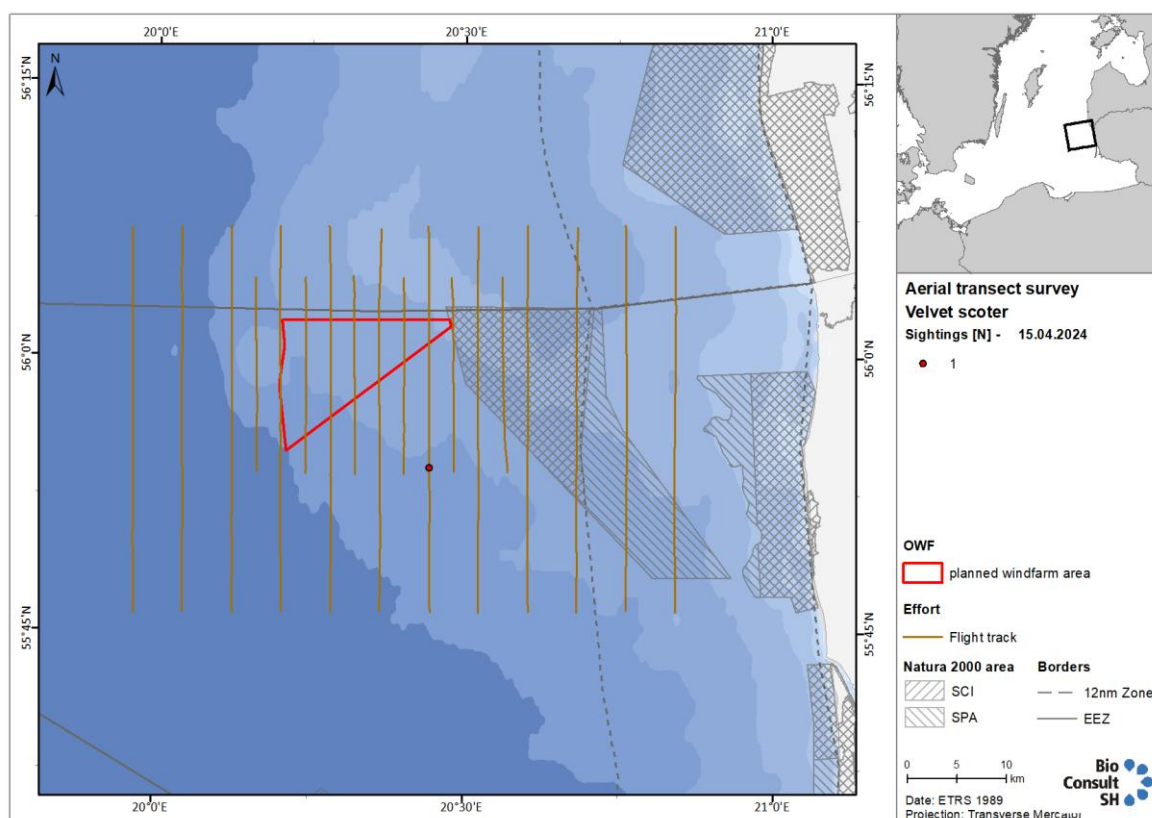
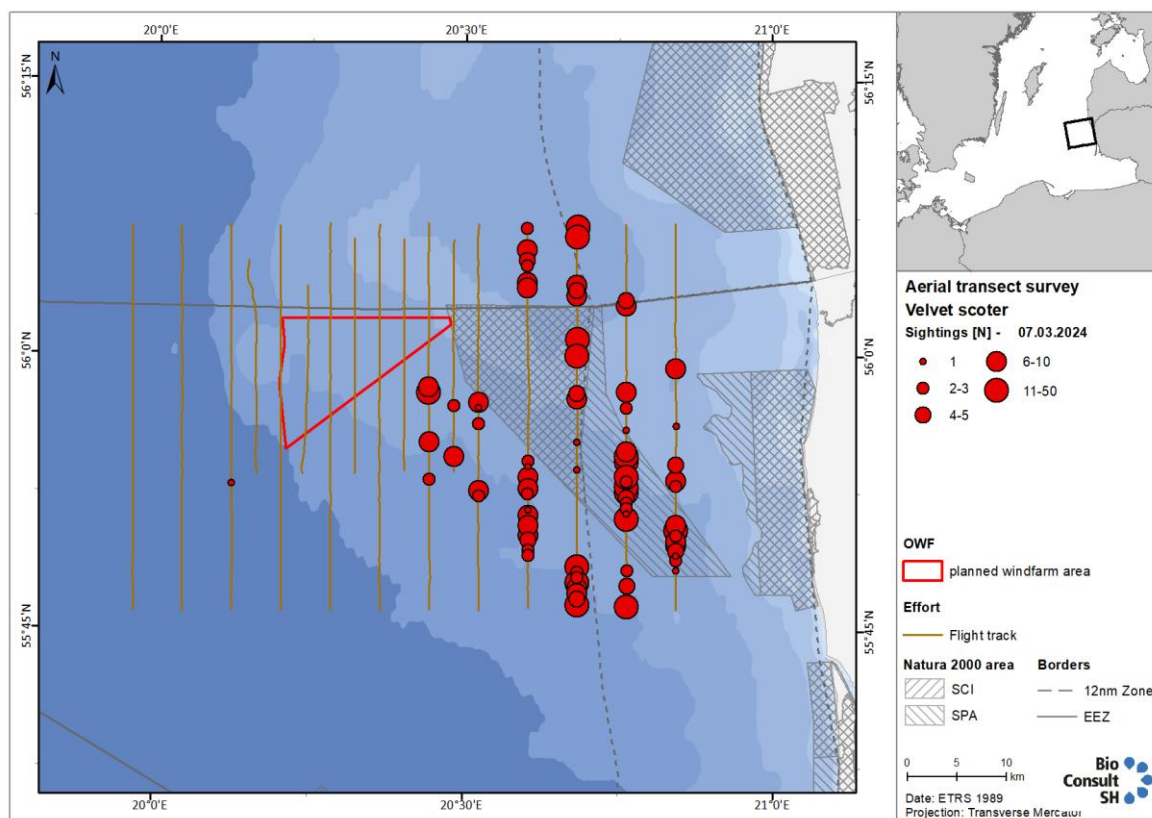


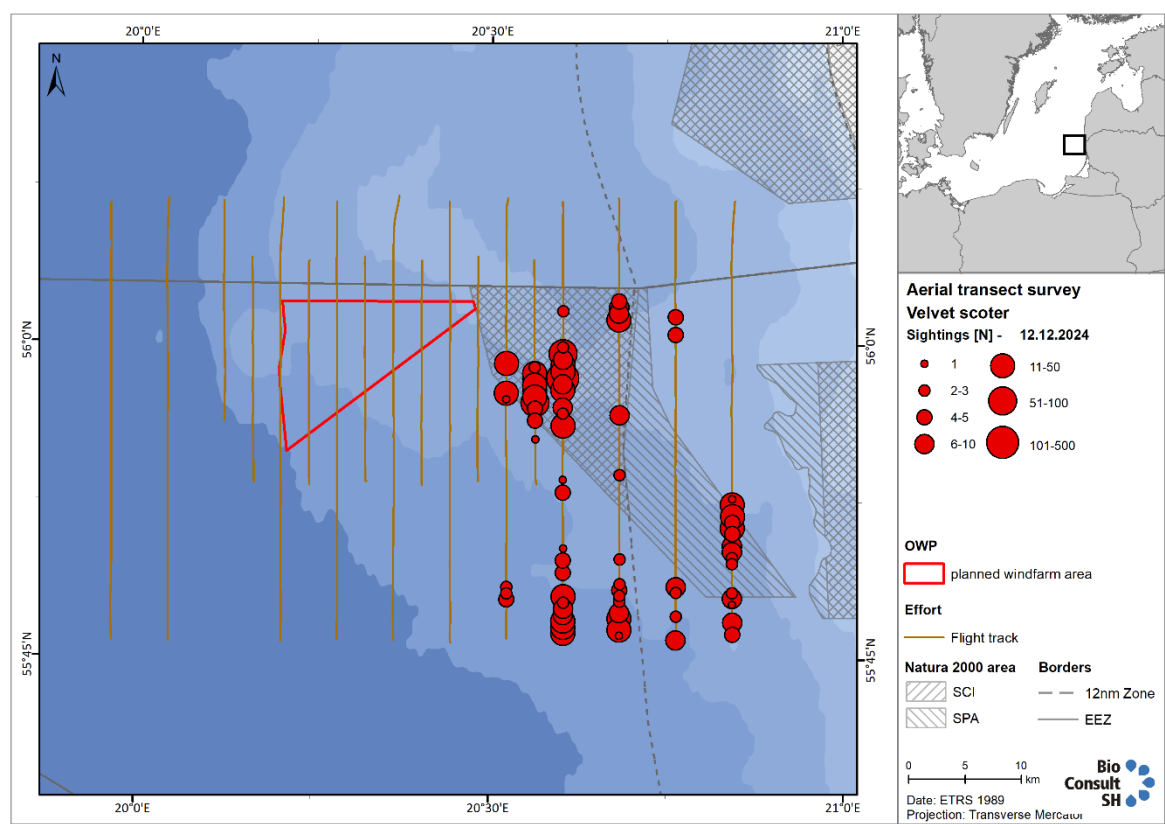
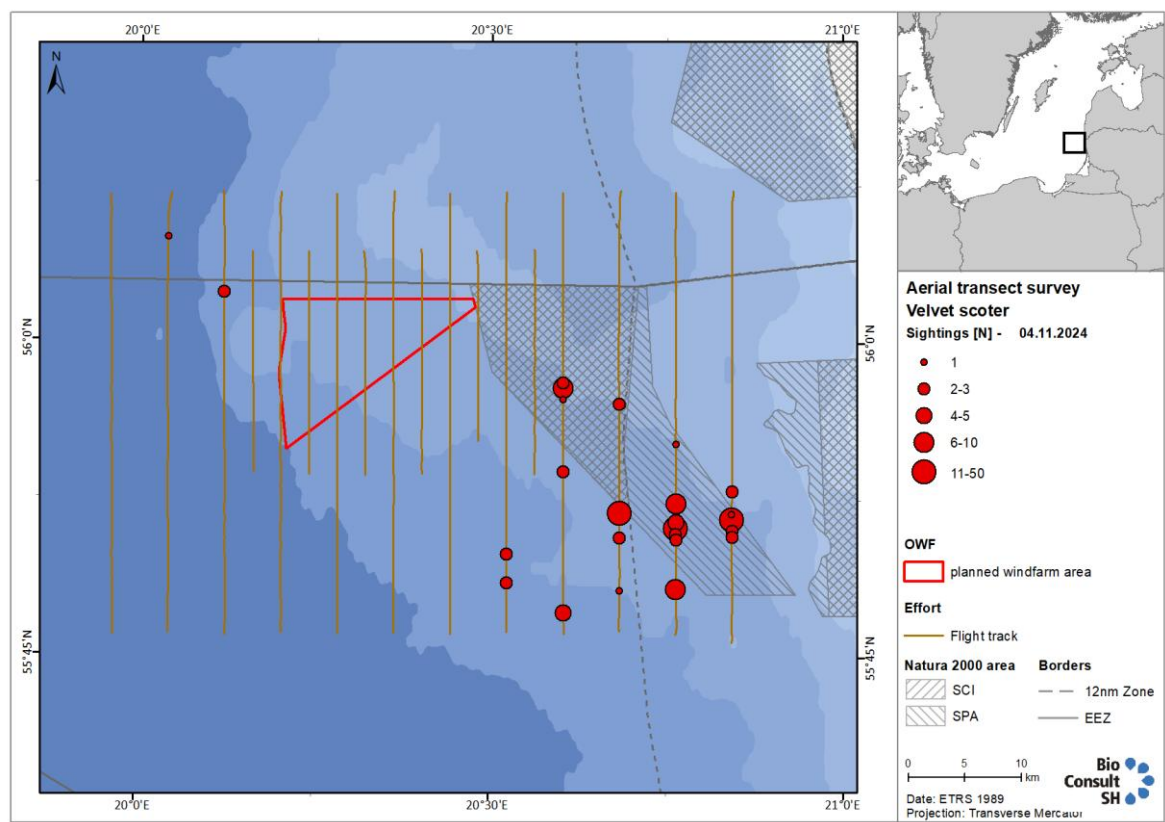


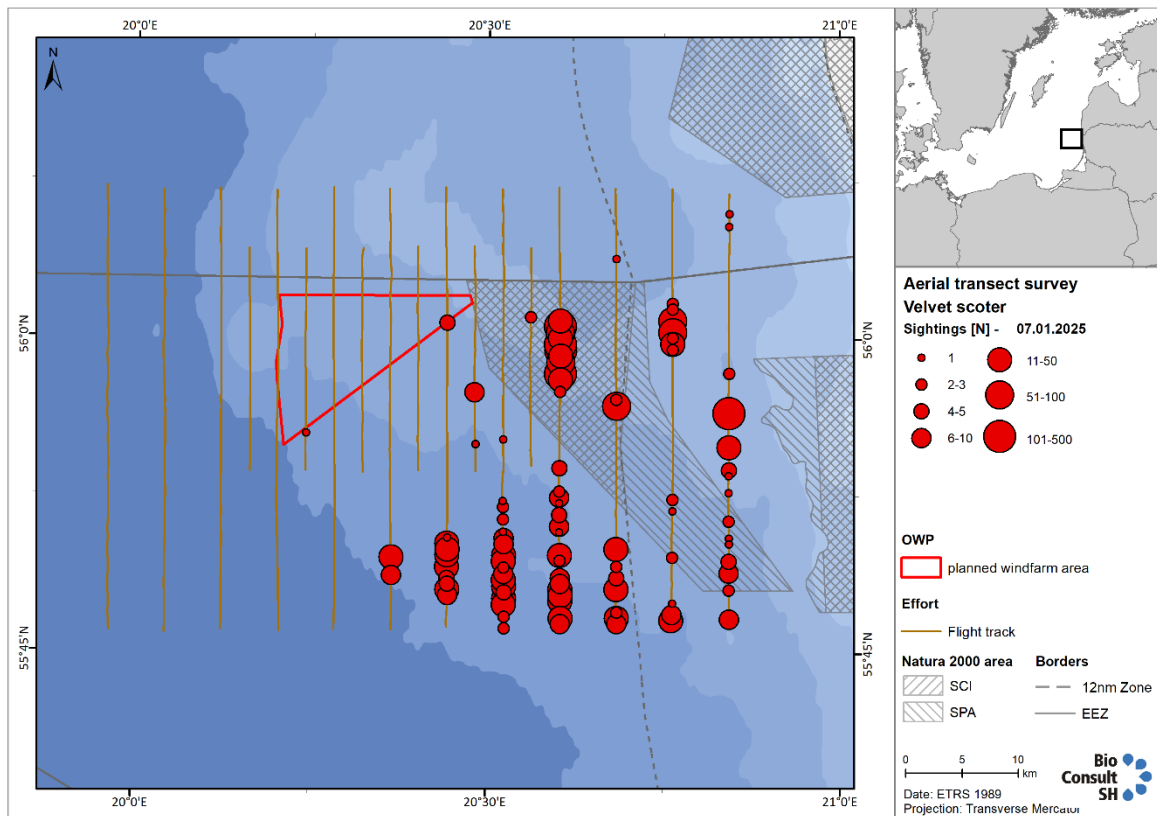
A.2.5 Velvet Scoter (*Melanitta fusca*)



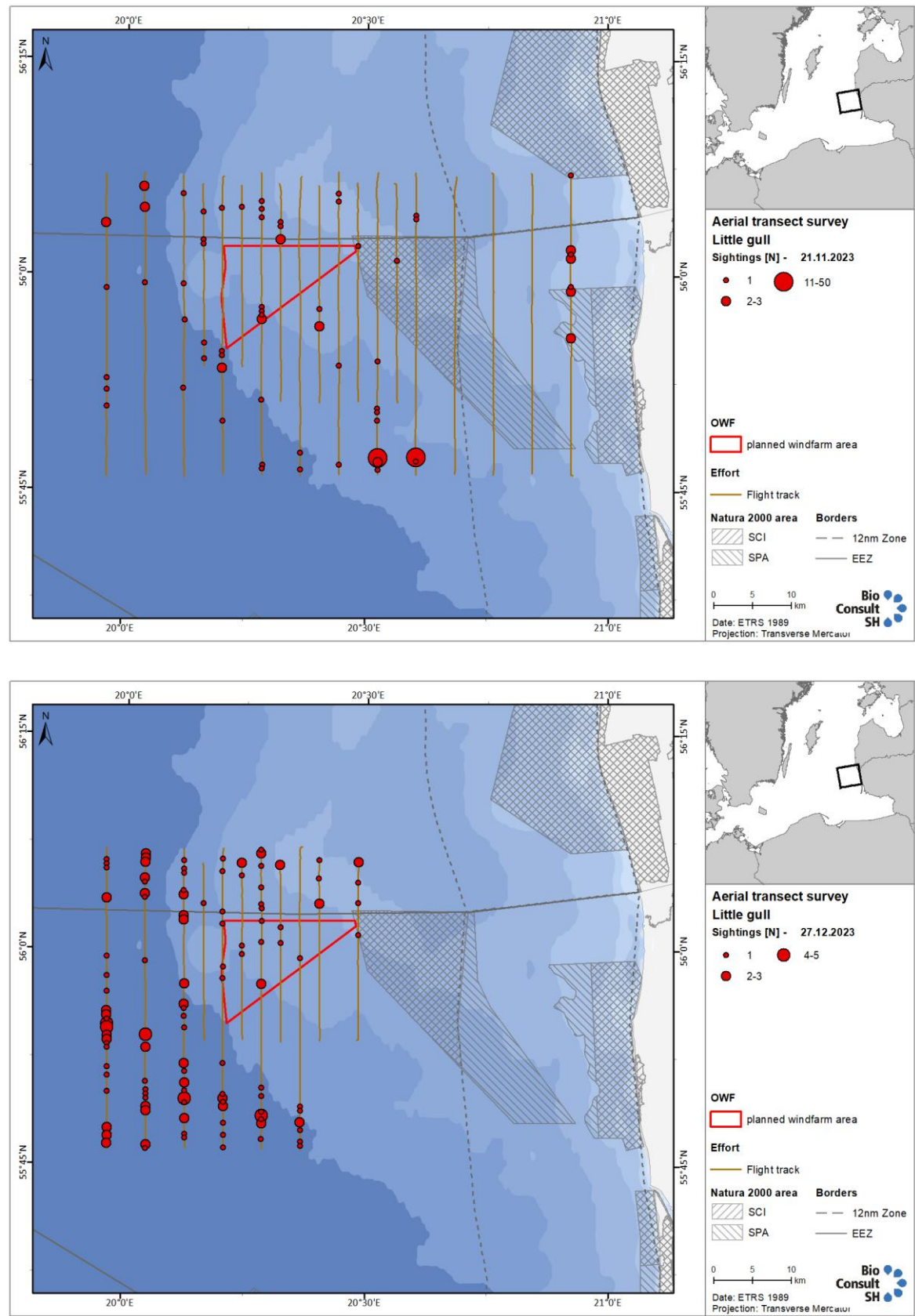


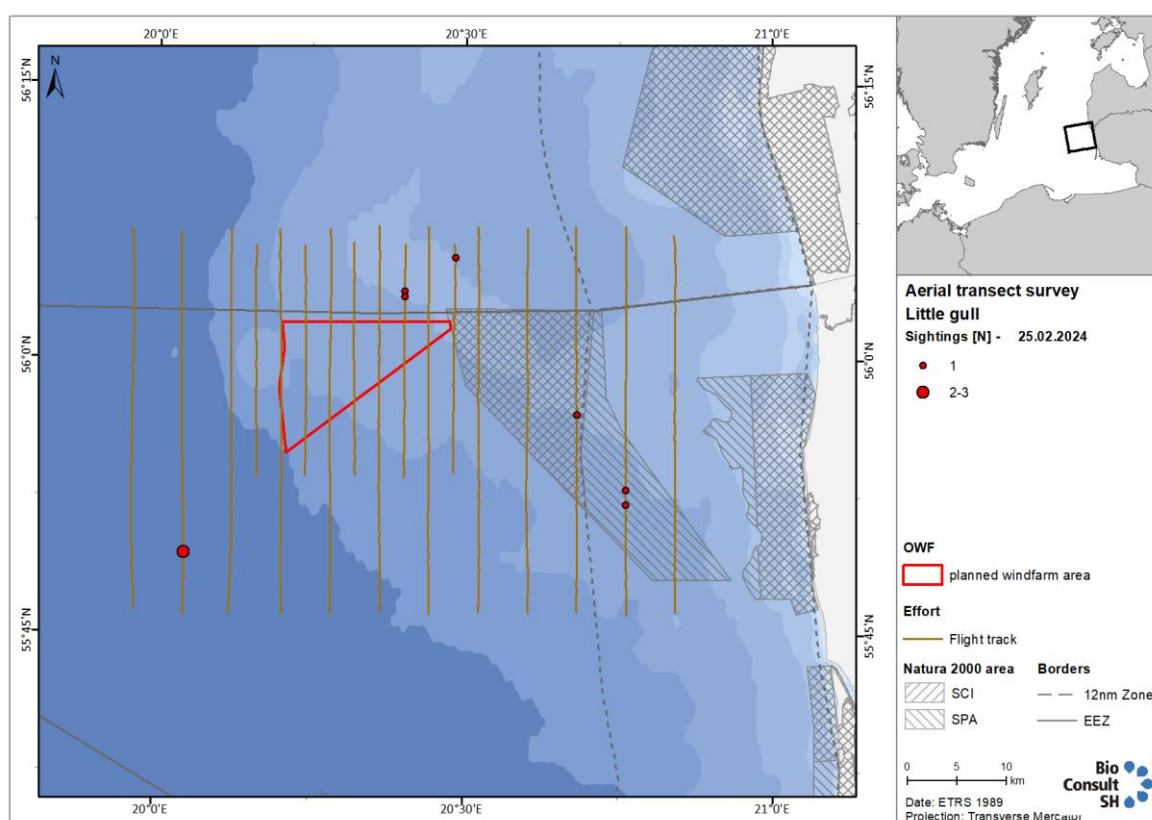
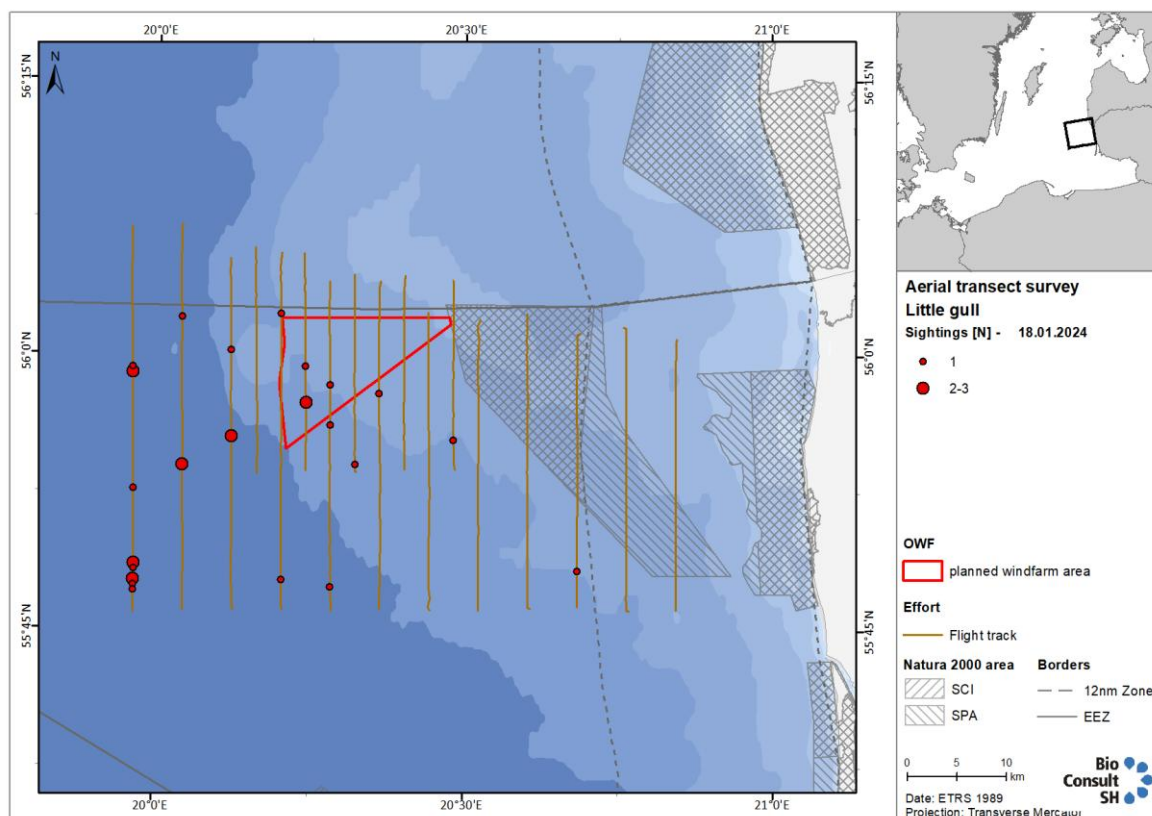


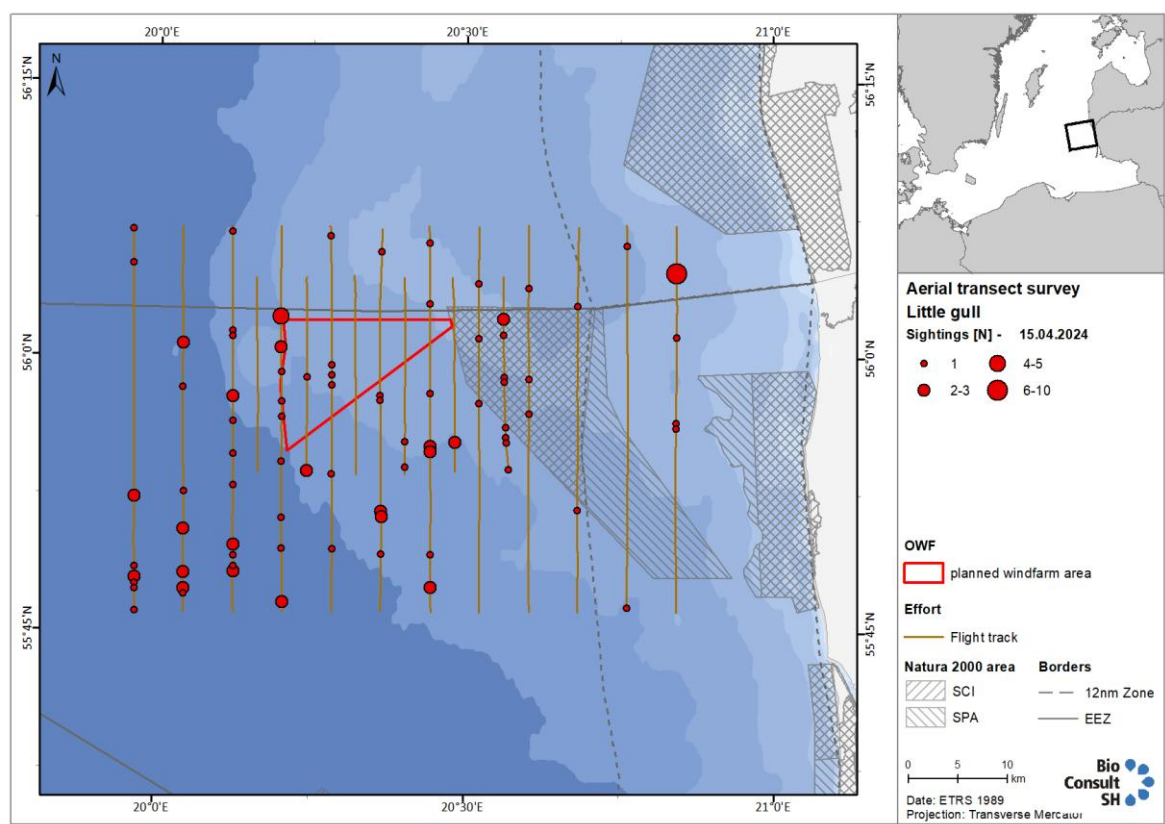
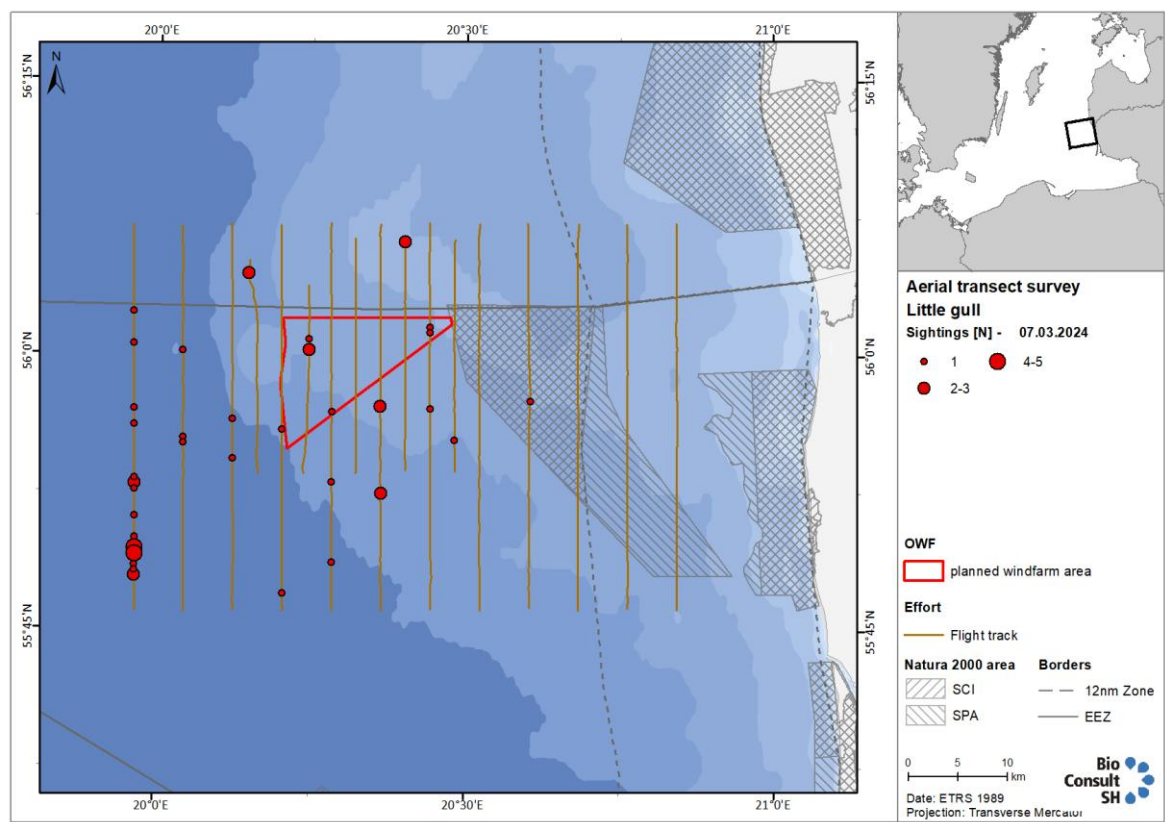


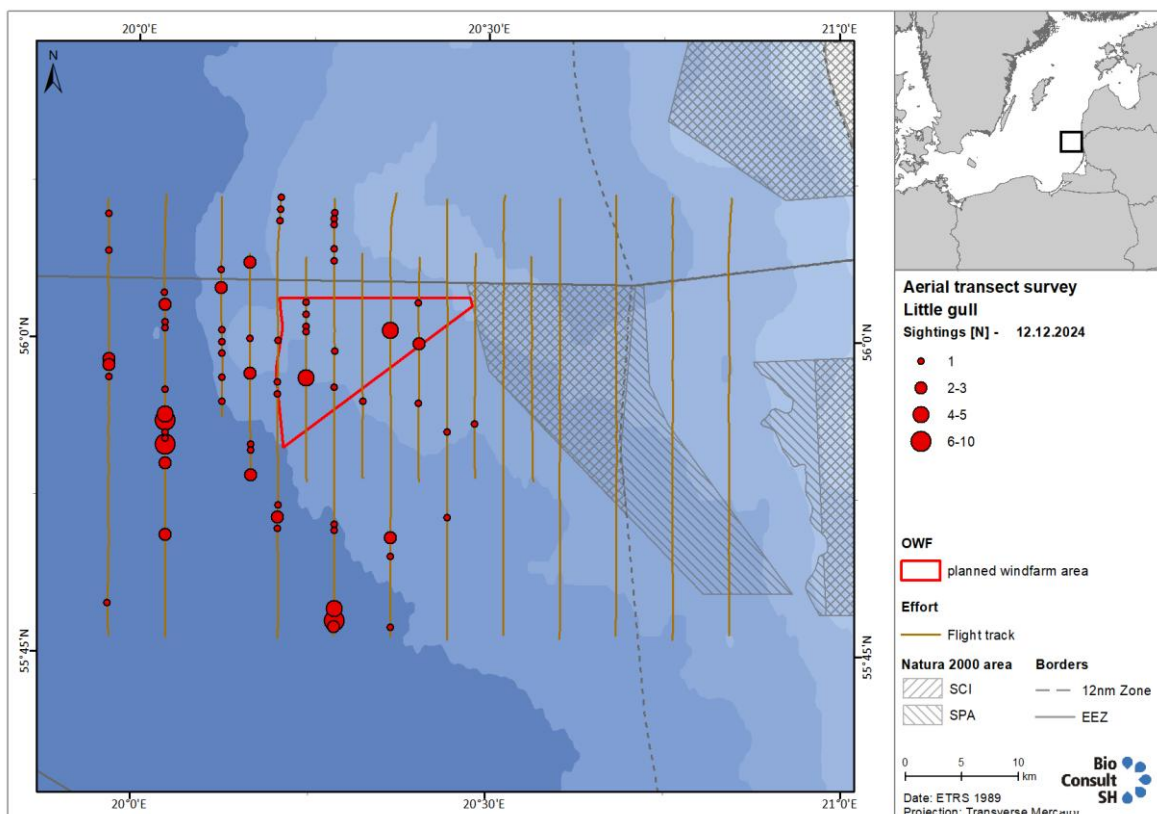
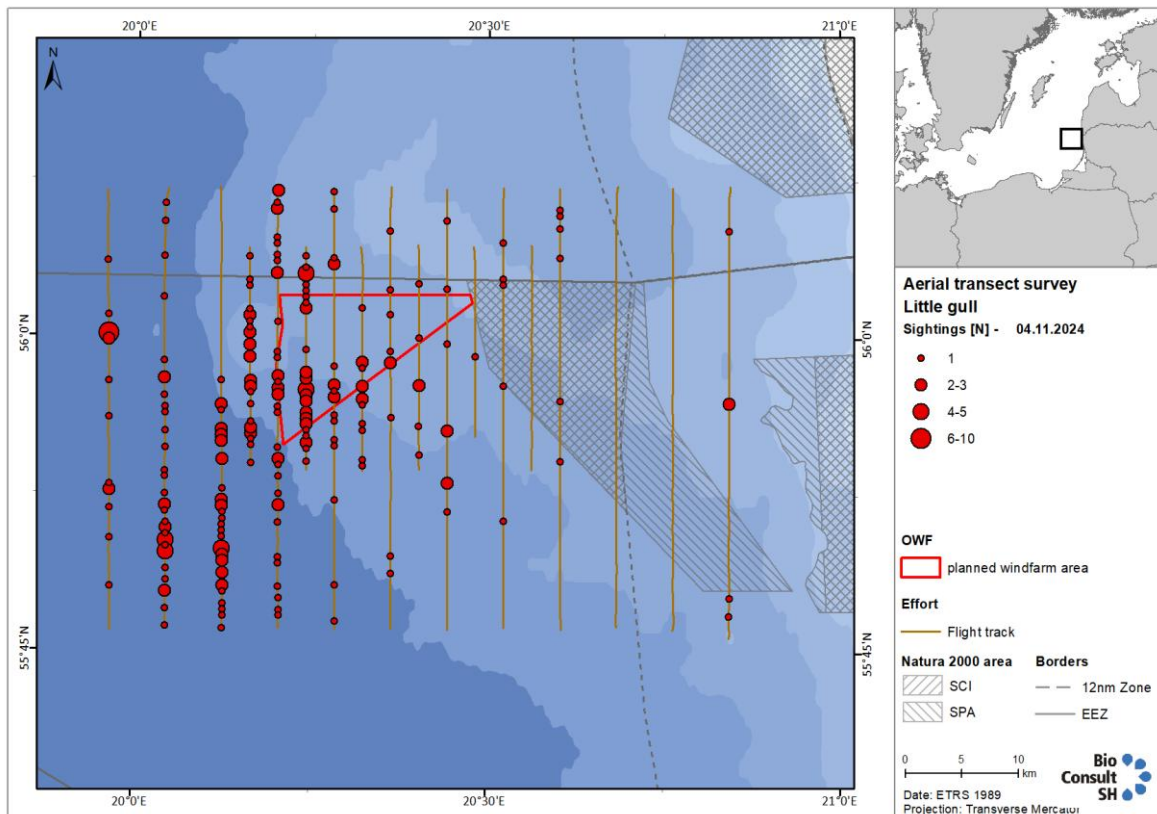


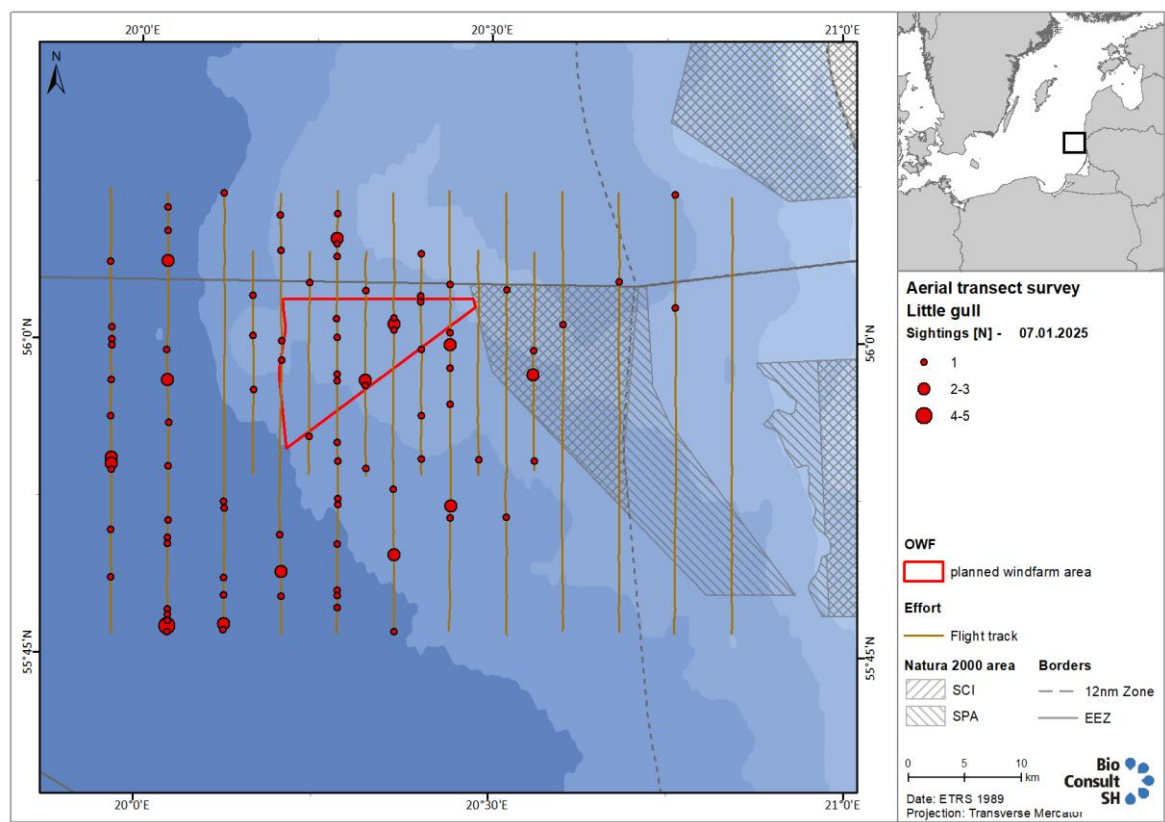
A.2.6 Little Gull (*Hydrocoloeus minutus*)



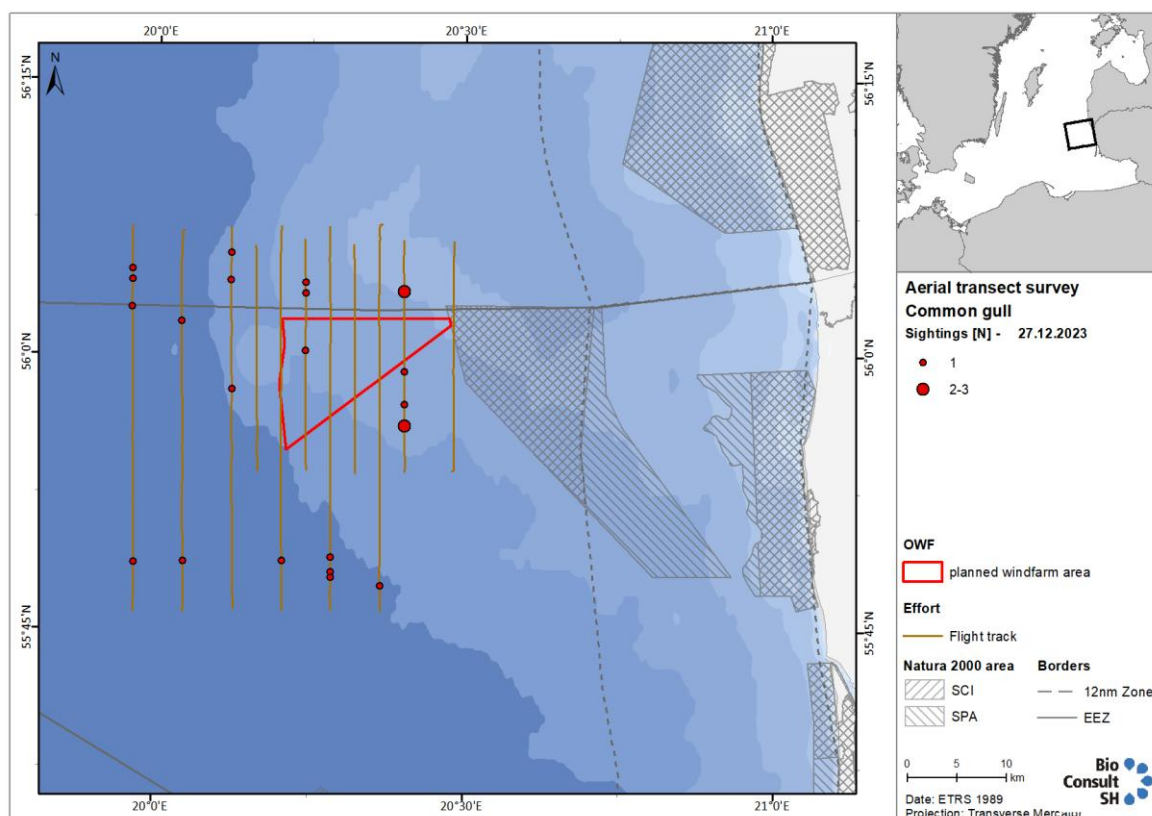
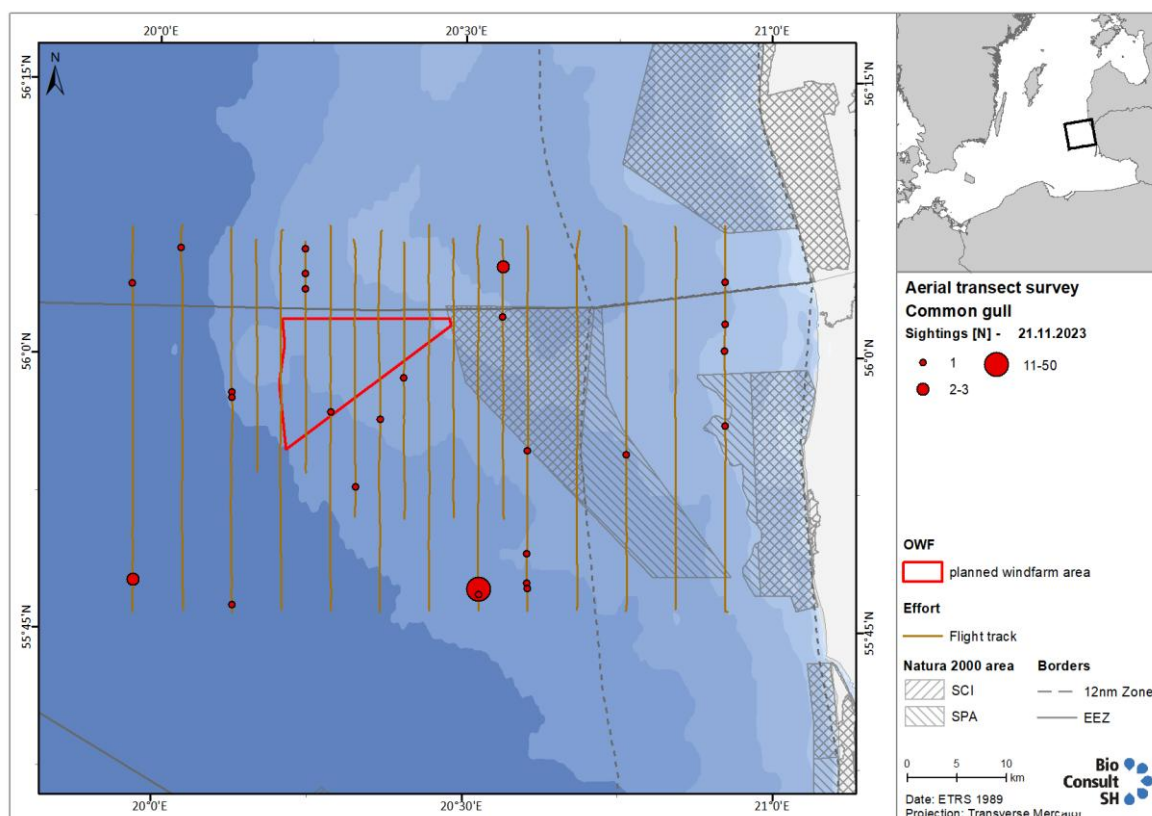


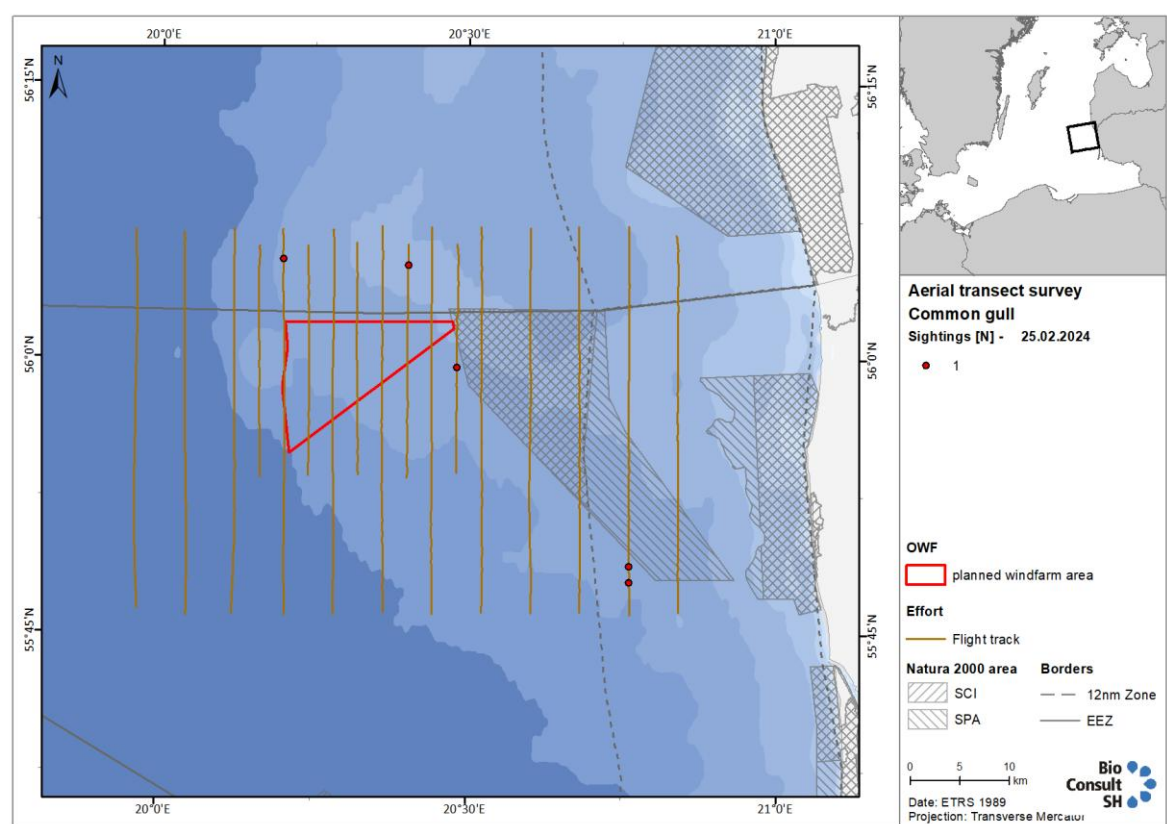
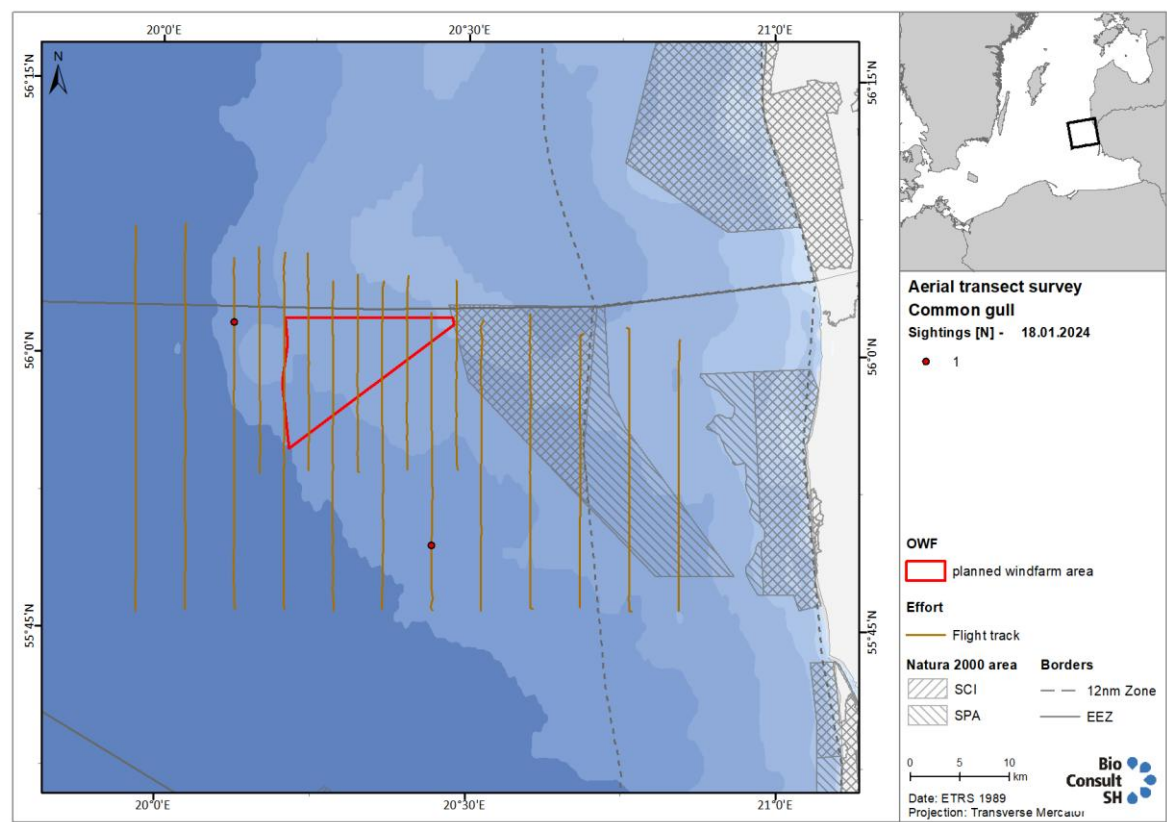


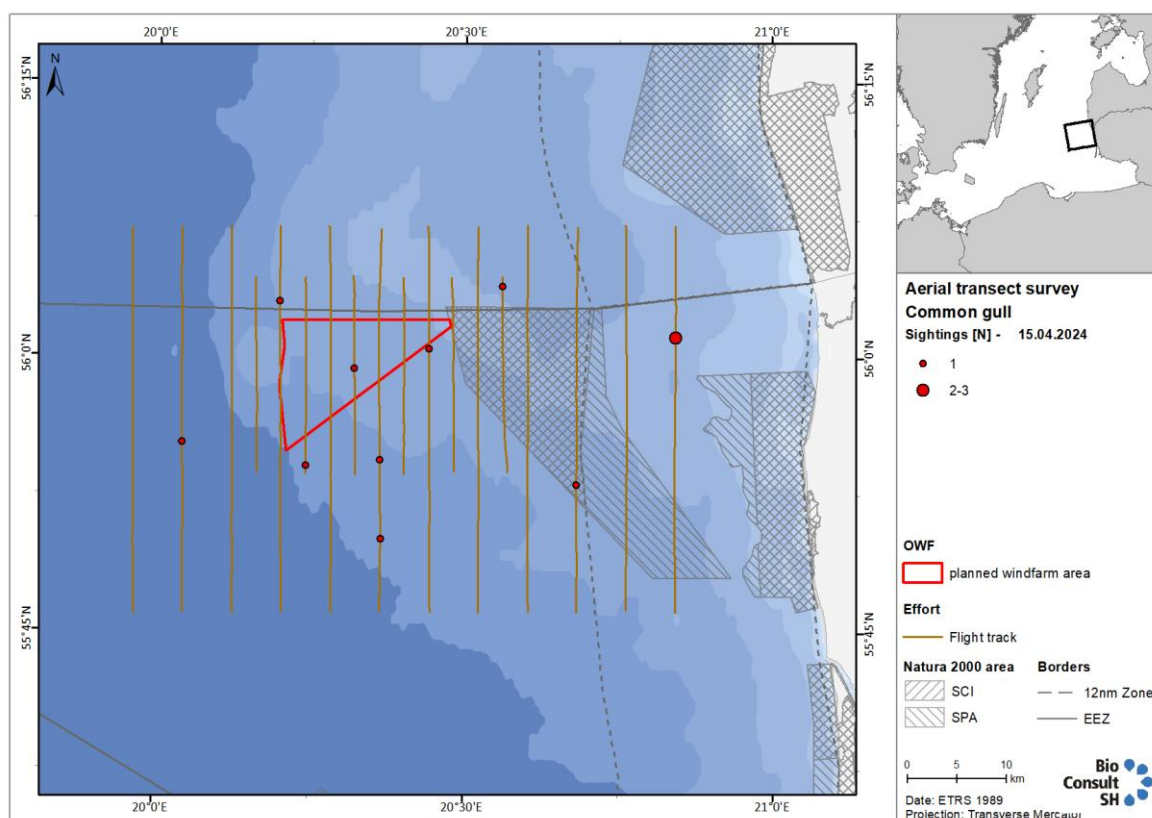
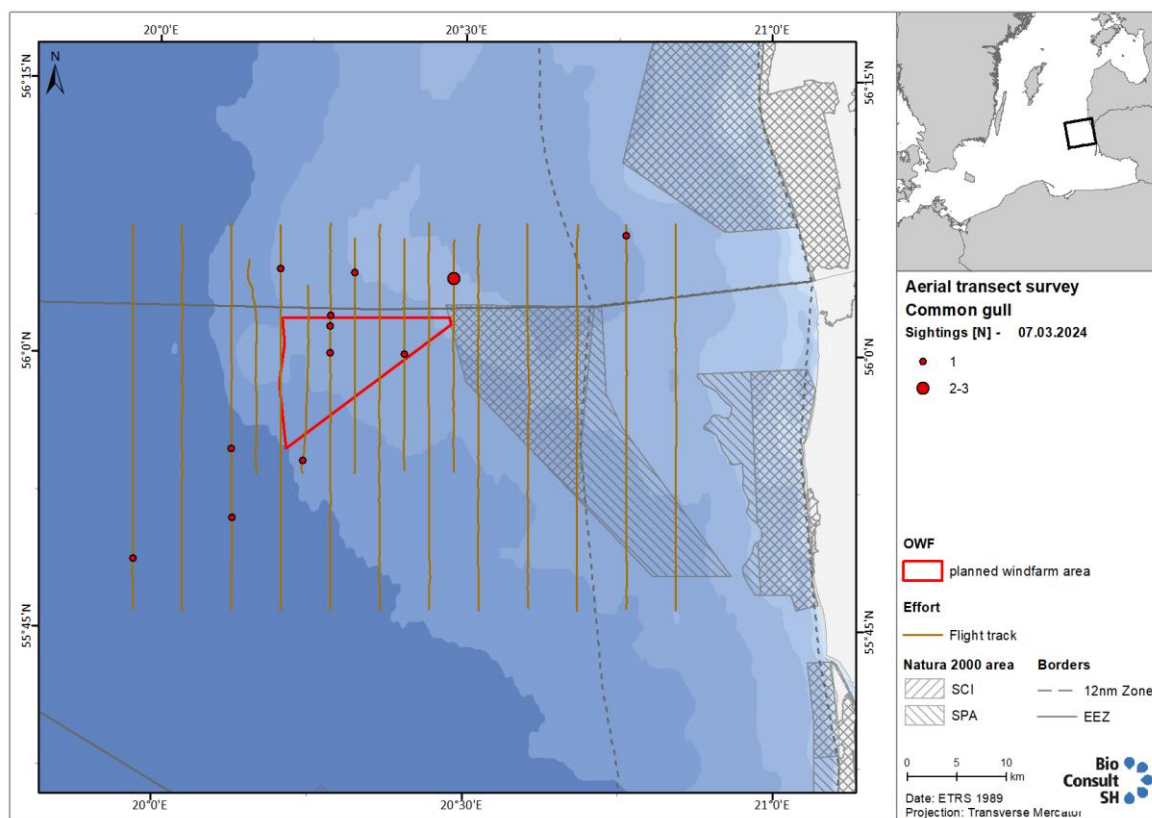


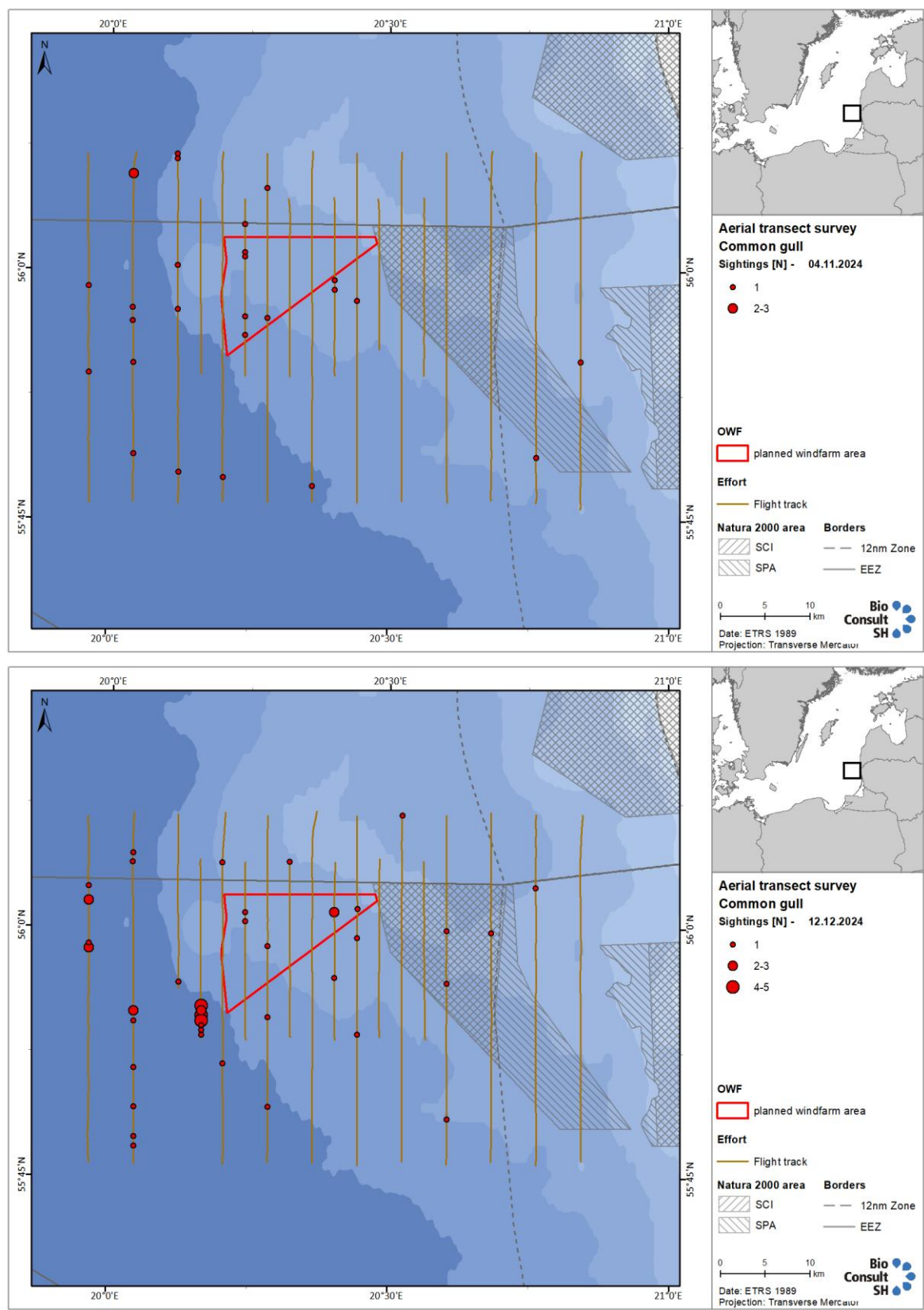


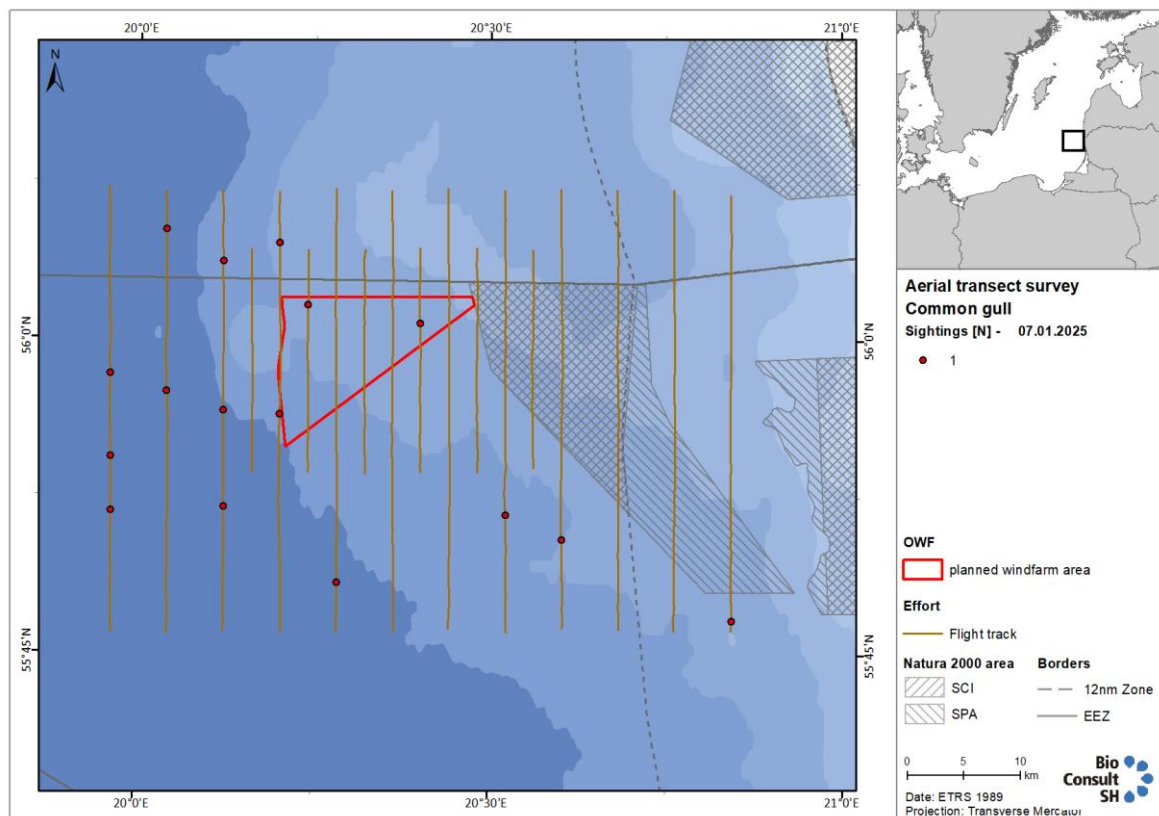
A.2.7 Common Gull (*Larus canus*)



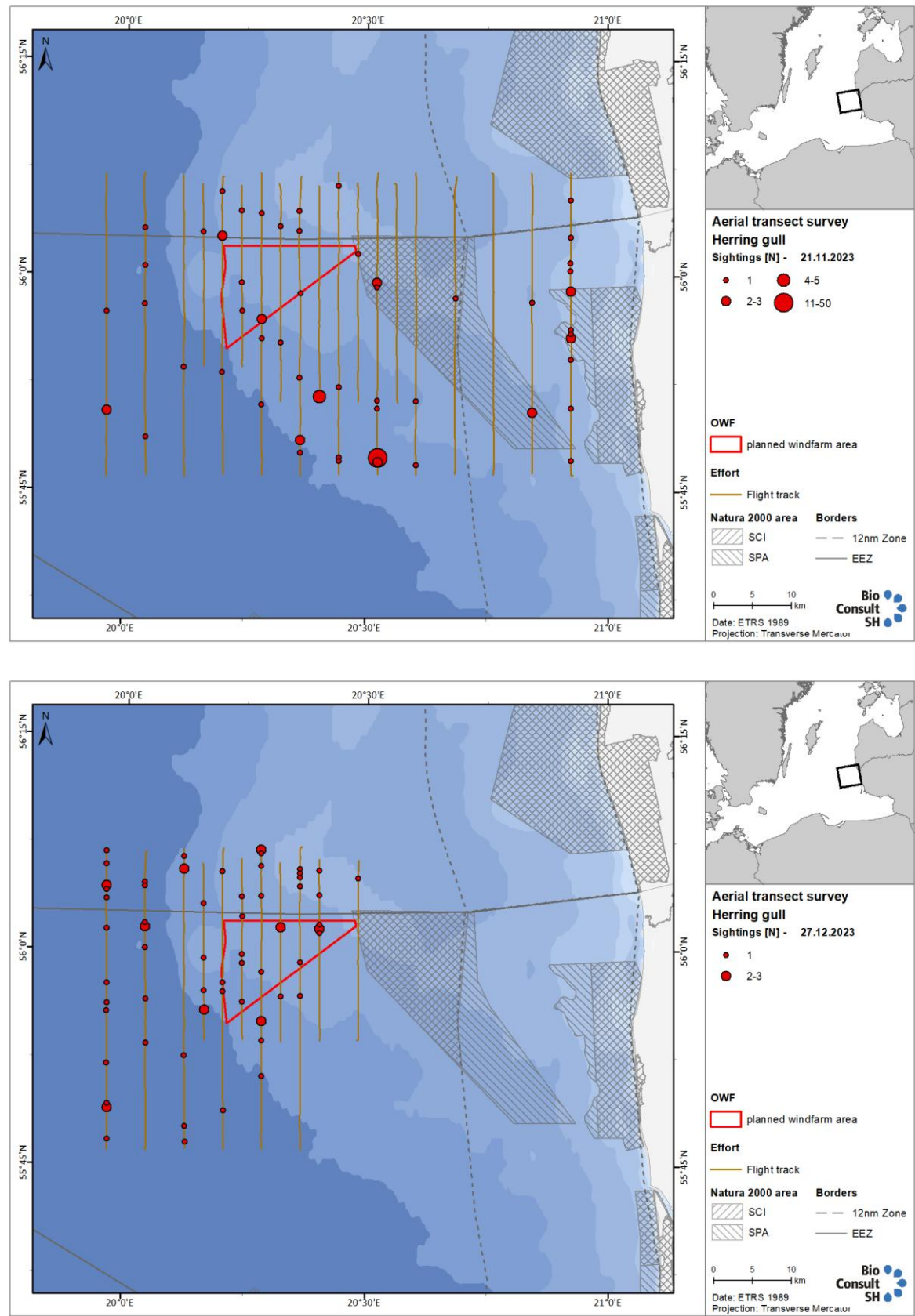


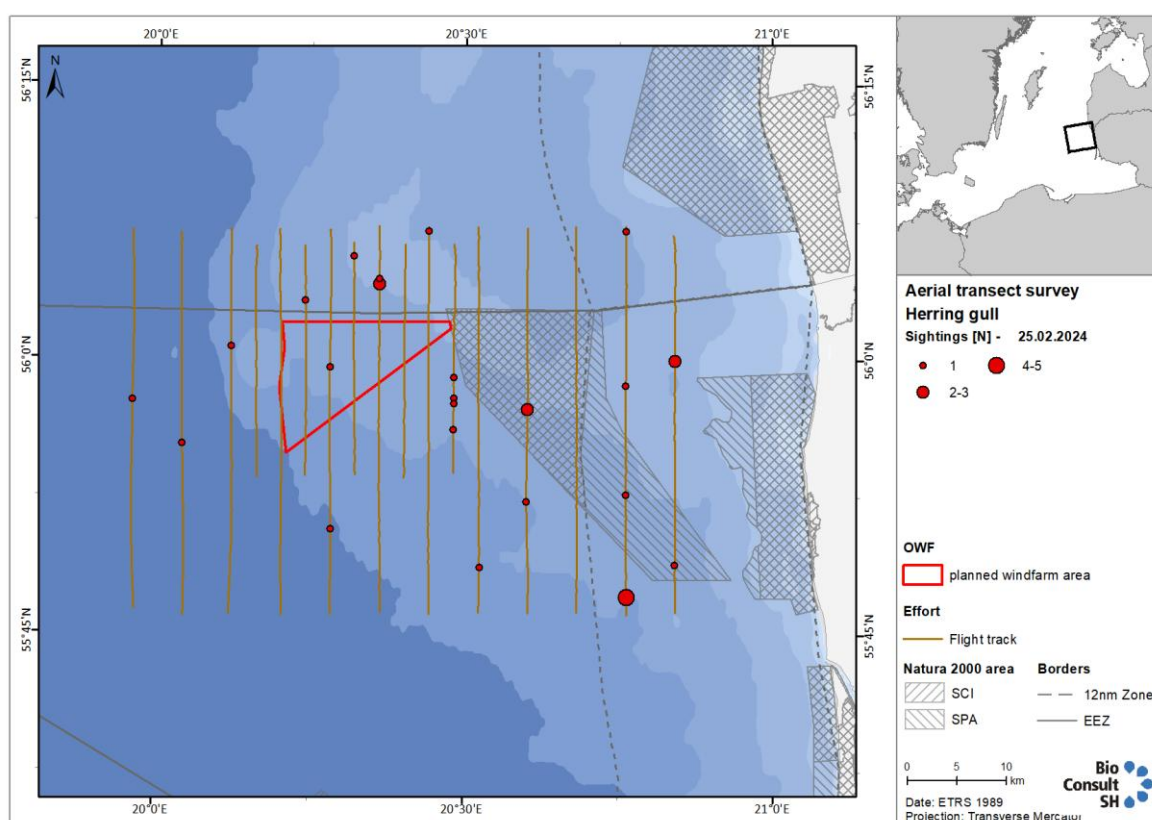
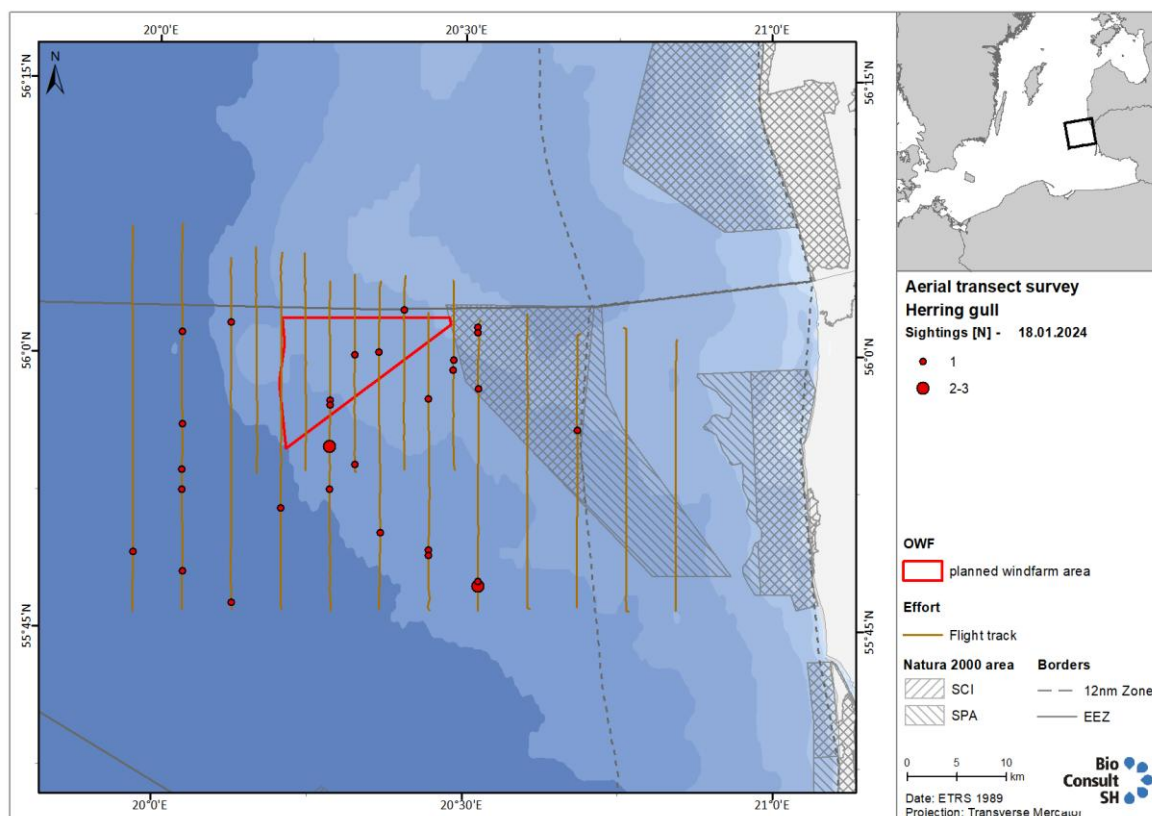


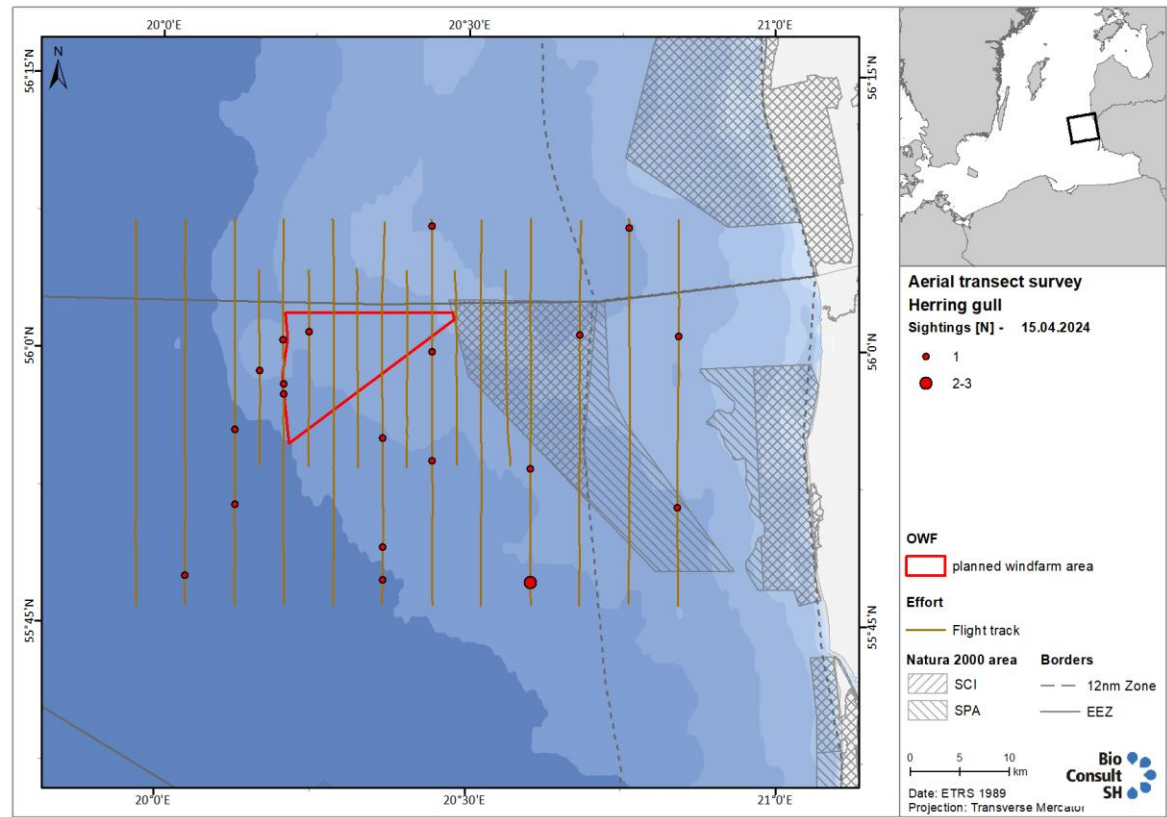
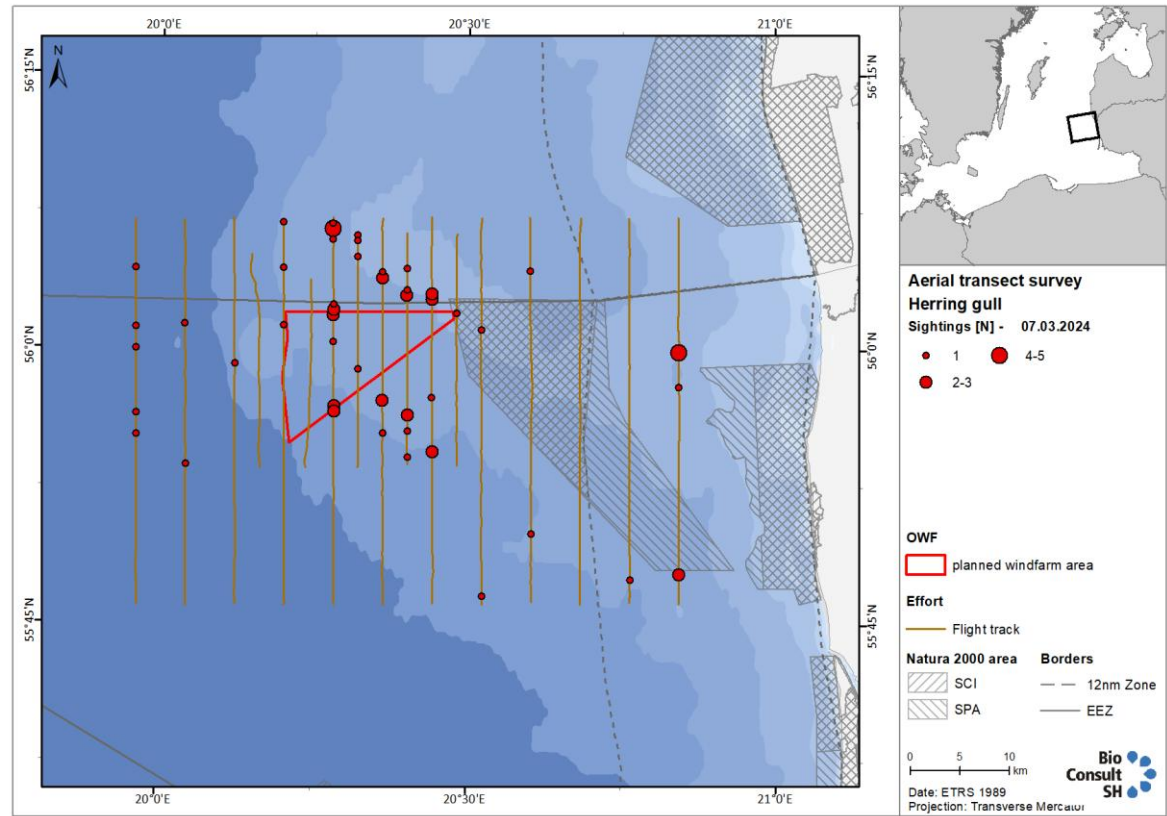


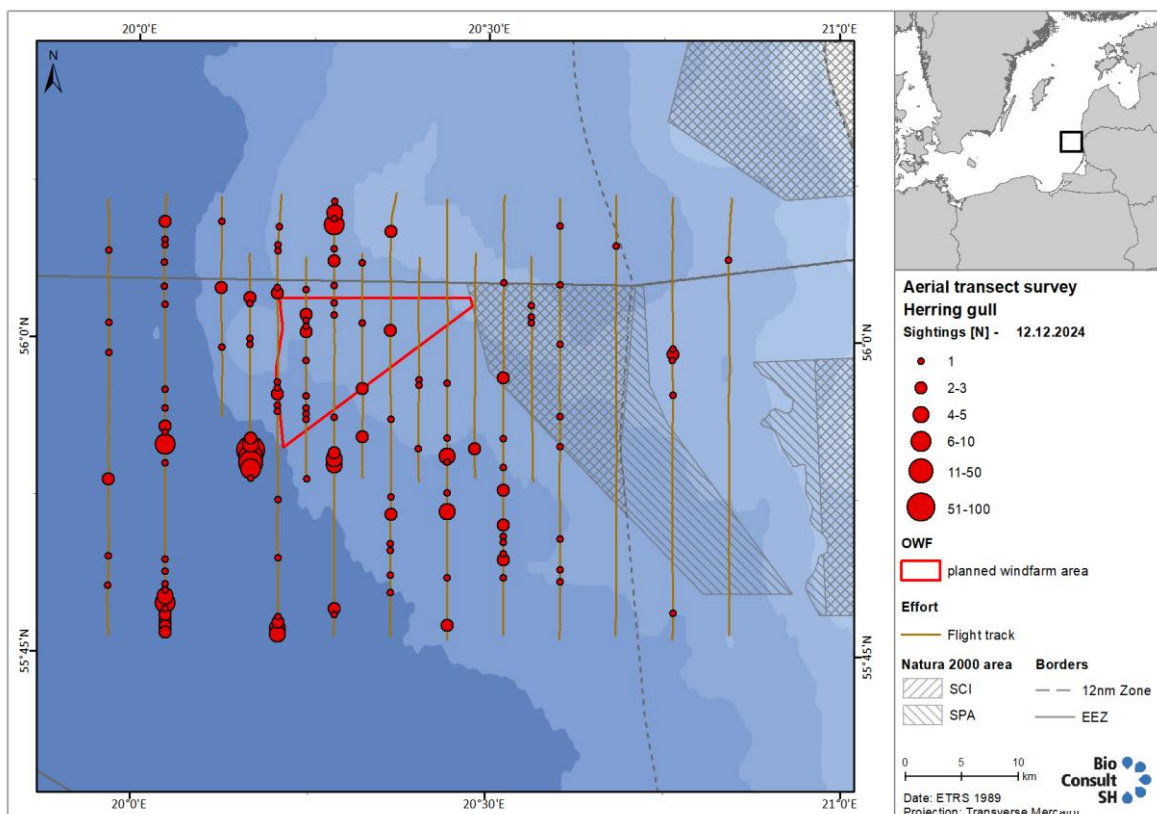
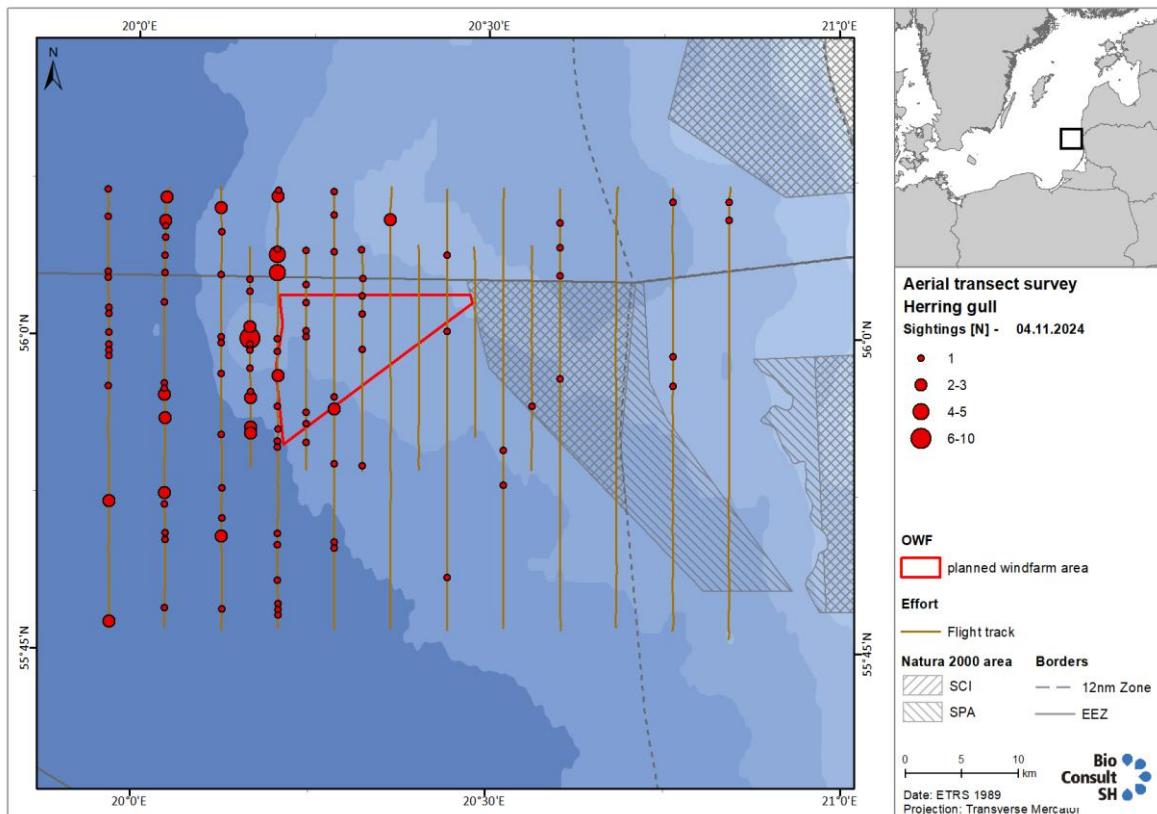


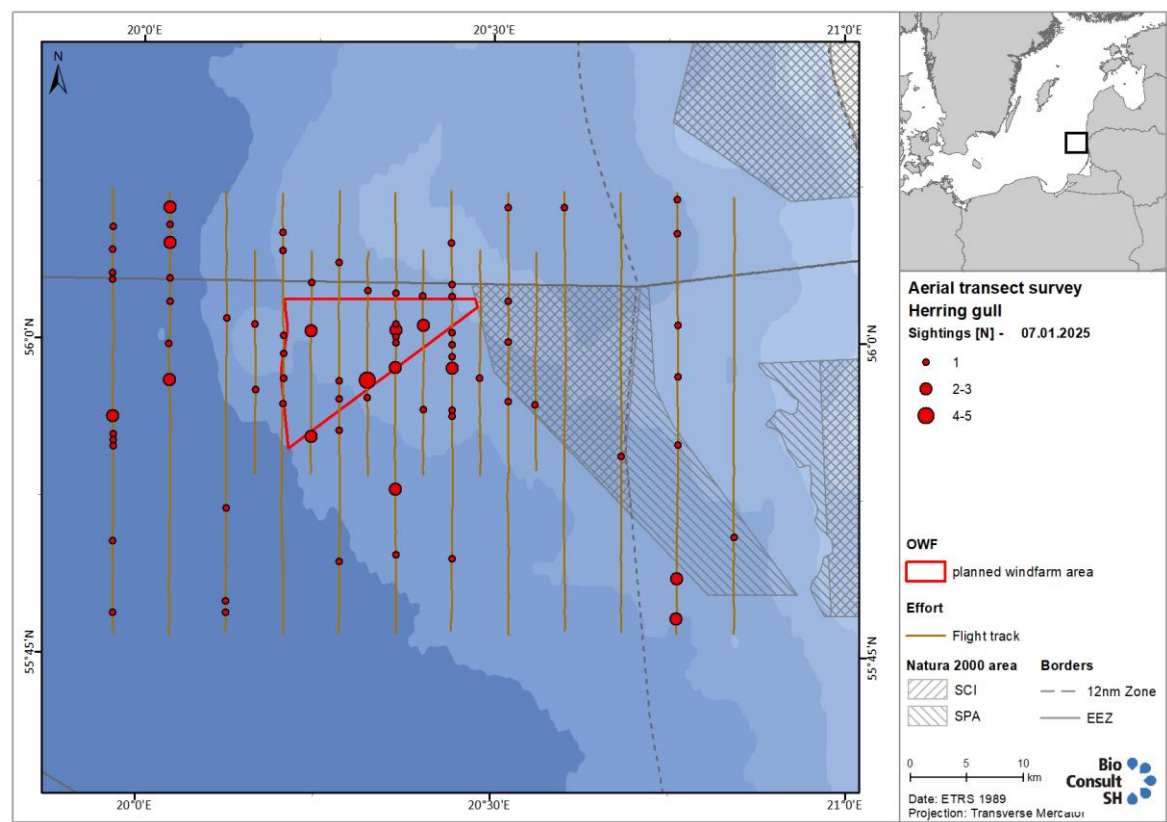
A.2.8 Herring Gull (*Larus argentatus*)



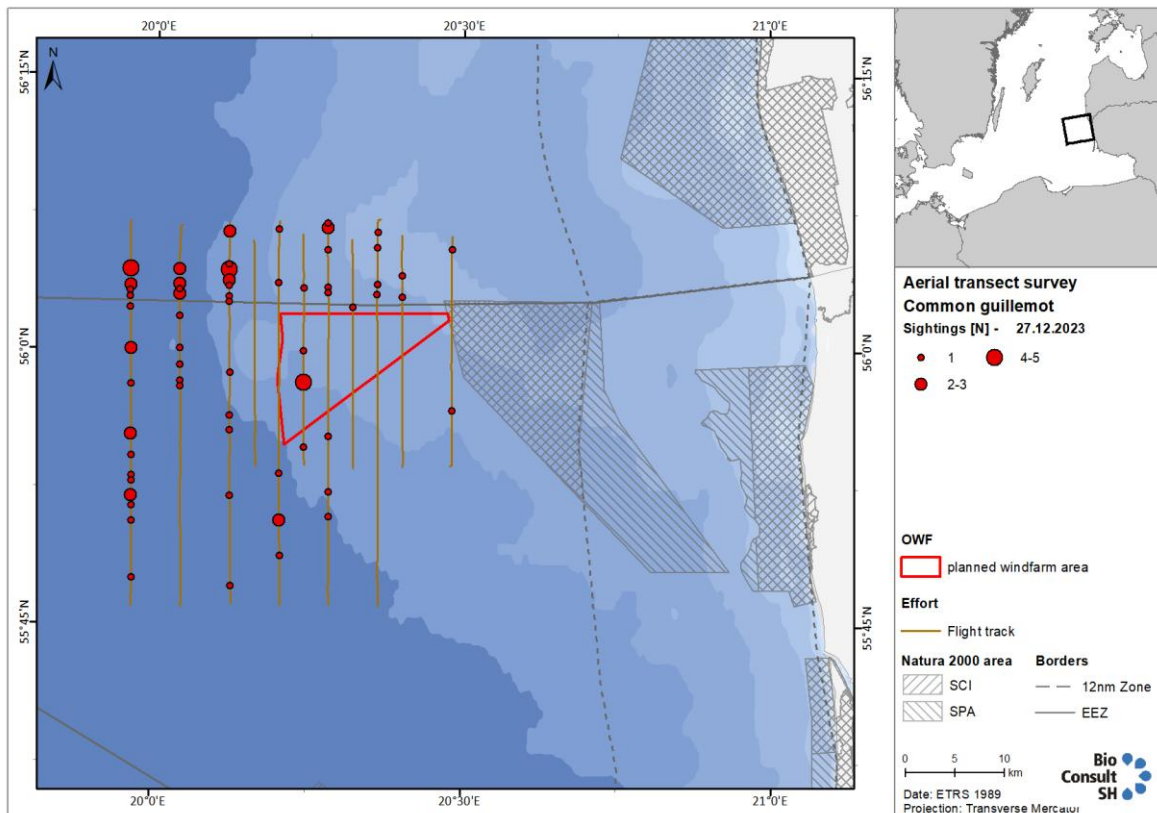
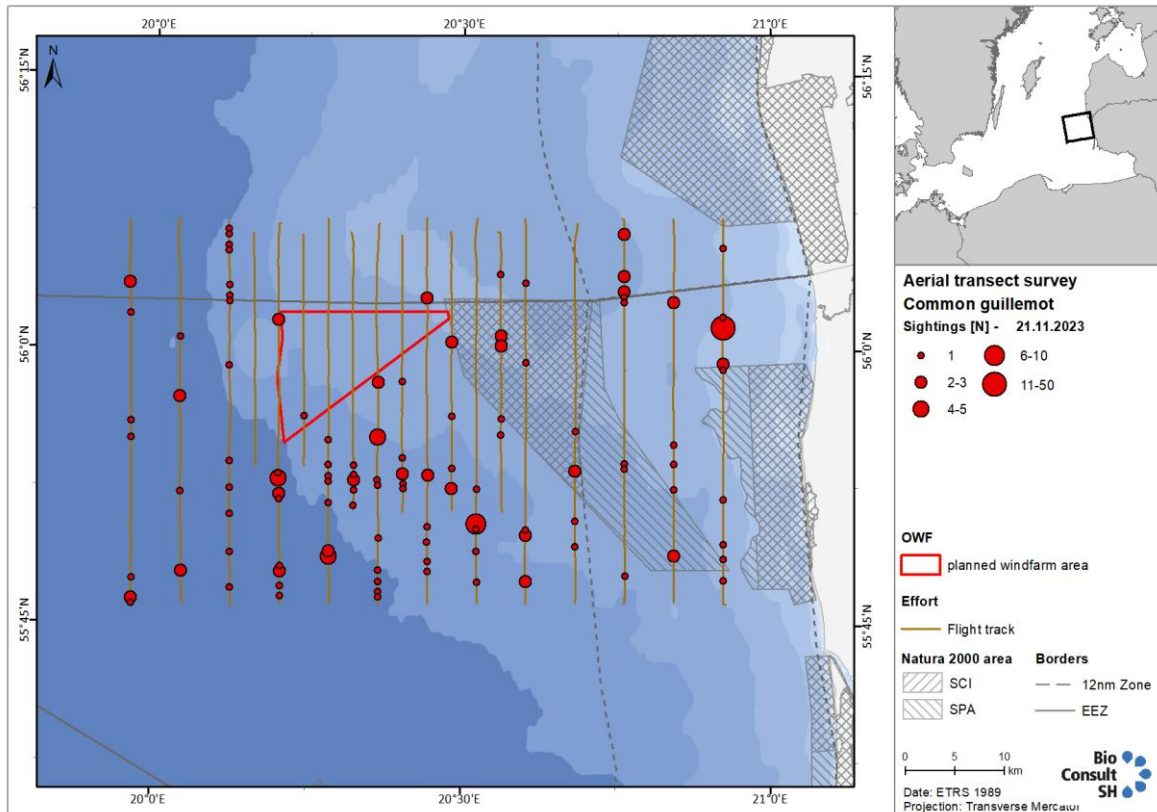


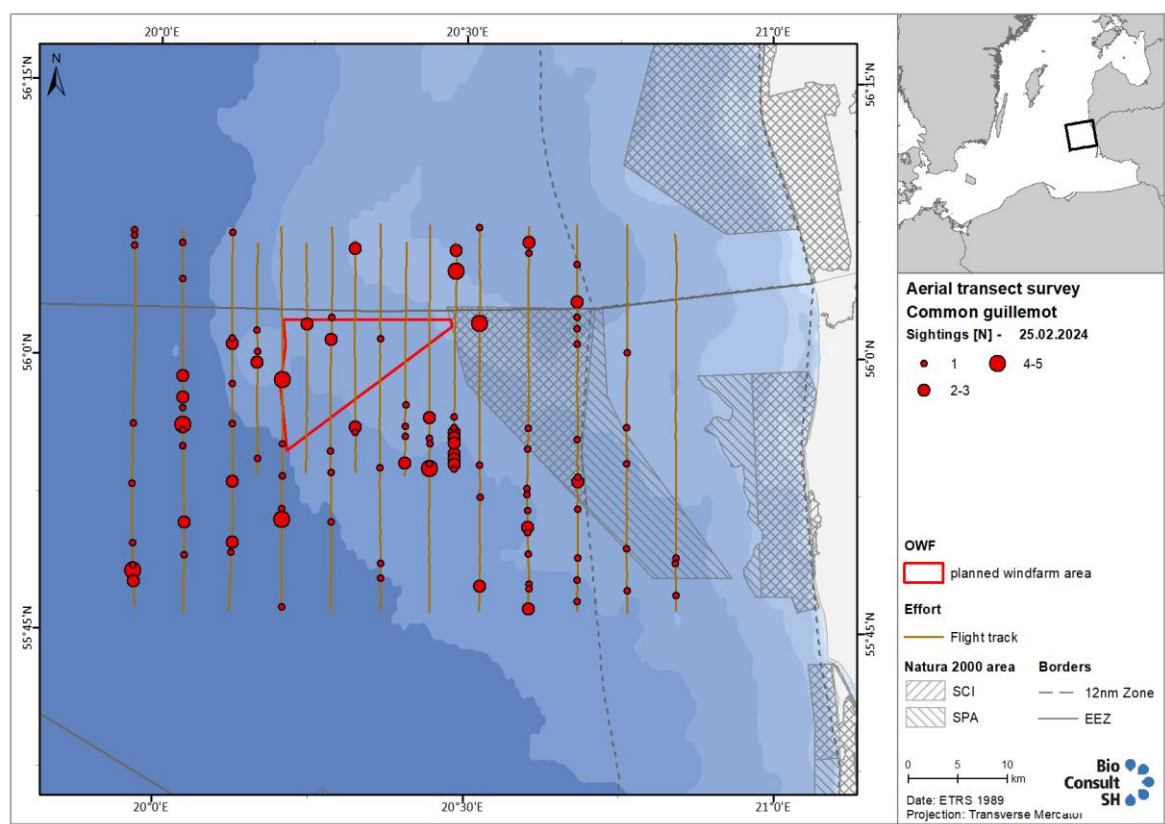
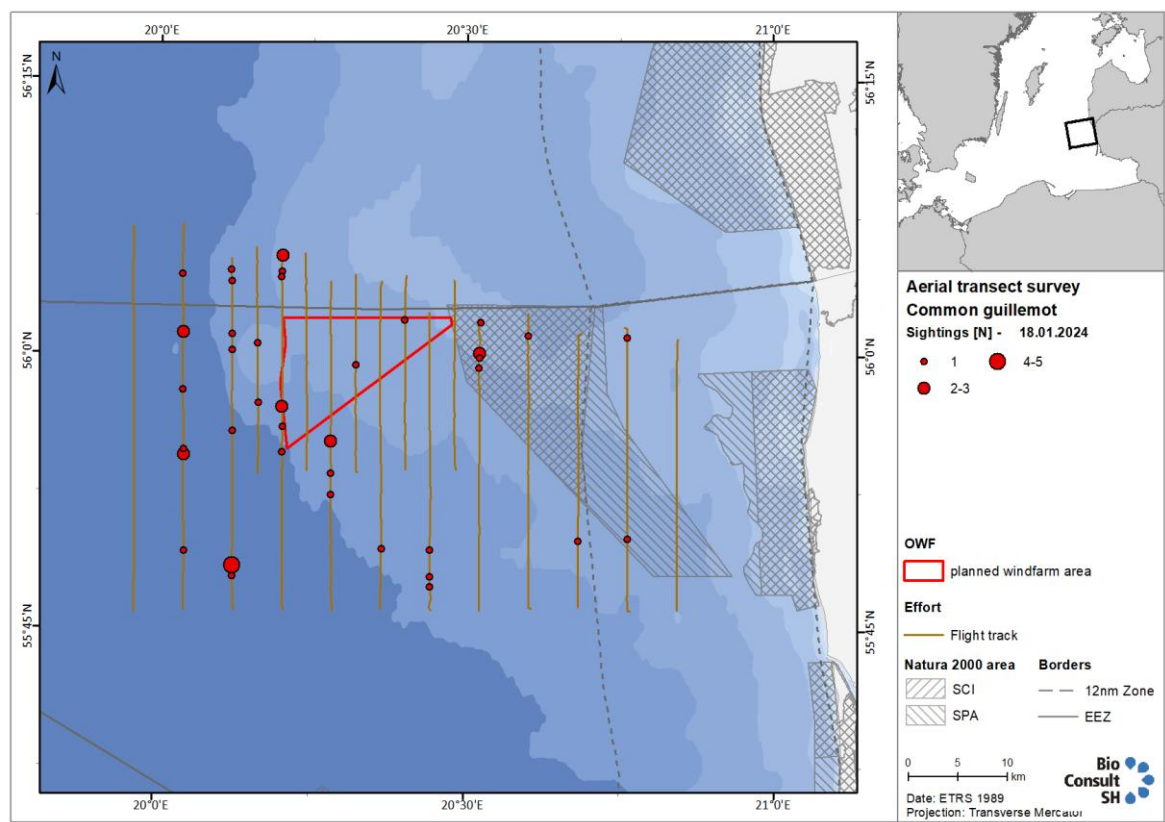


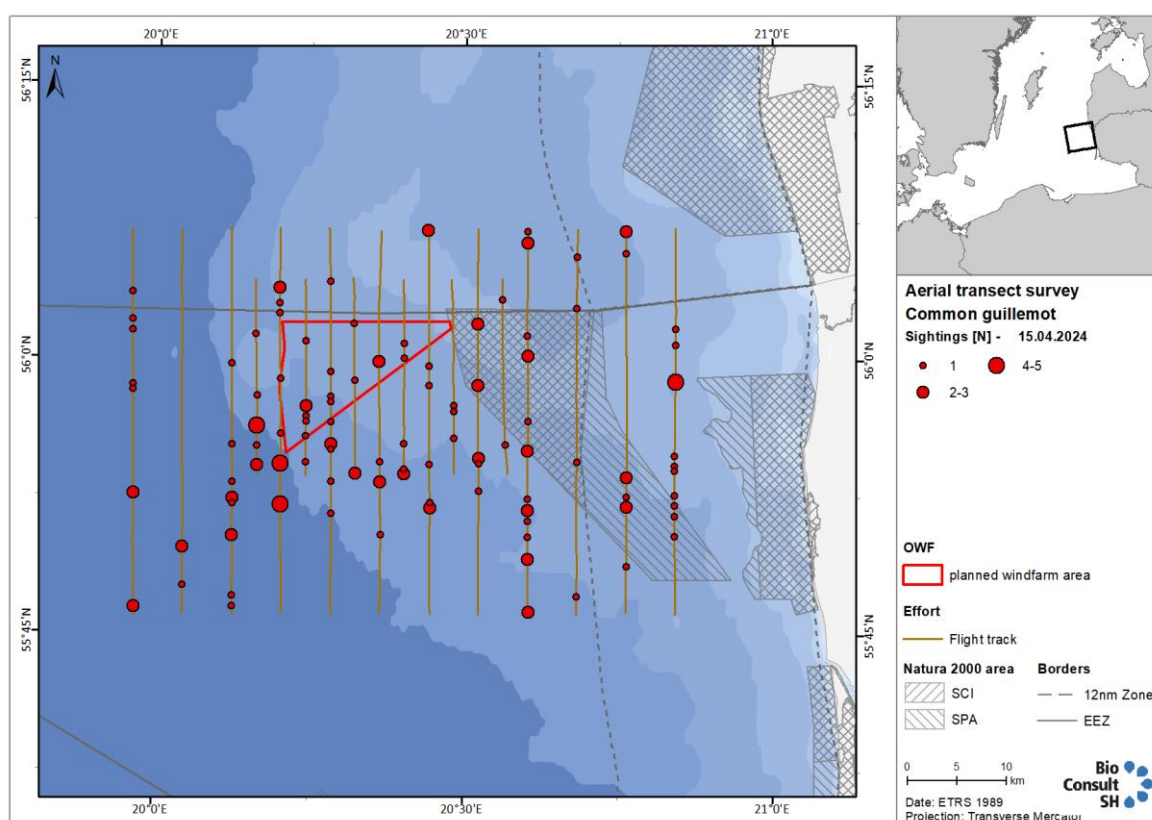
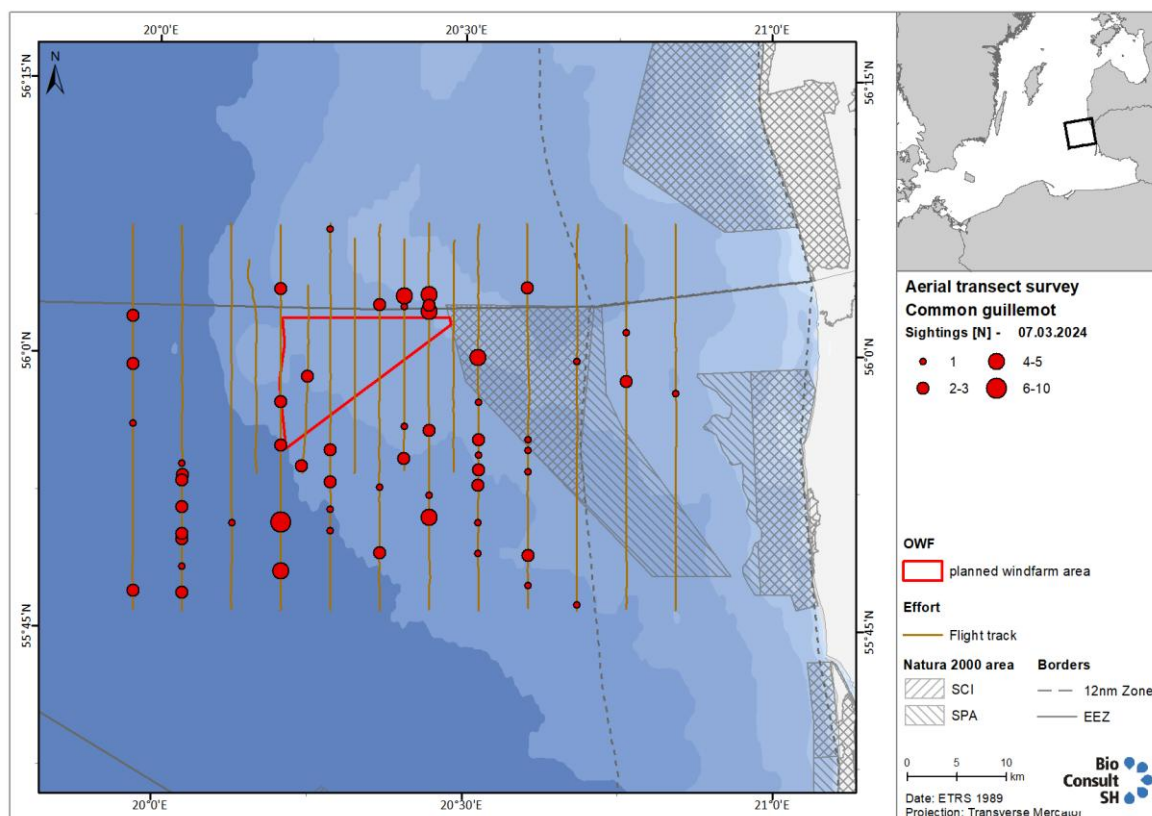


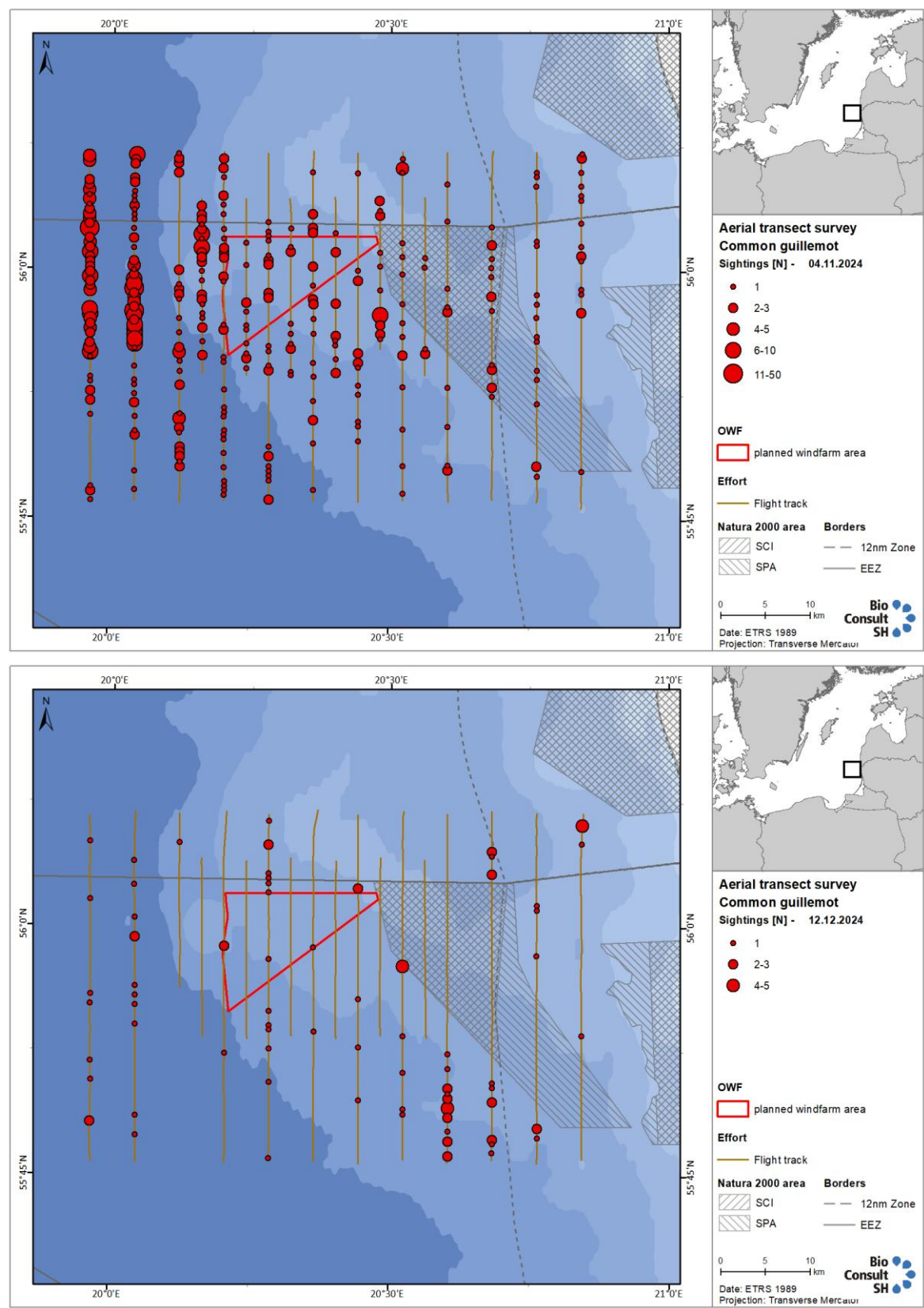


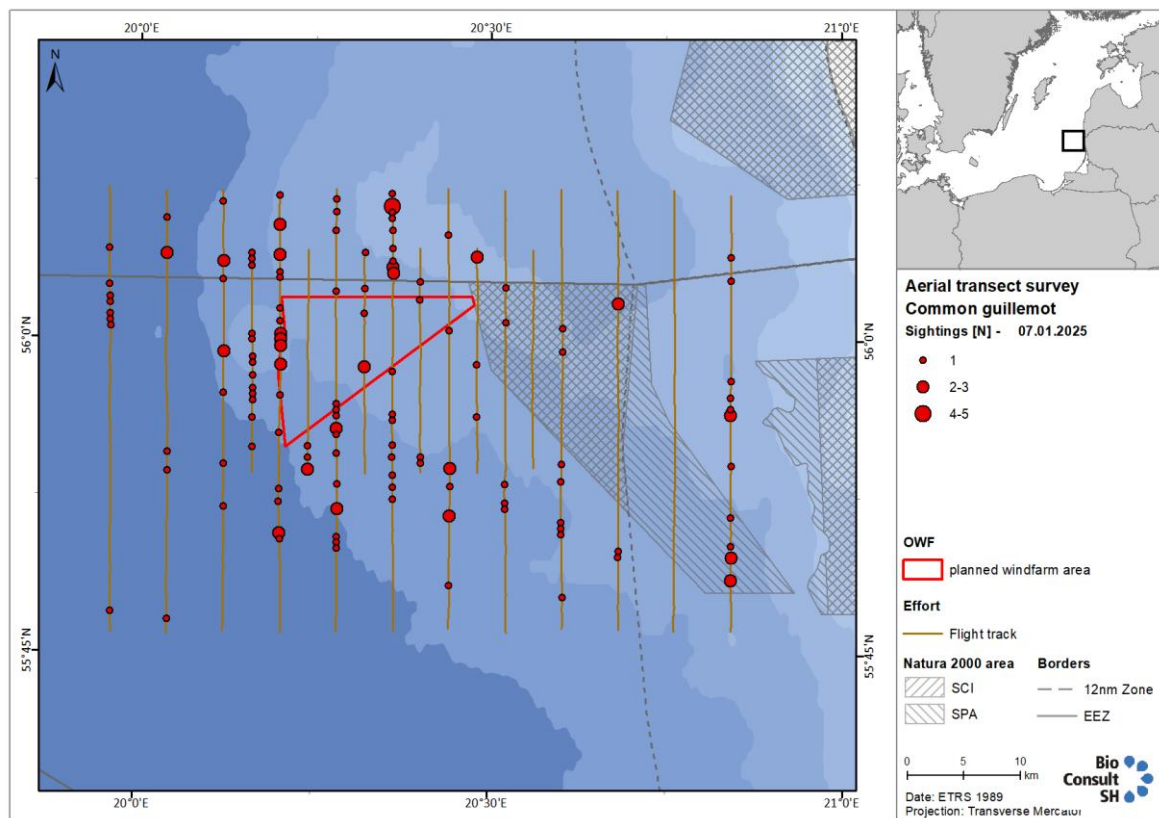
A.2.9 Common Guillemot (*Uria aalge*)



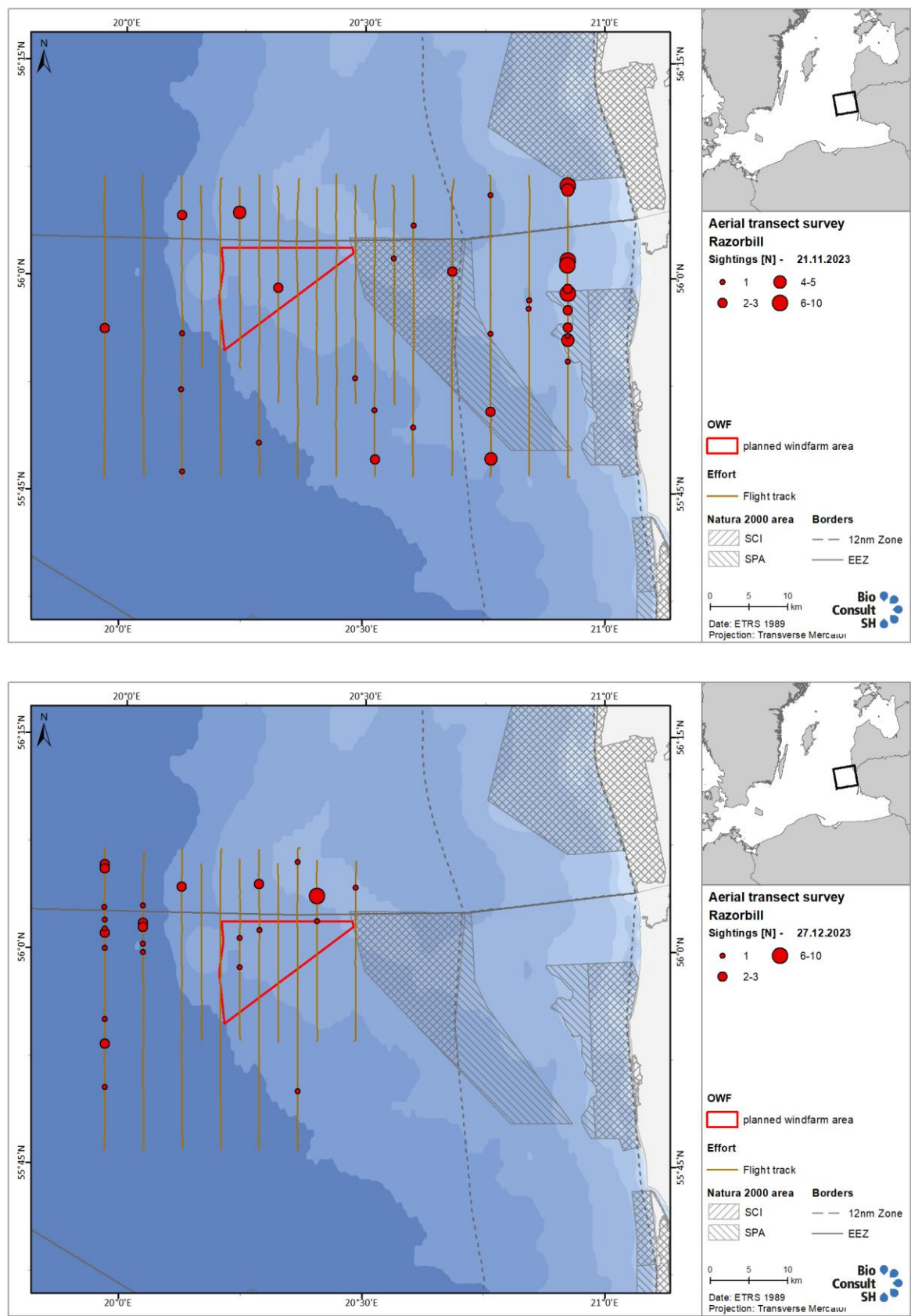


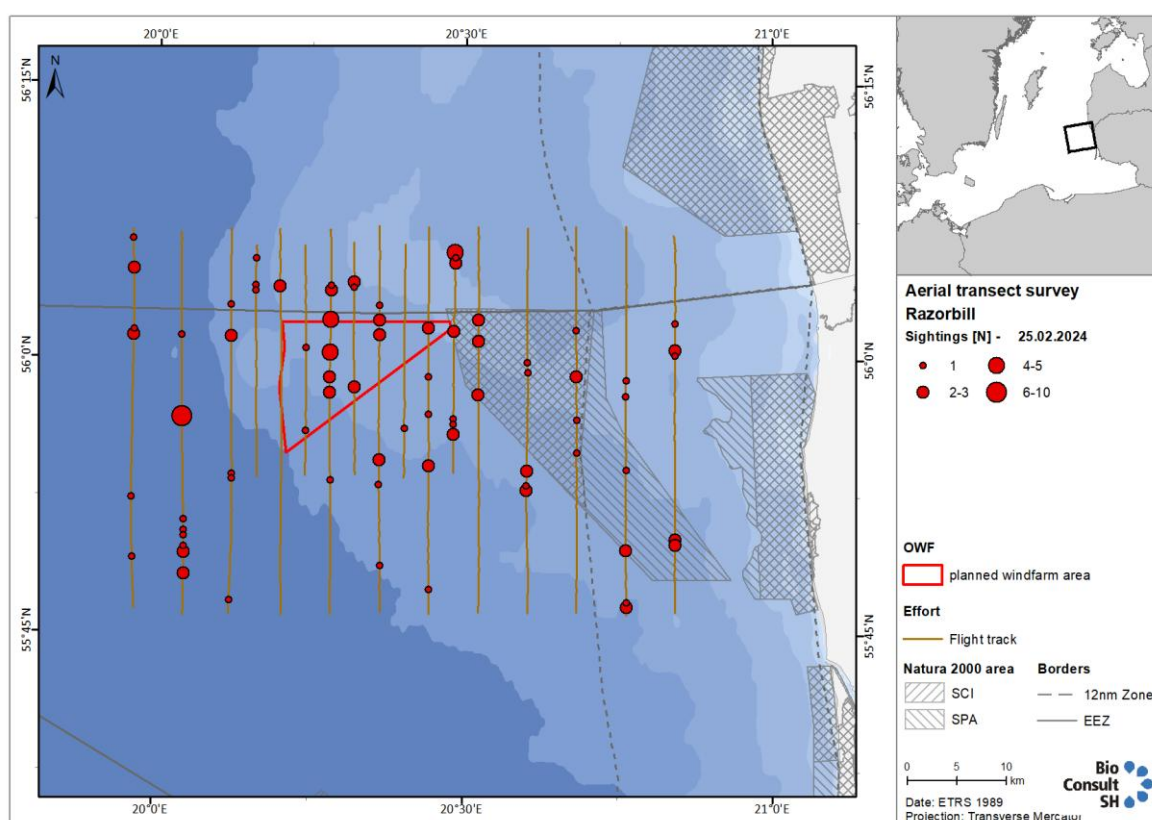
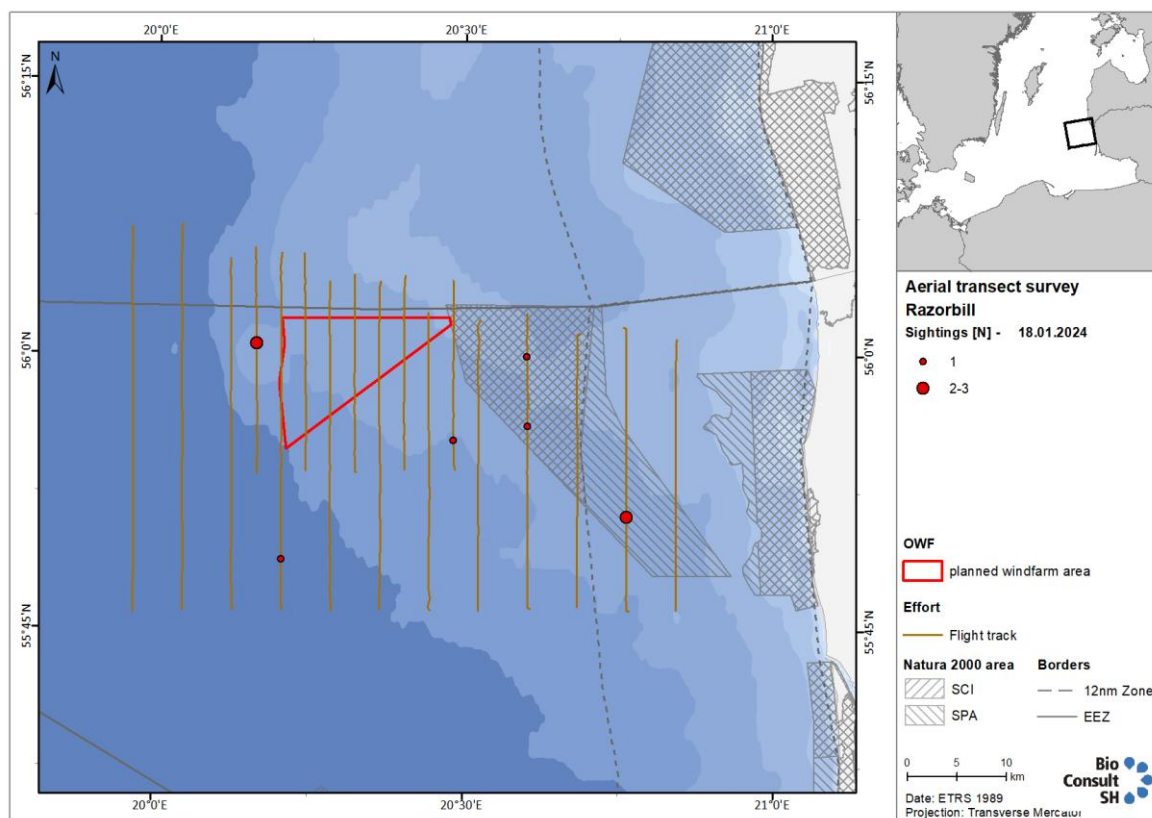


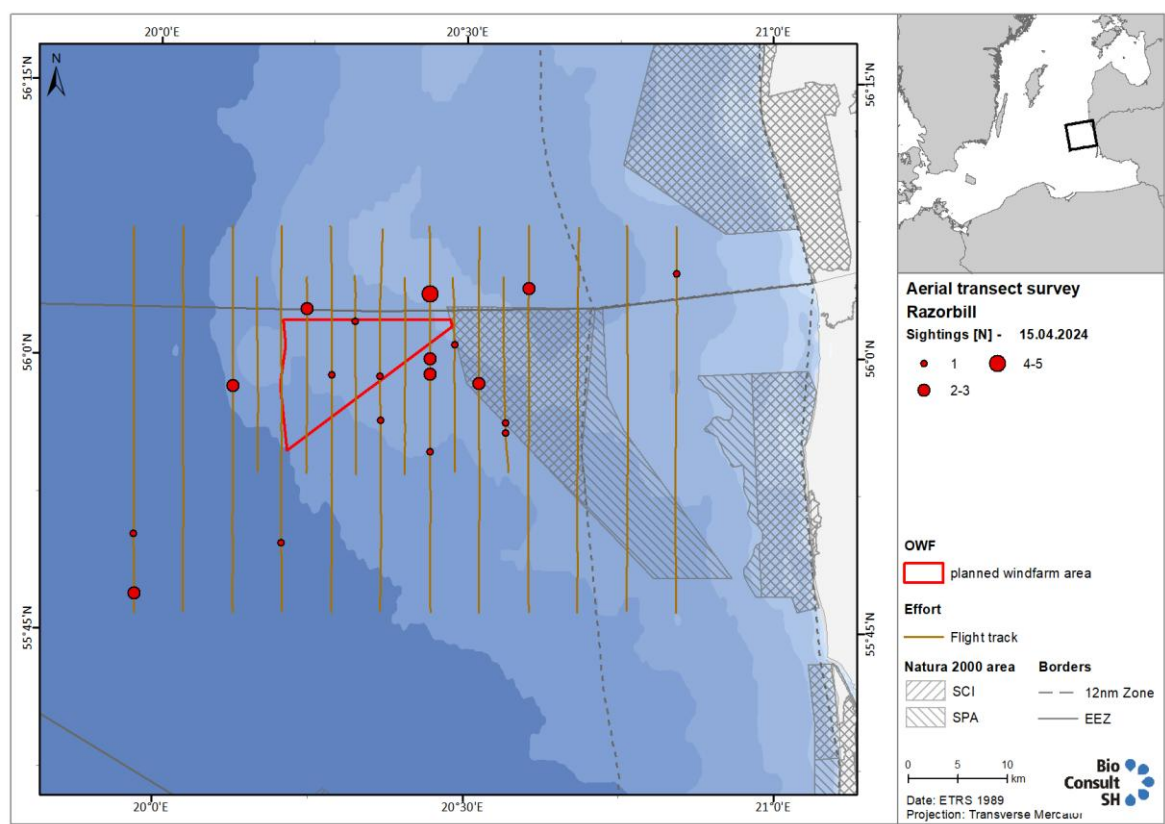
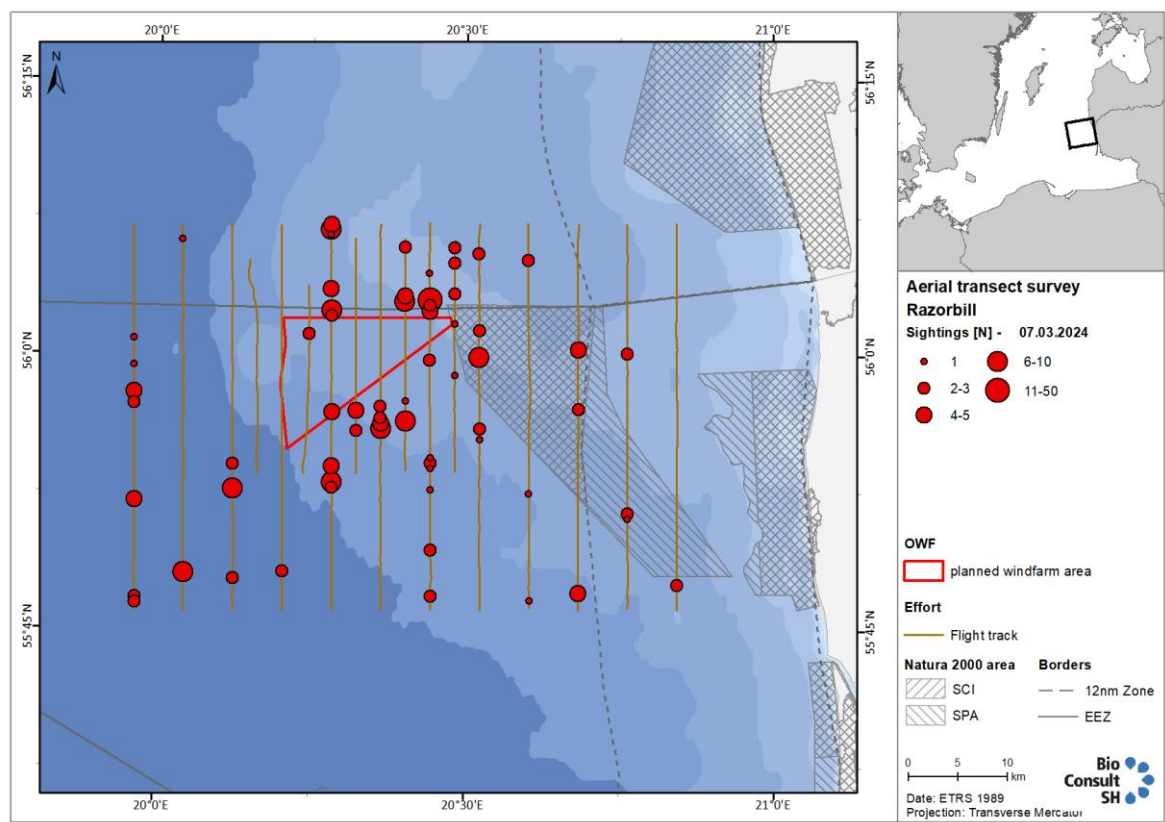


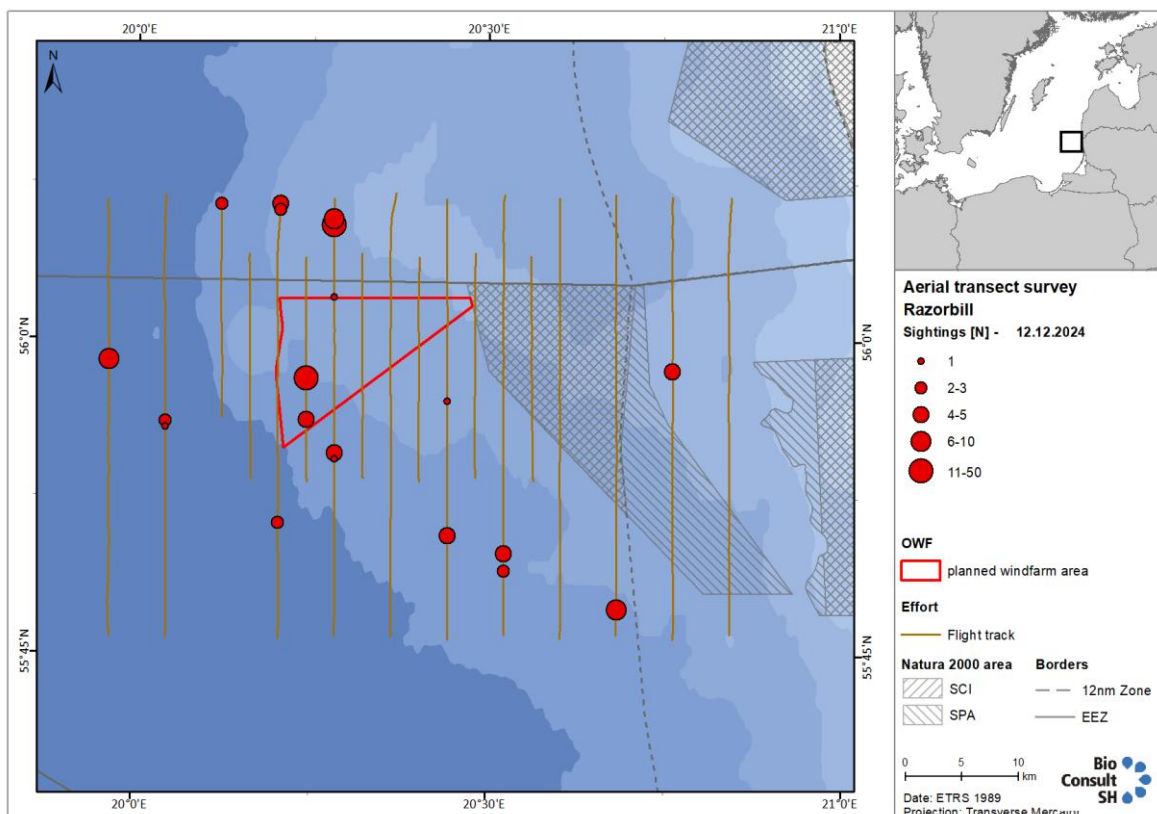
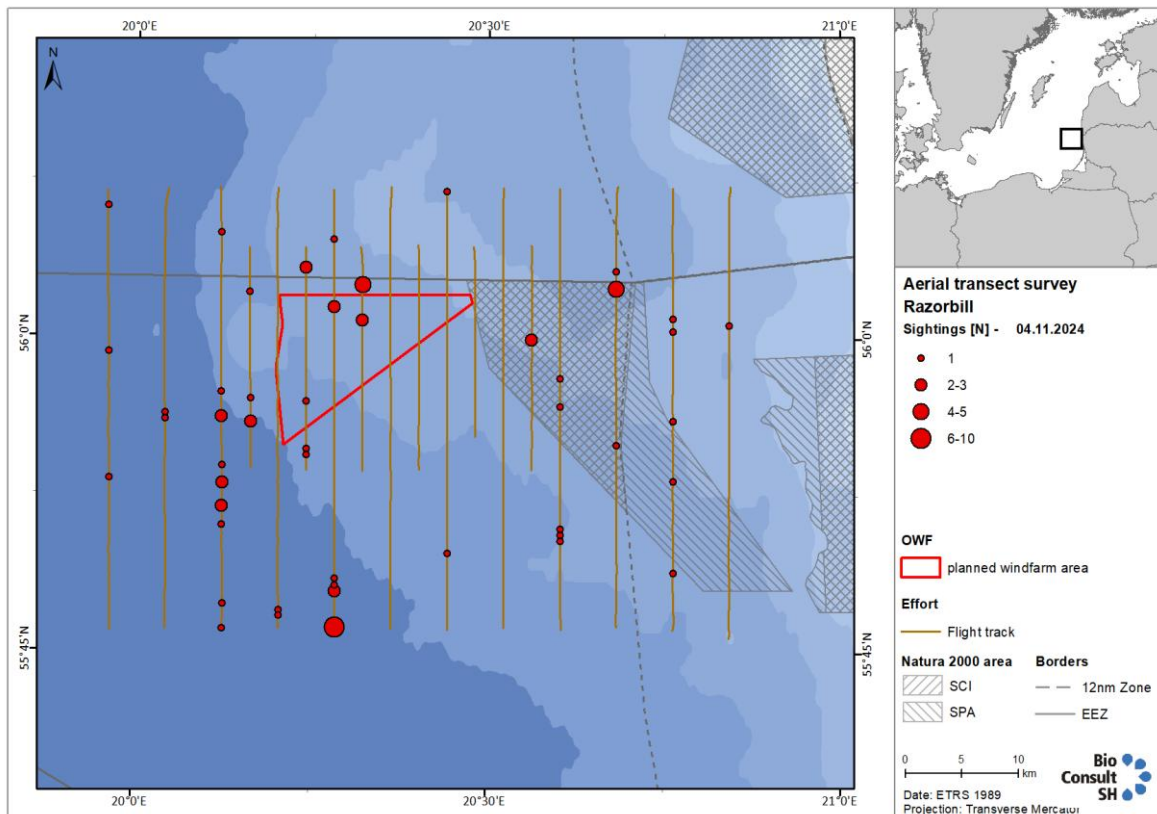


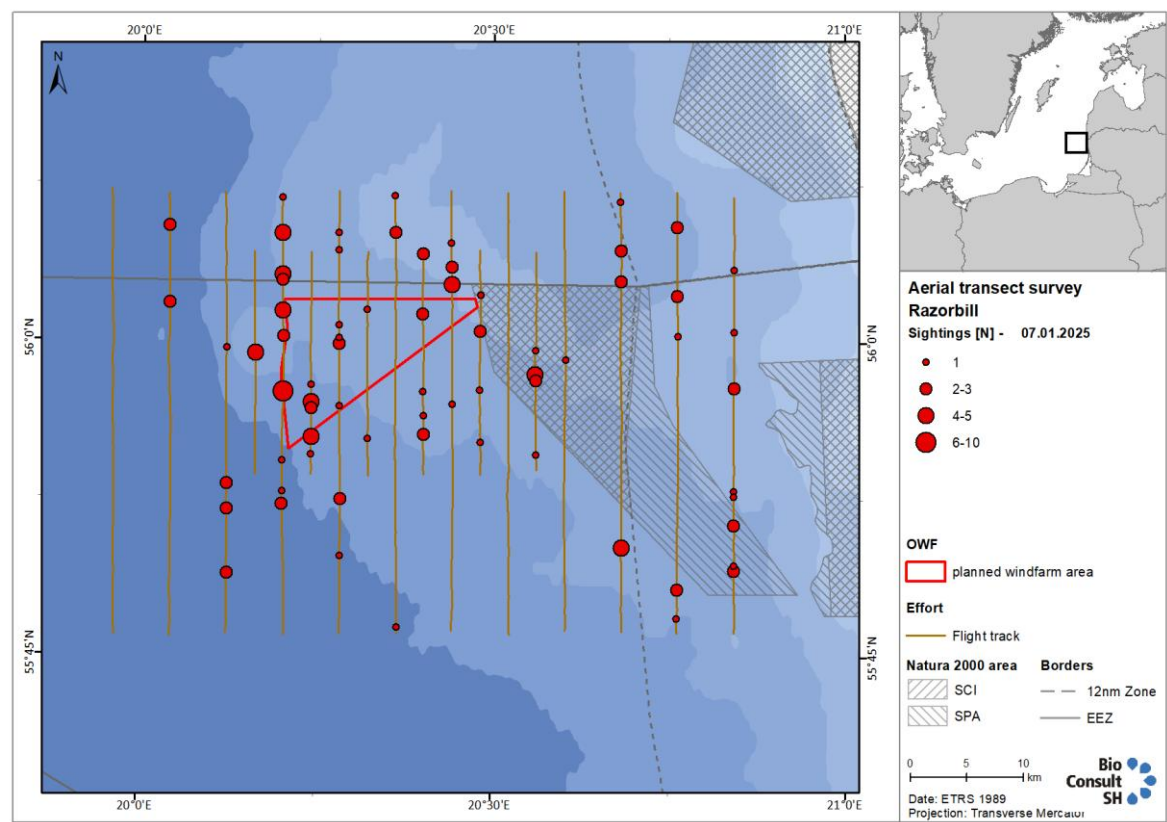
A.2.10 Razorbill (*Alca torda*)





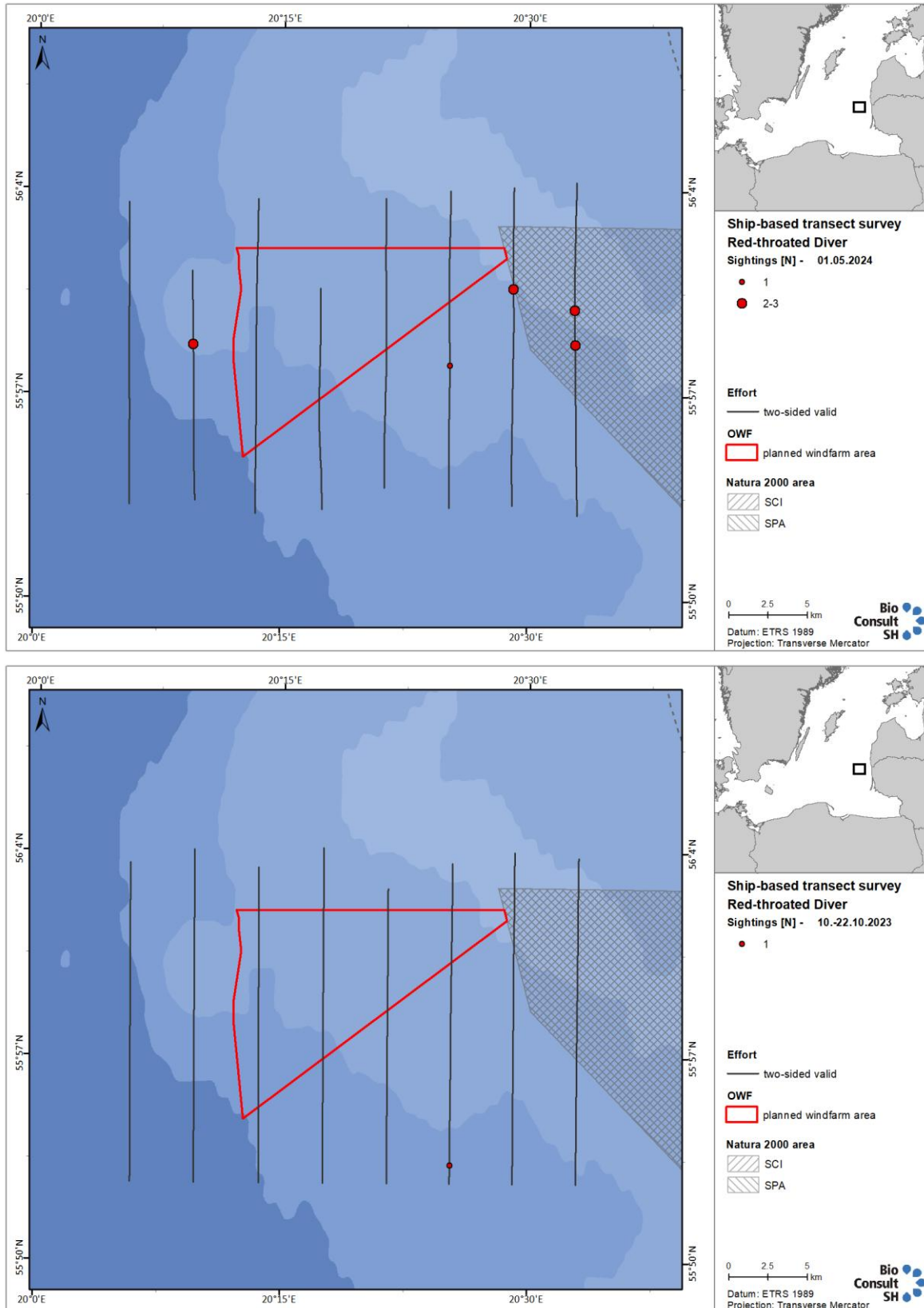


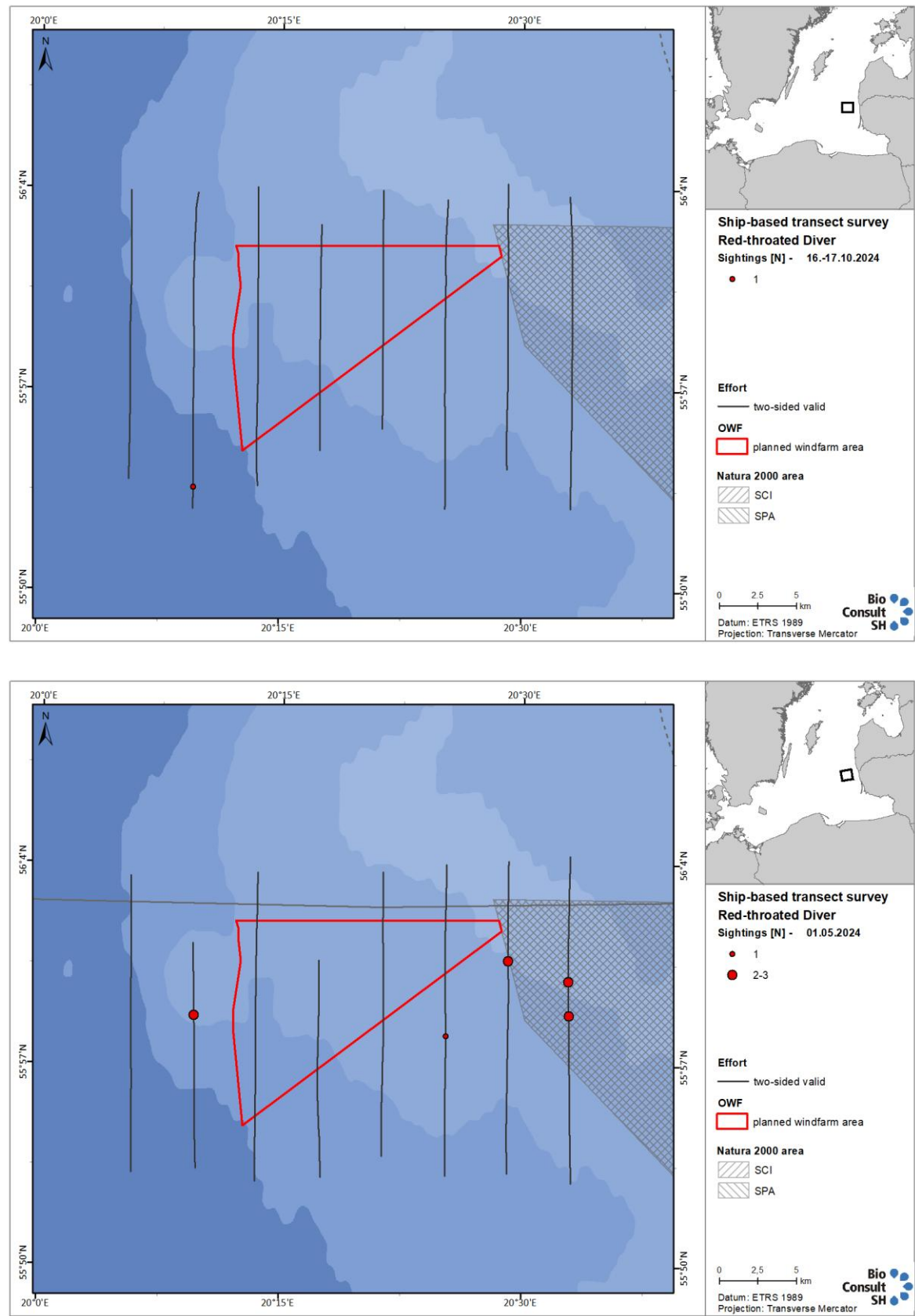


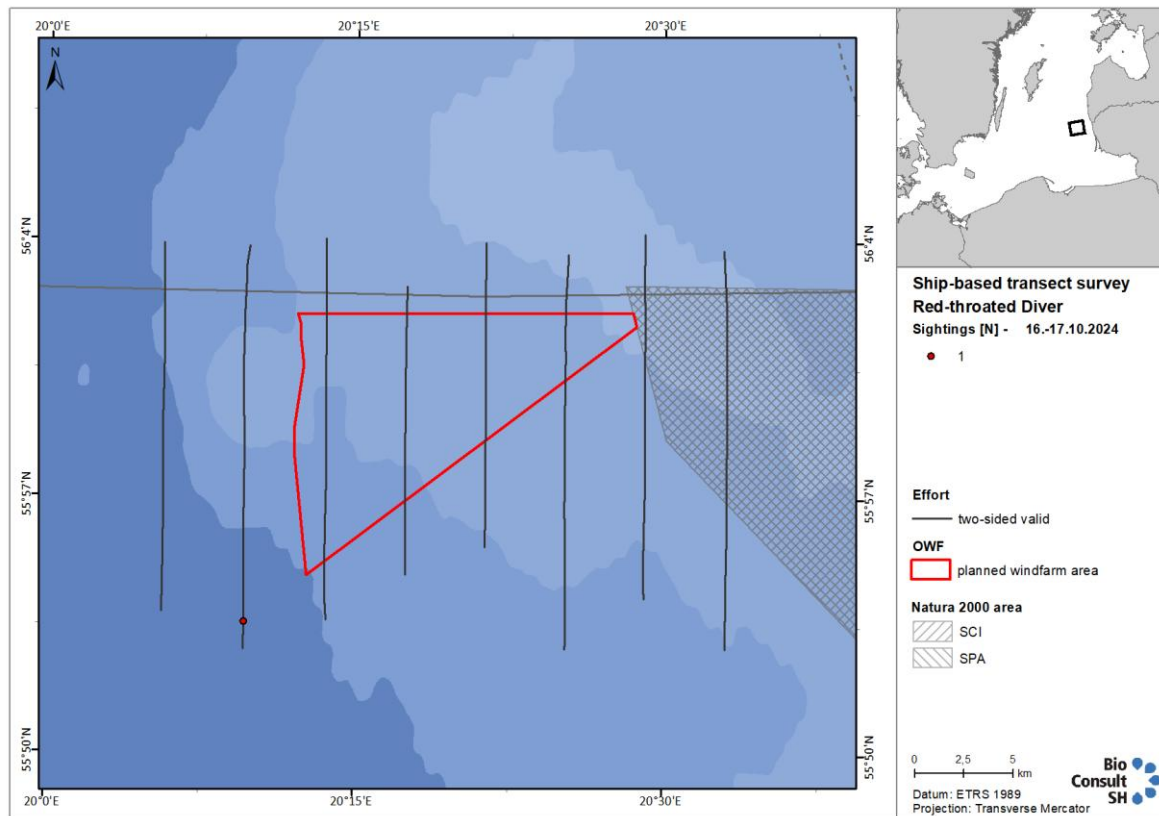


A.3 Species distribution maps from ship surveys

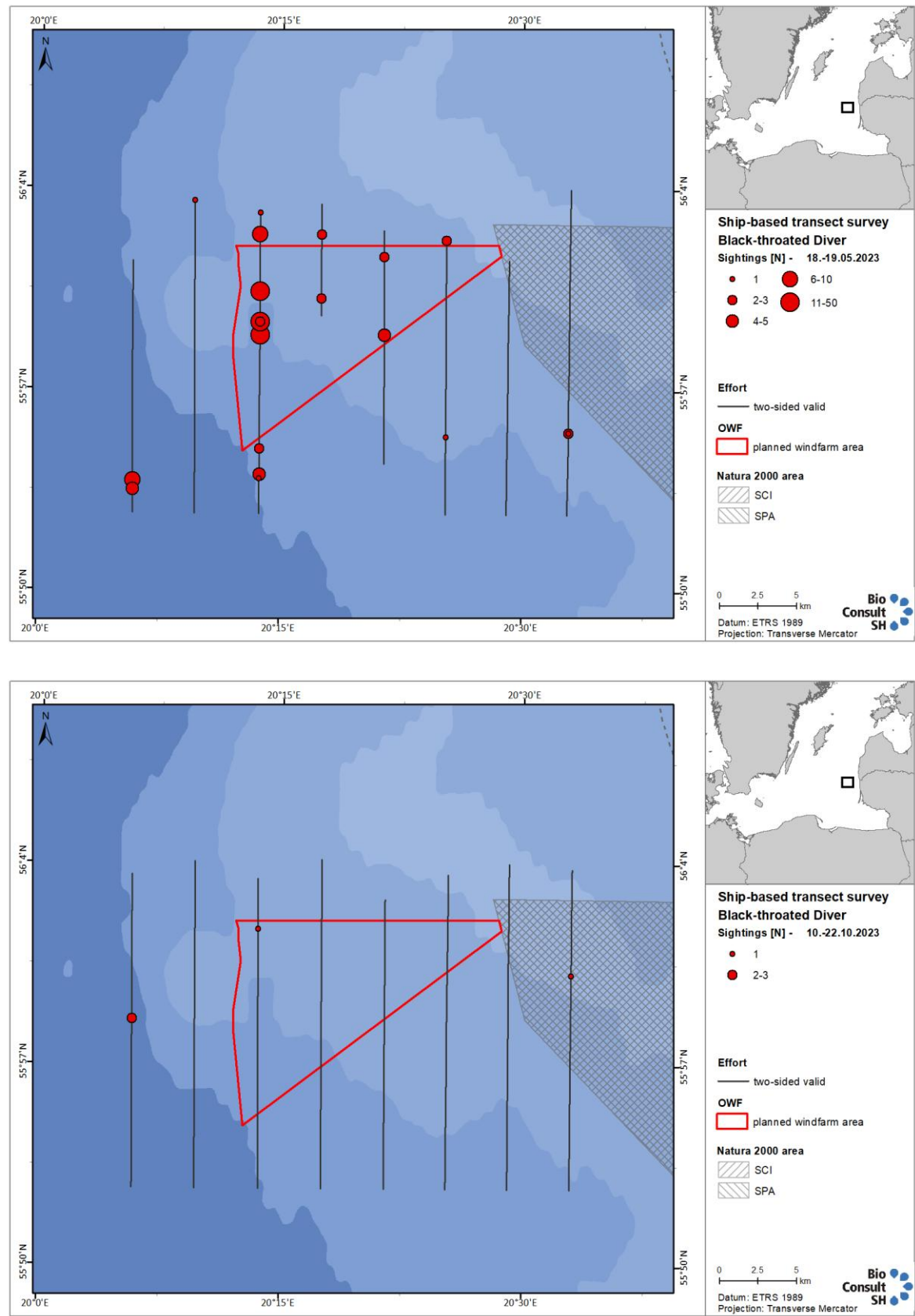
A.3.1 Red-throated Diver (*Gavia stellata*)

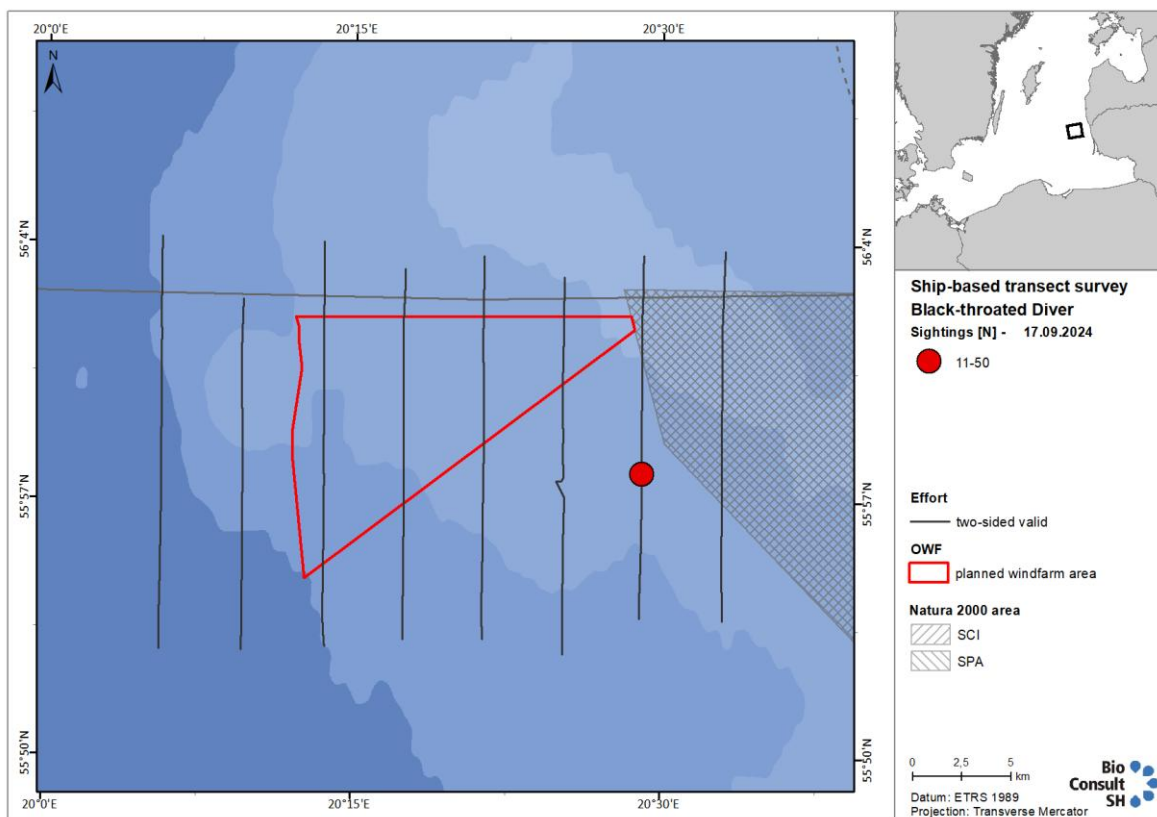
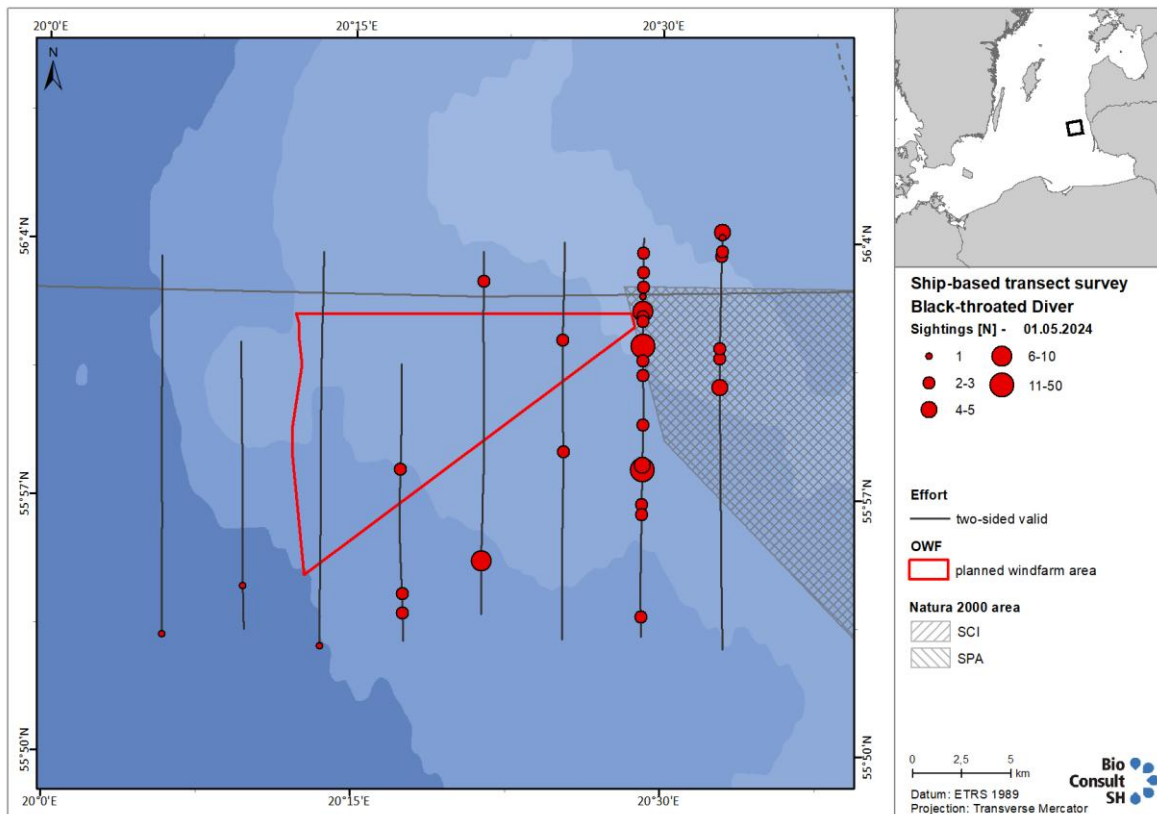


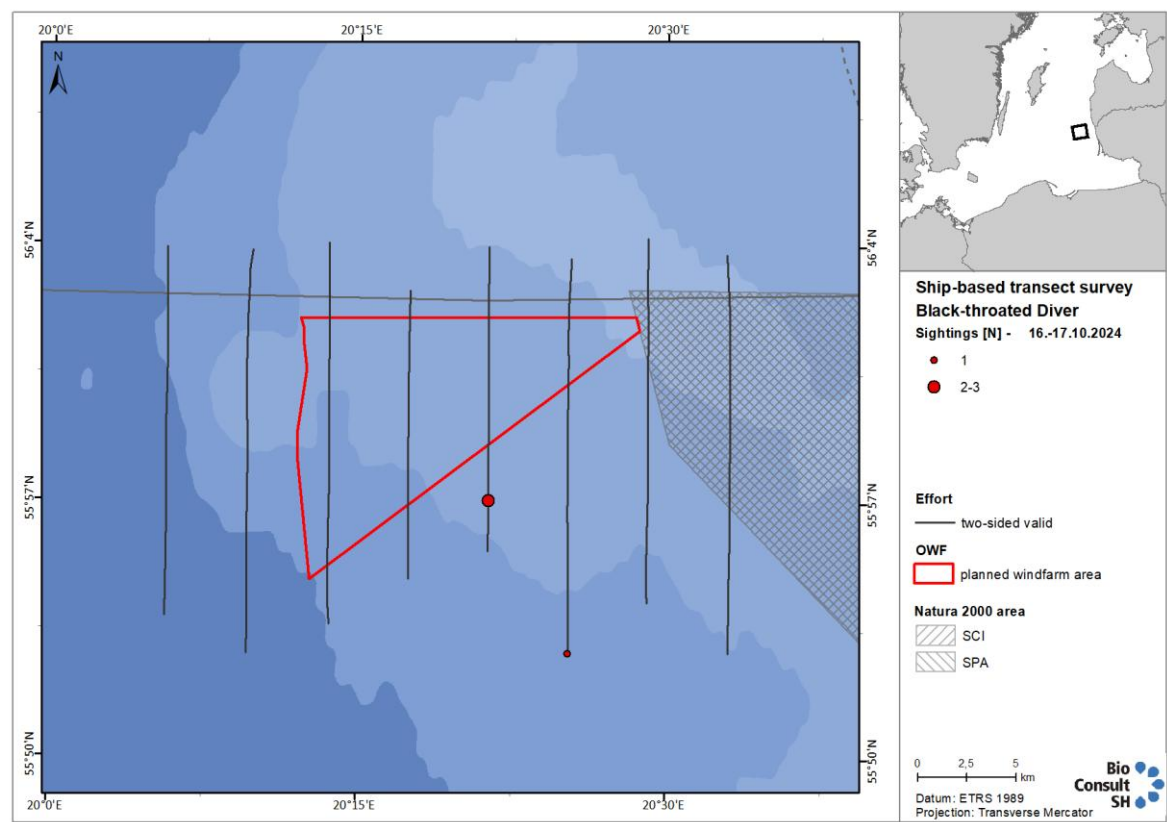




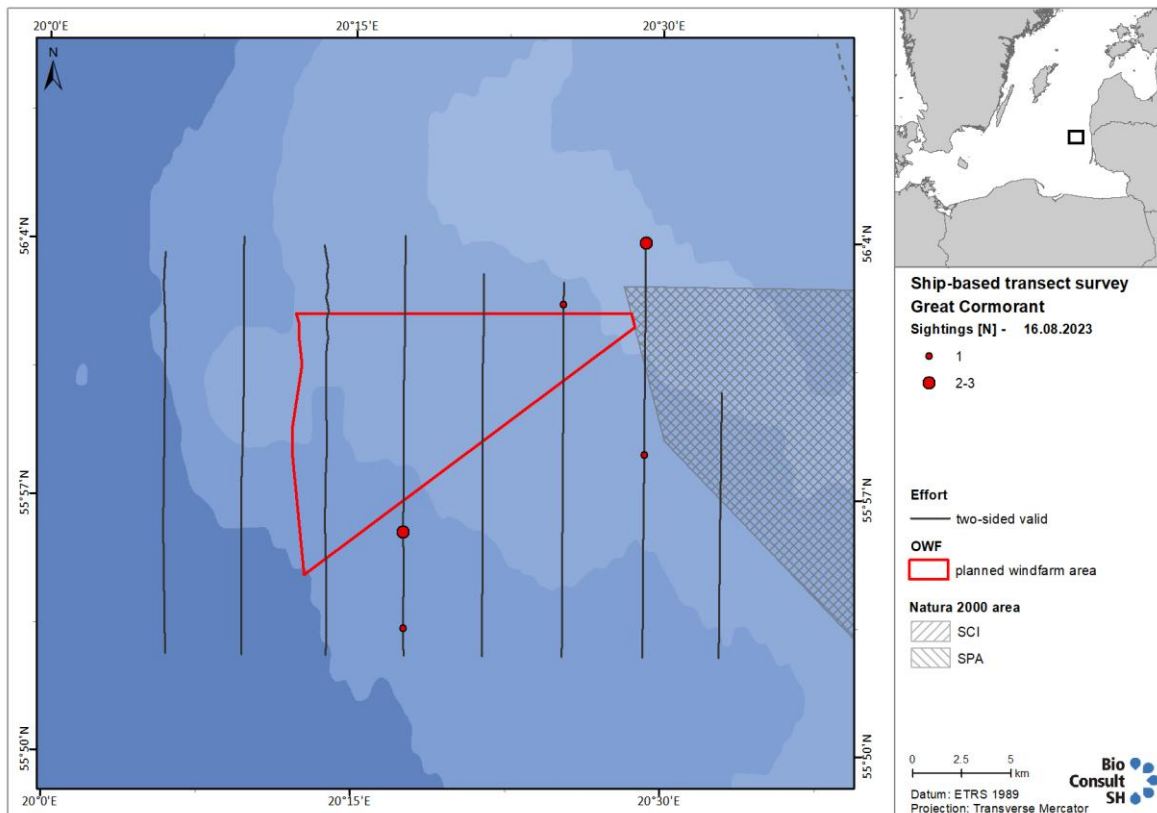
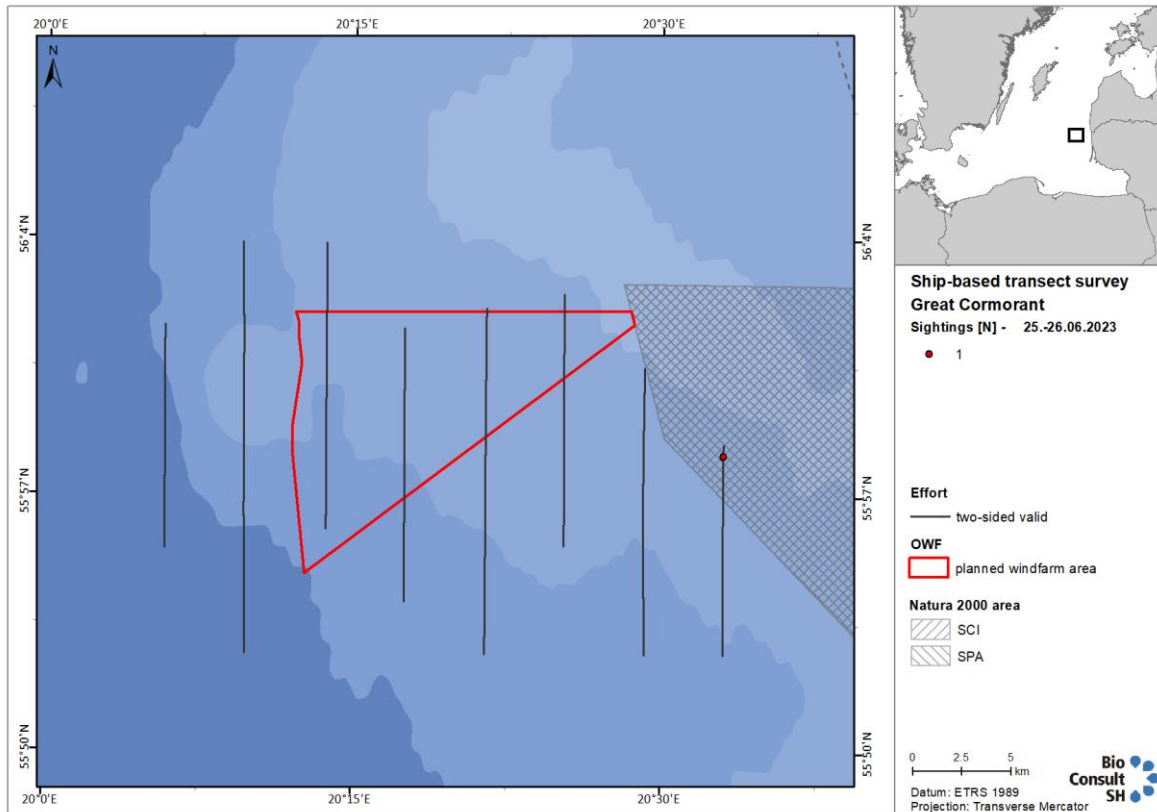
A.3.2 Black-throated Diver (*Gavia arctica*)

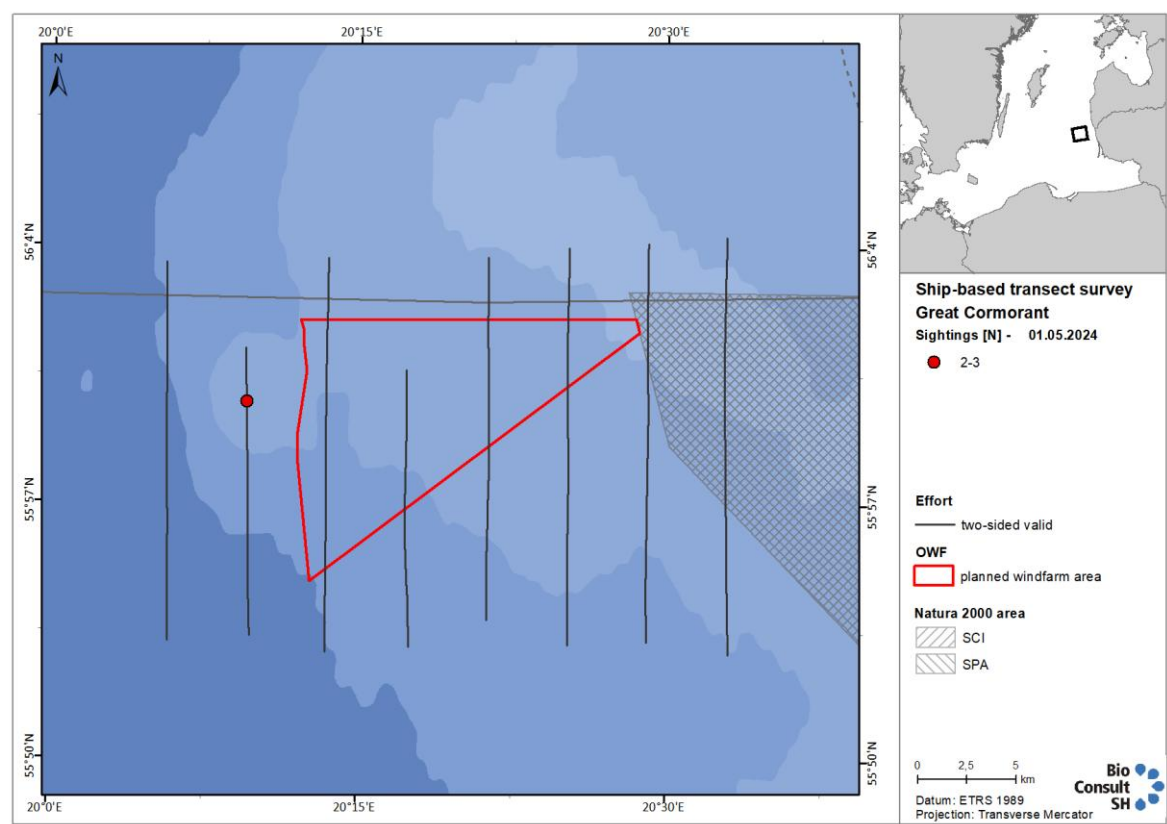
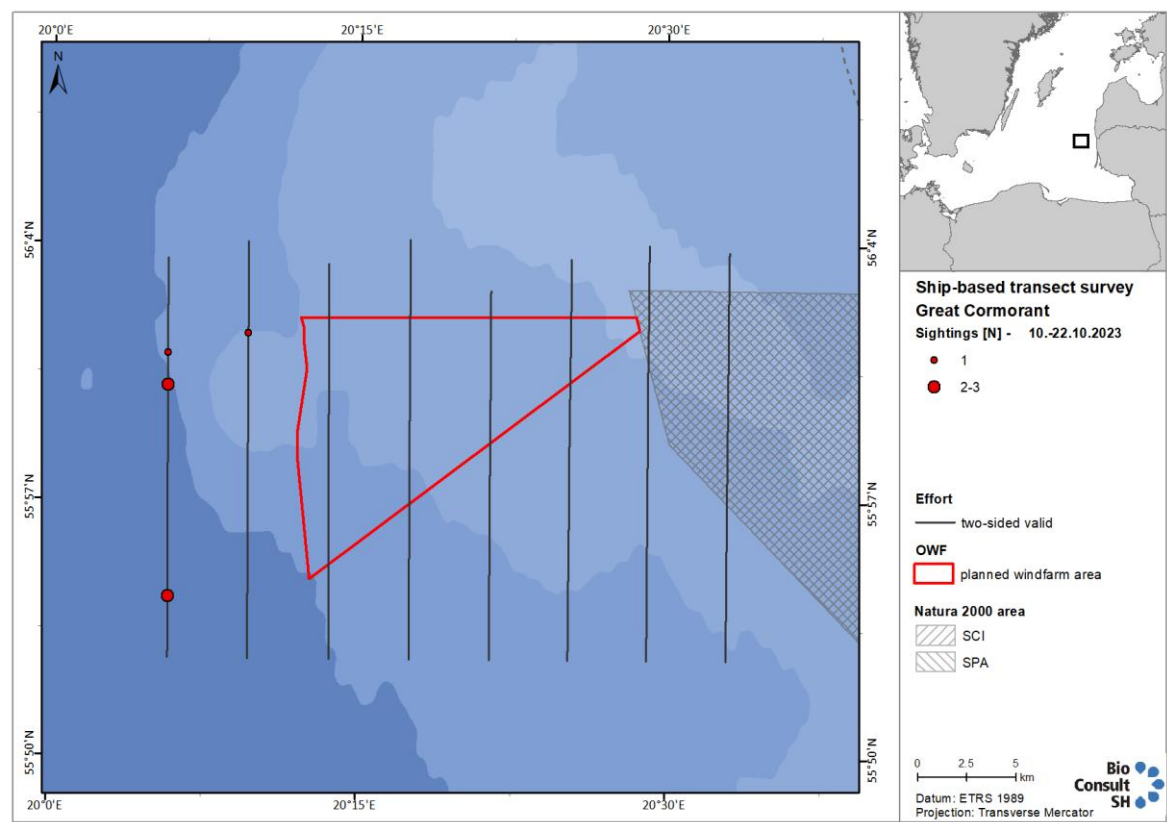


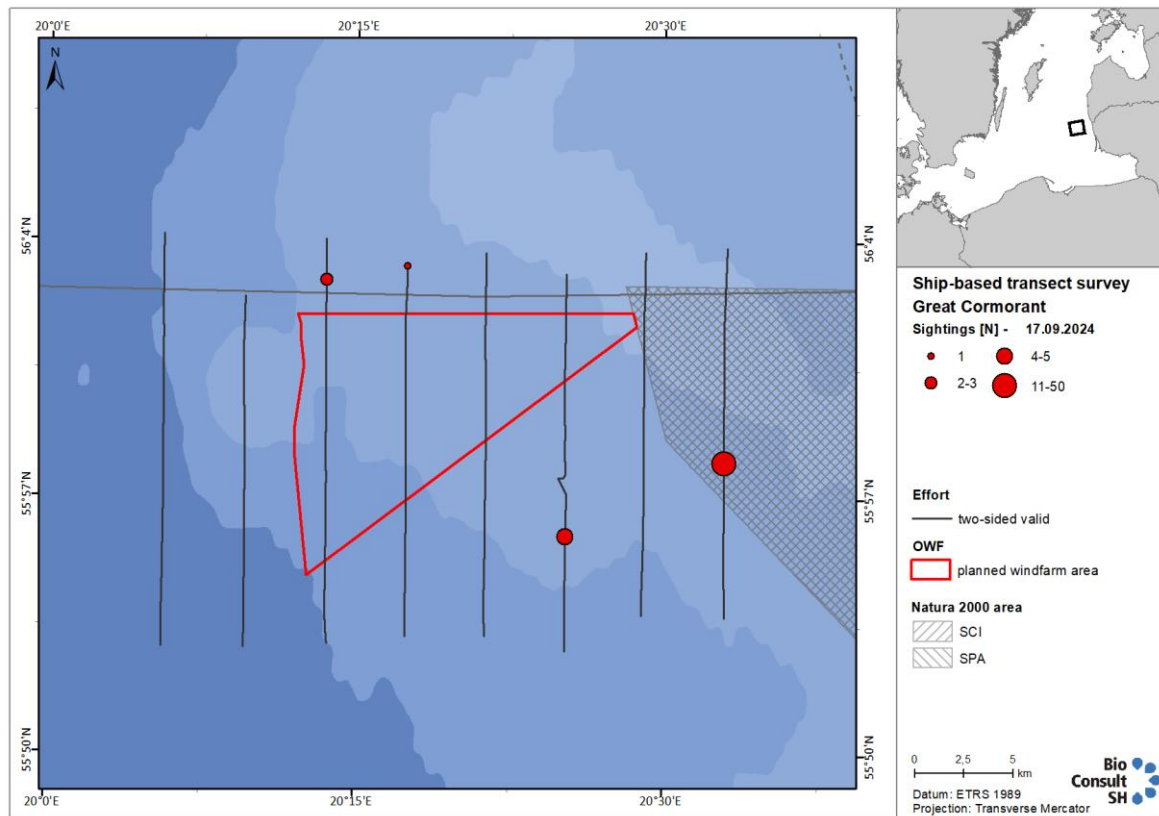




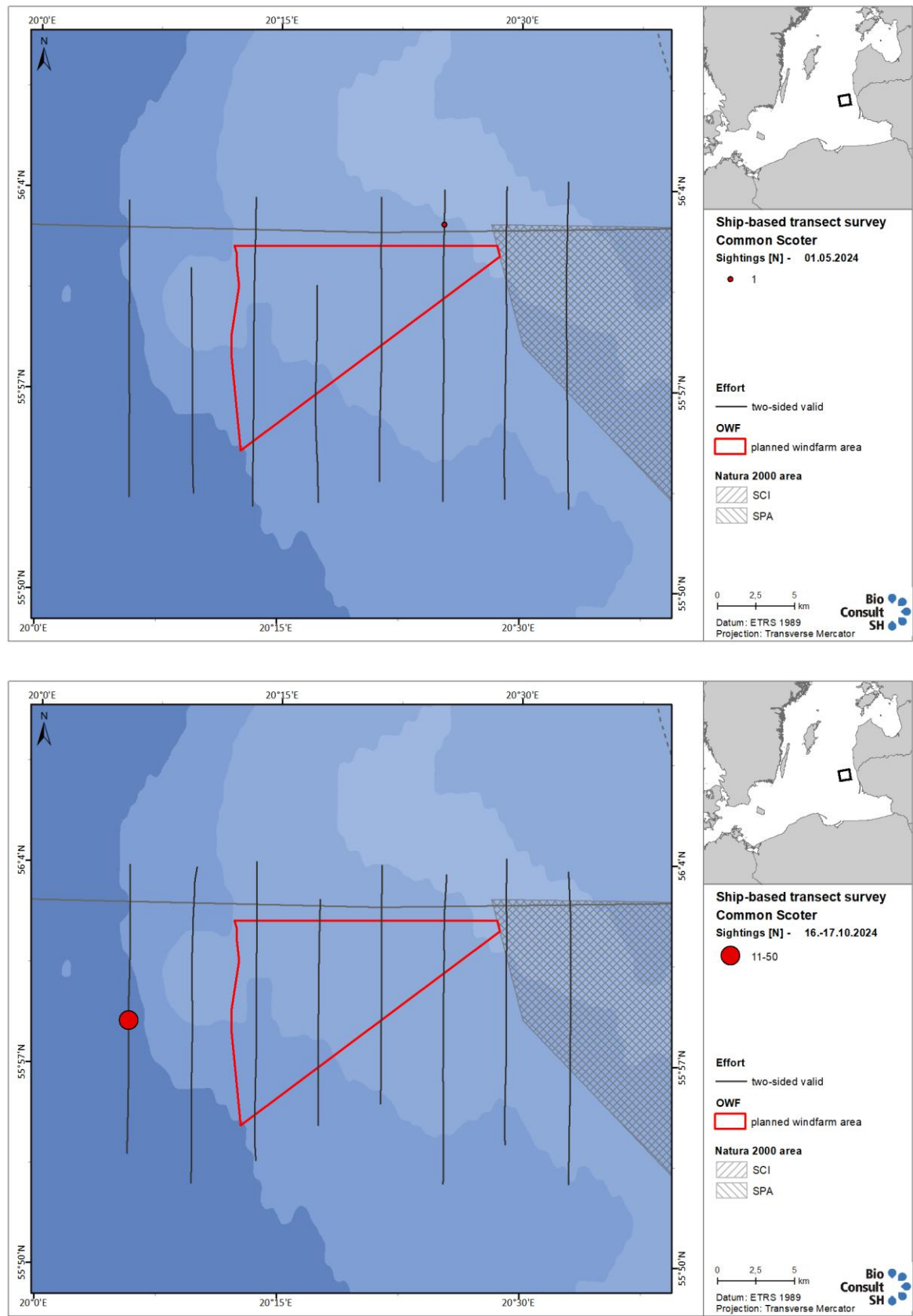
A.3.3 Great Cormorant (*Phalacrocorax carbo*)



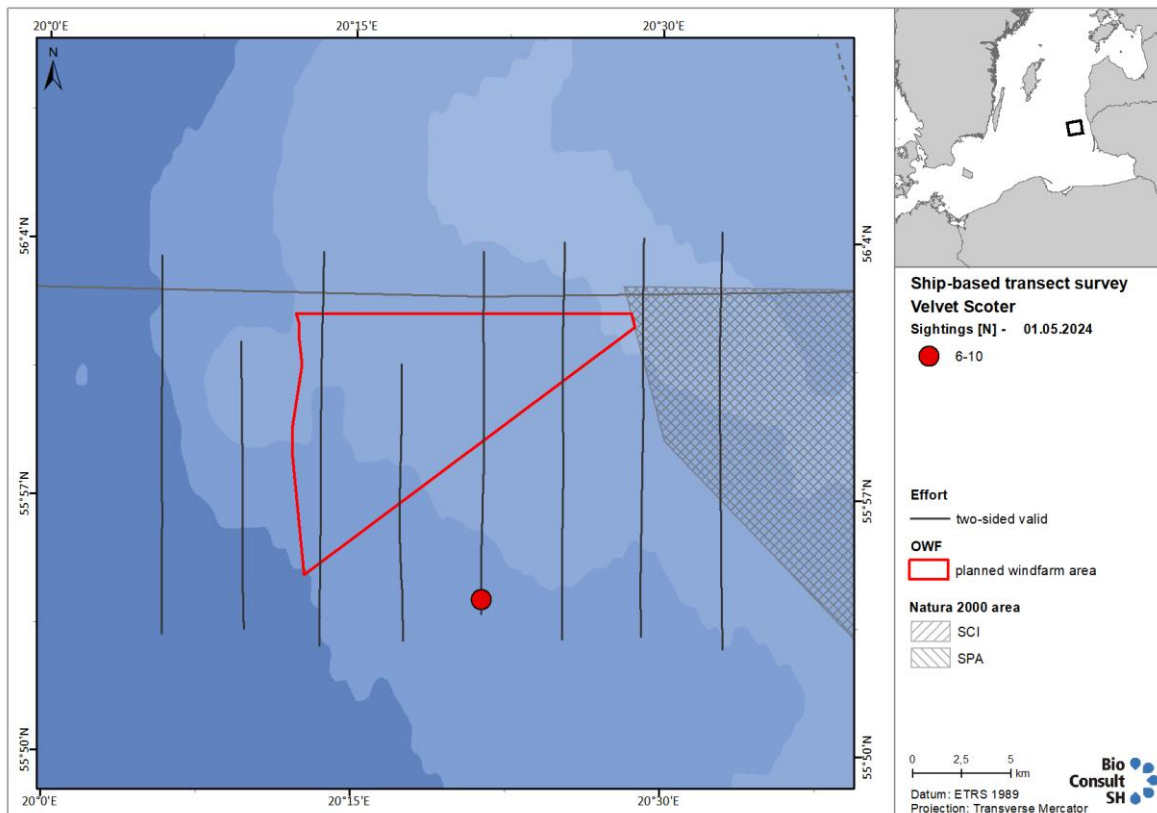
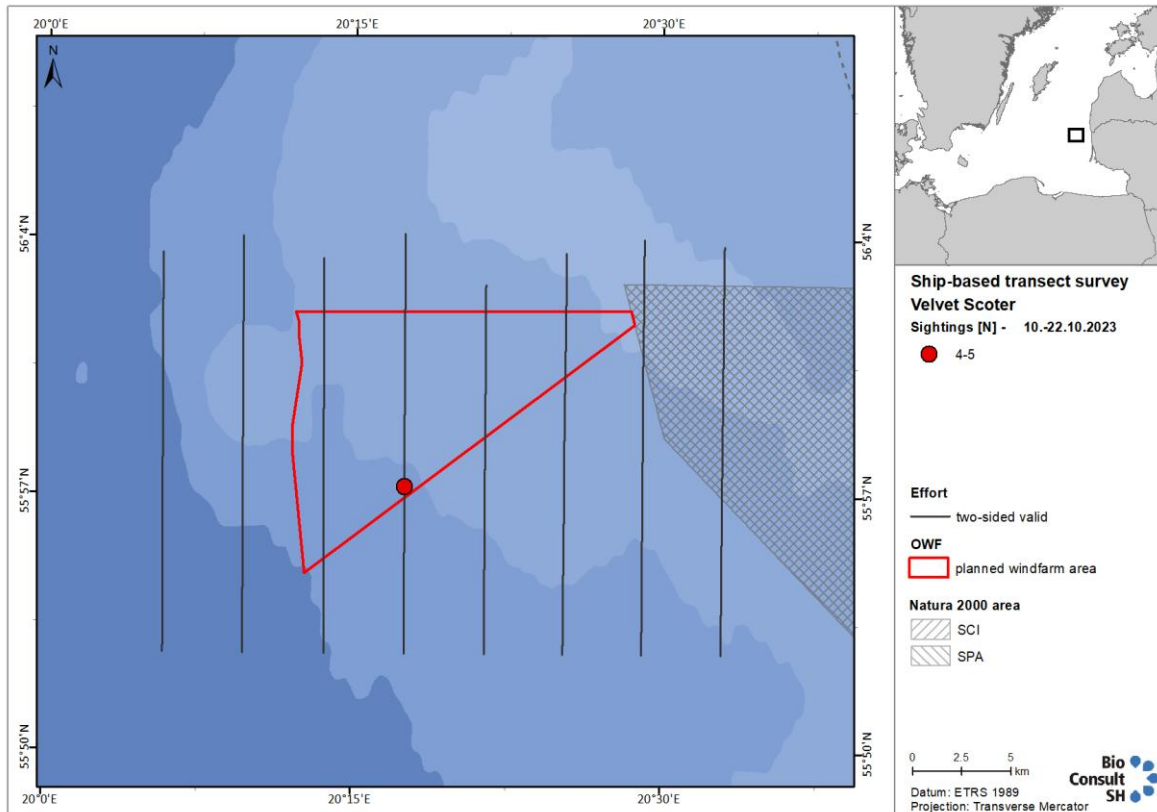


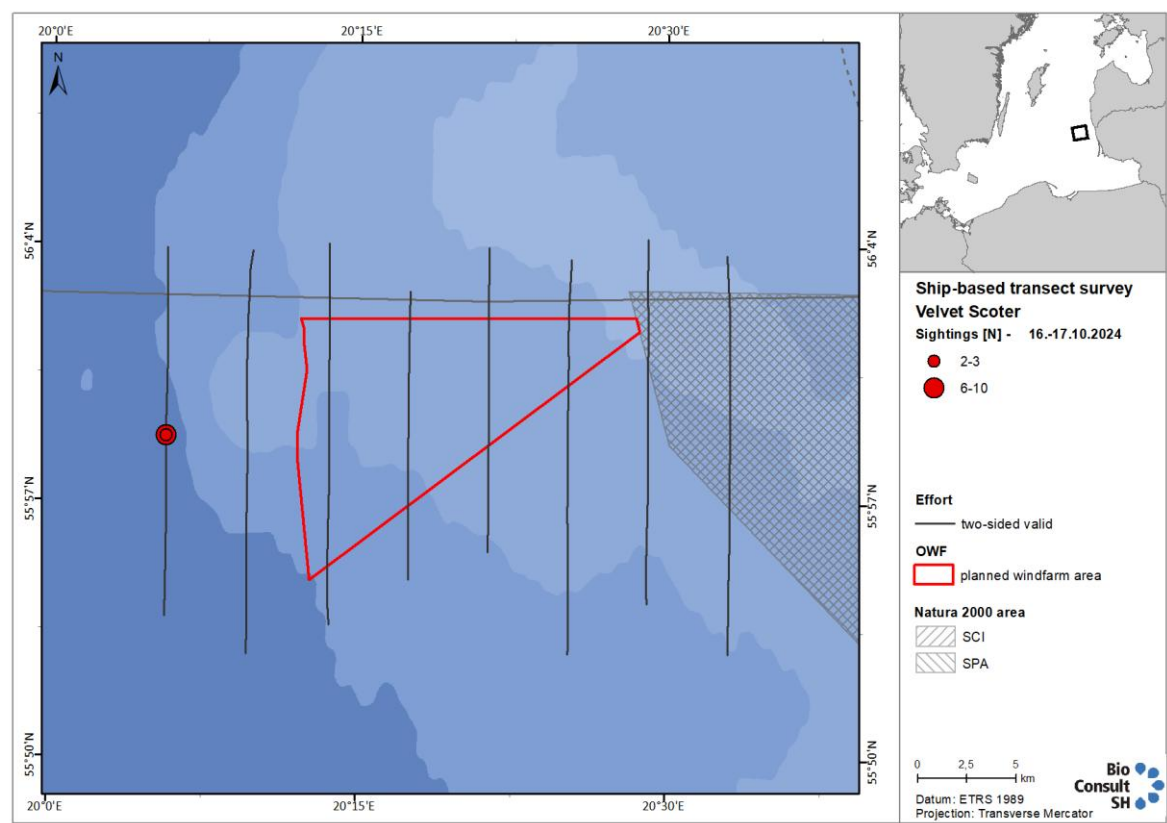
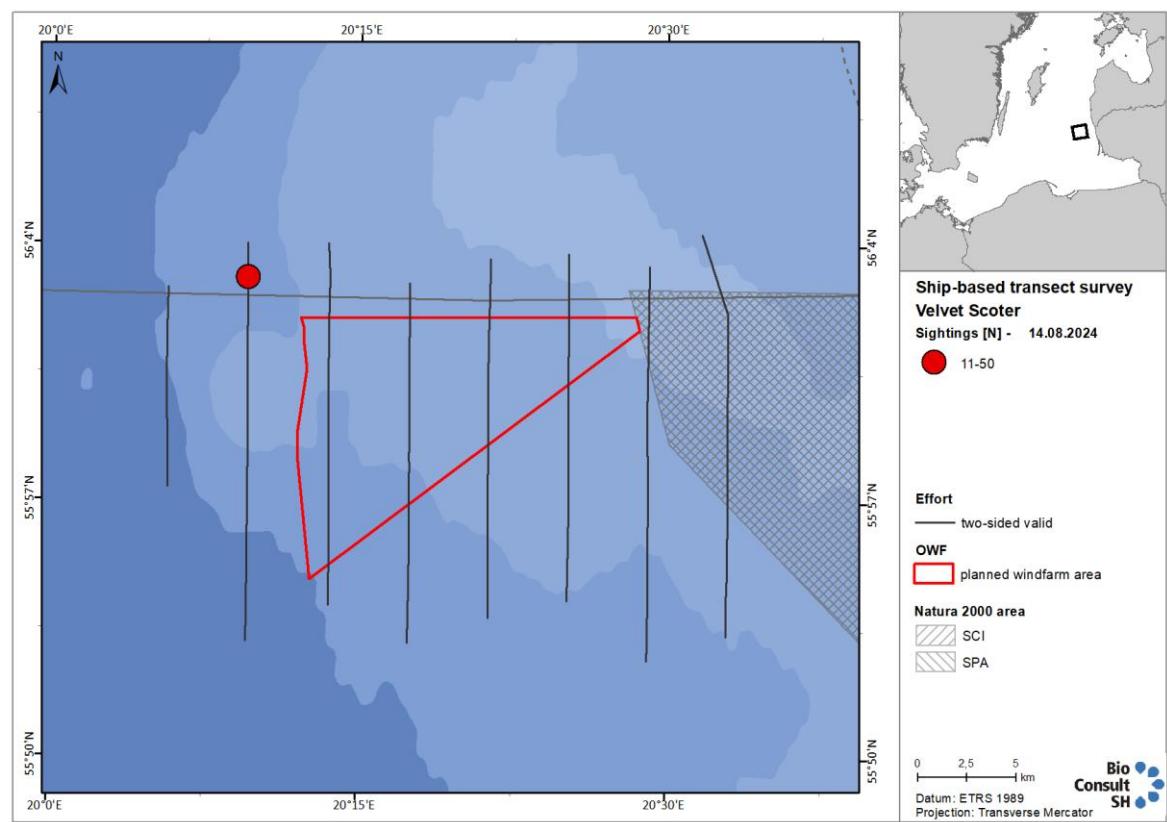


A.3.4 Common Scoter (*Melanitta nigra*)

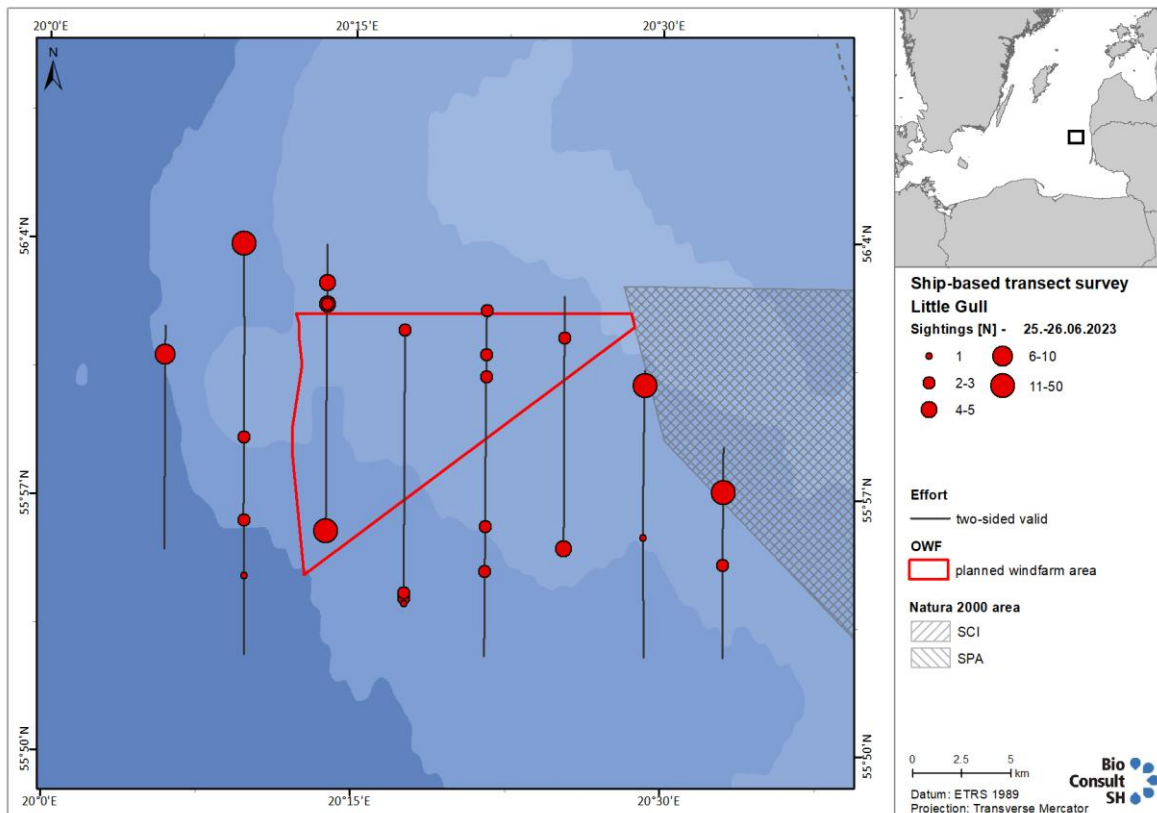
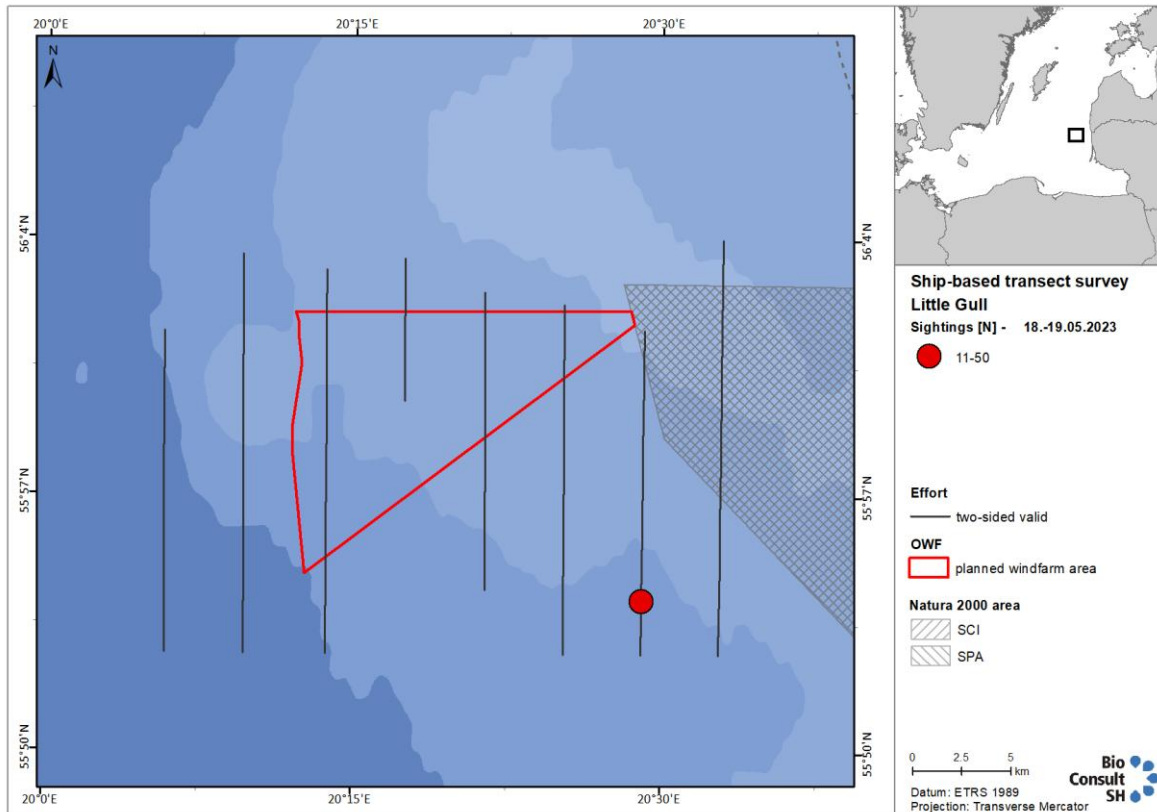


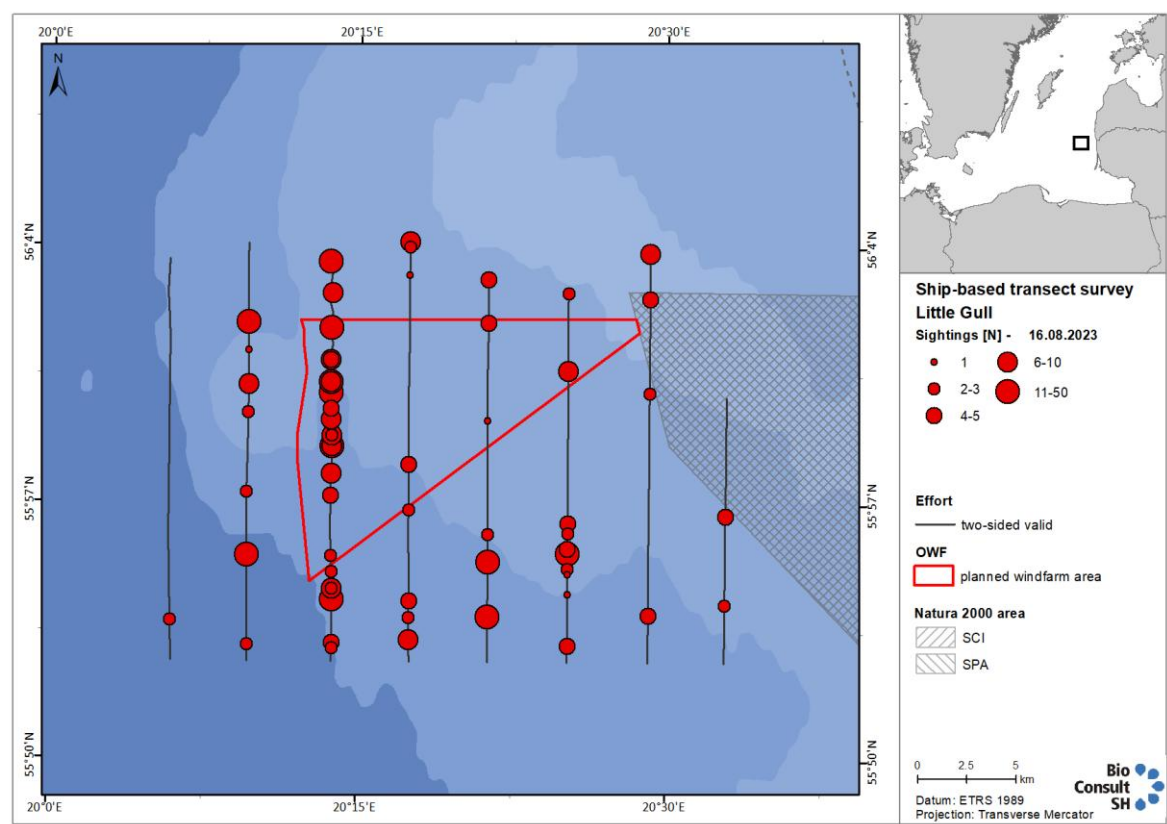
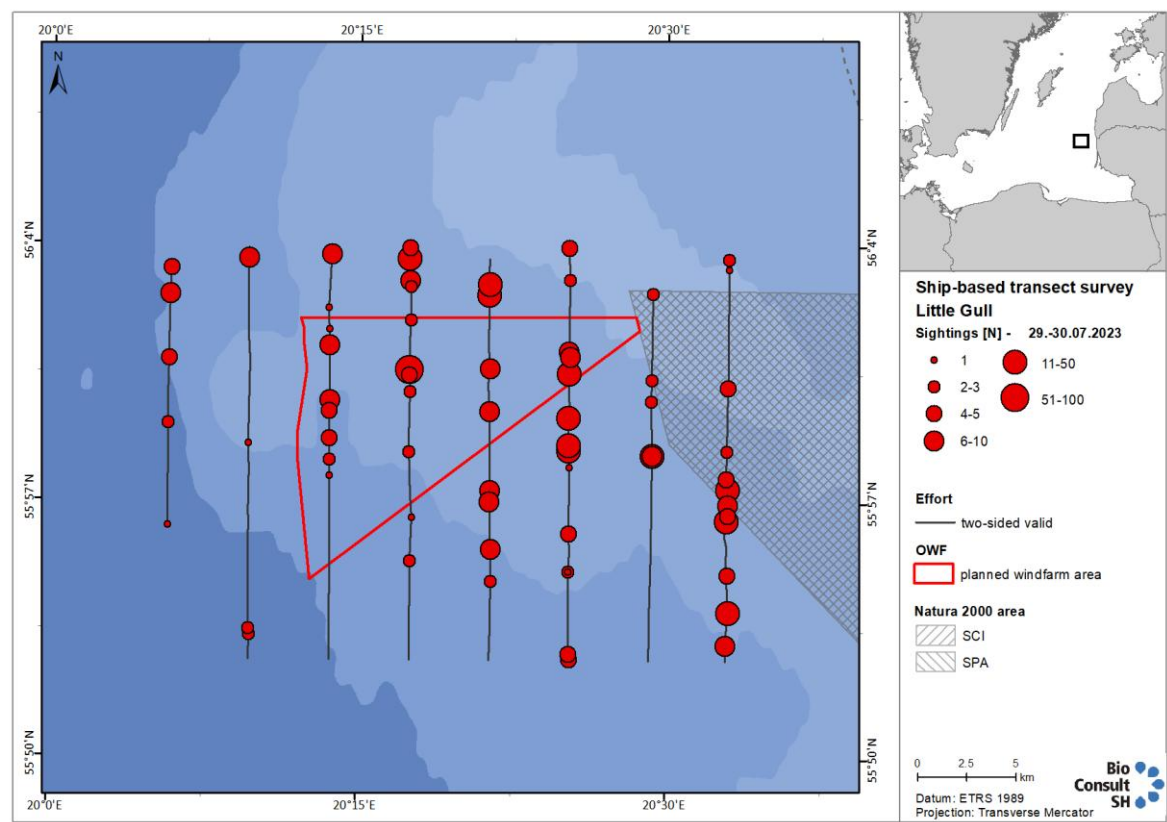
A.3.5 Velvet Scoter (*Melanitta fusca*)

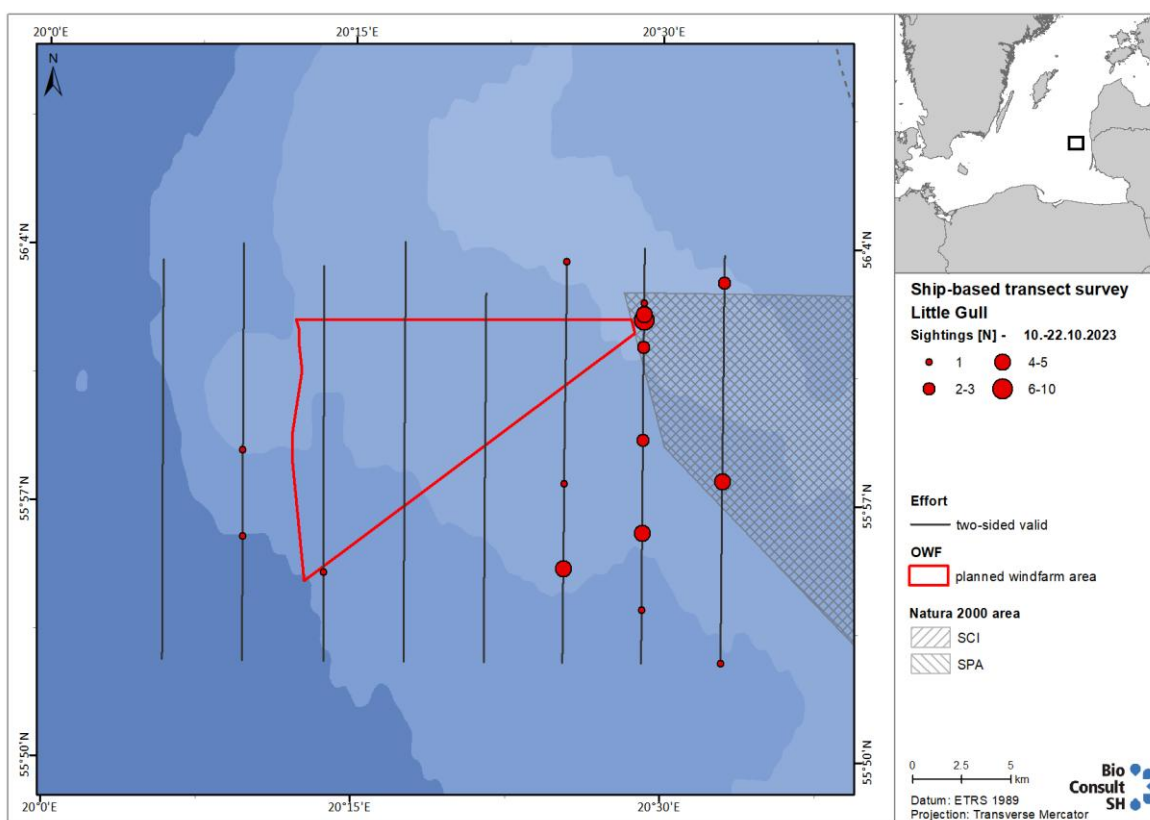
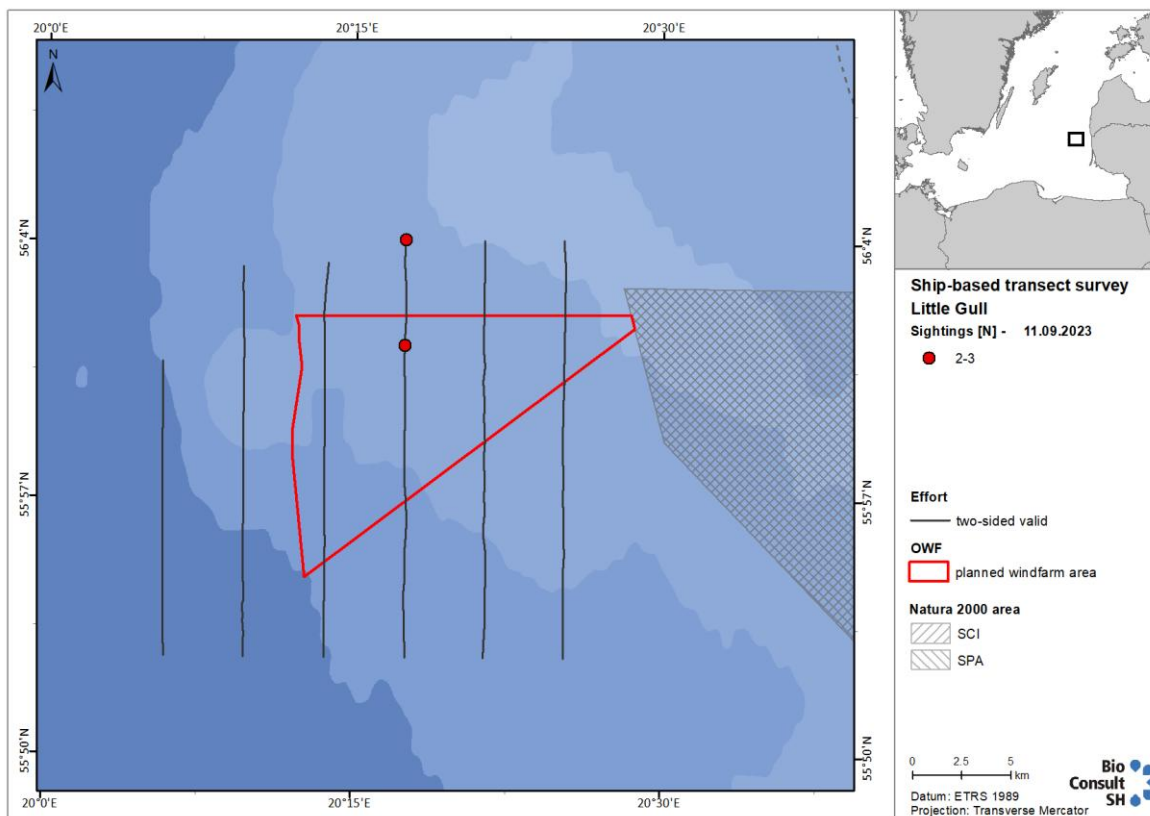


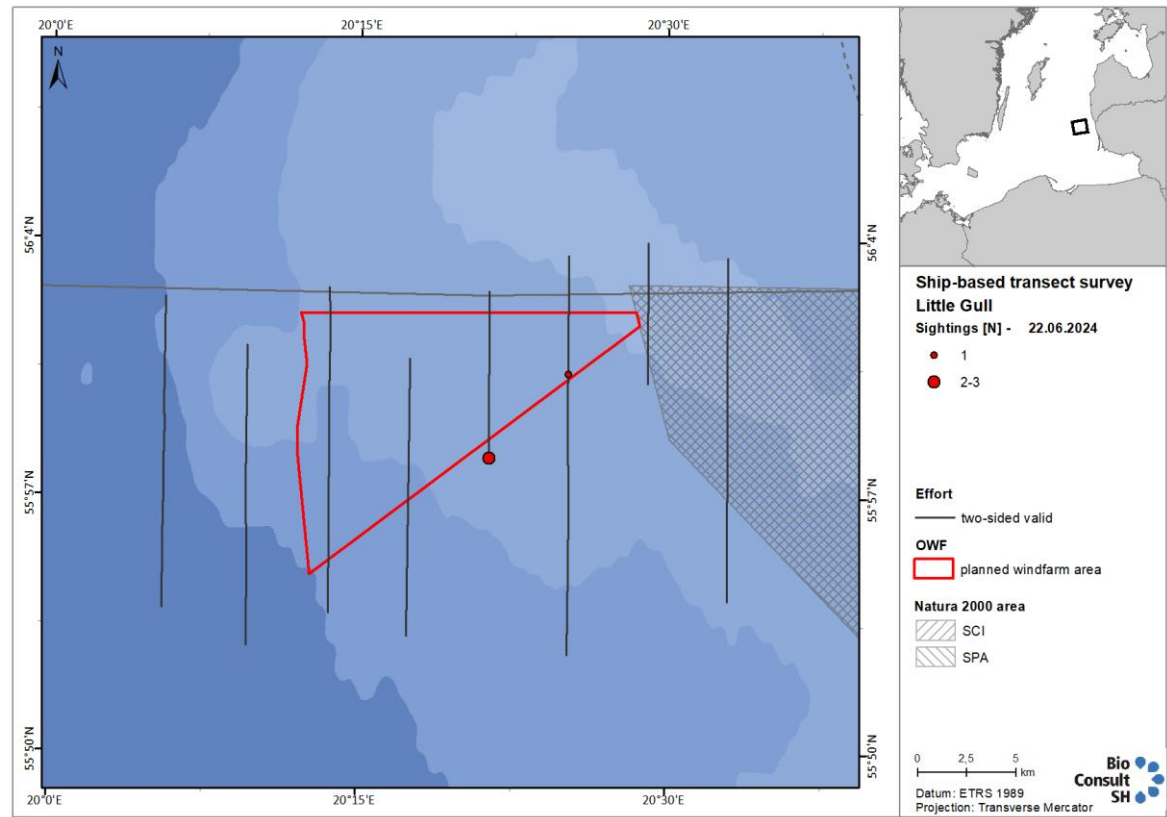
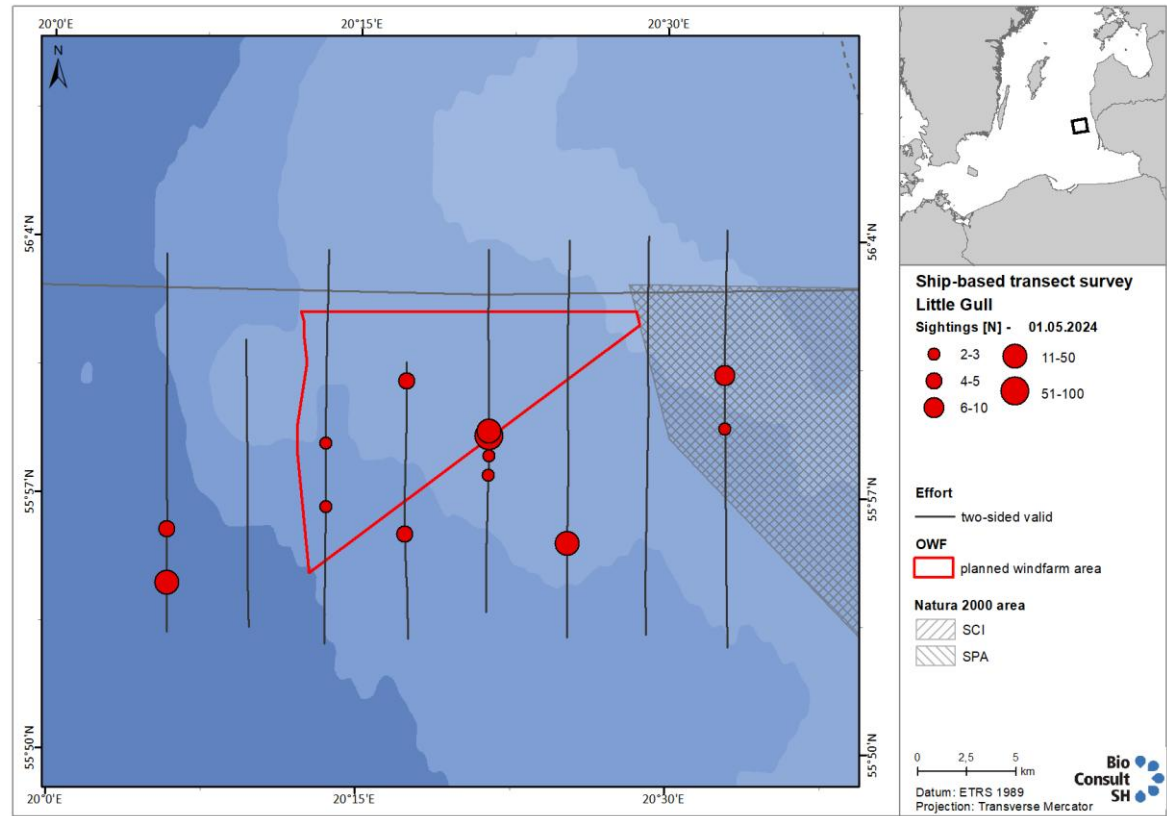


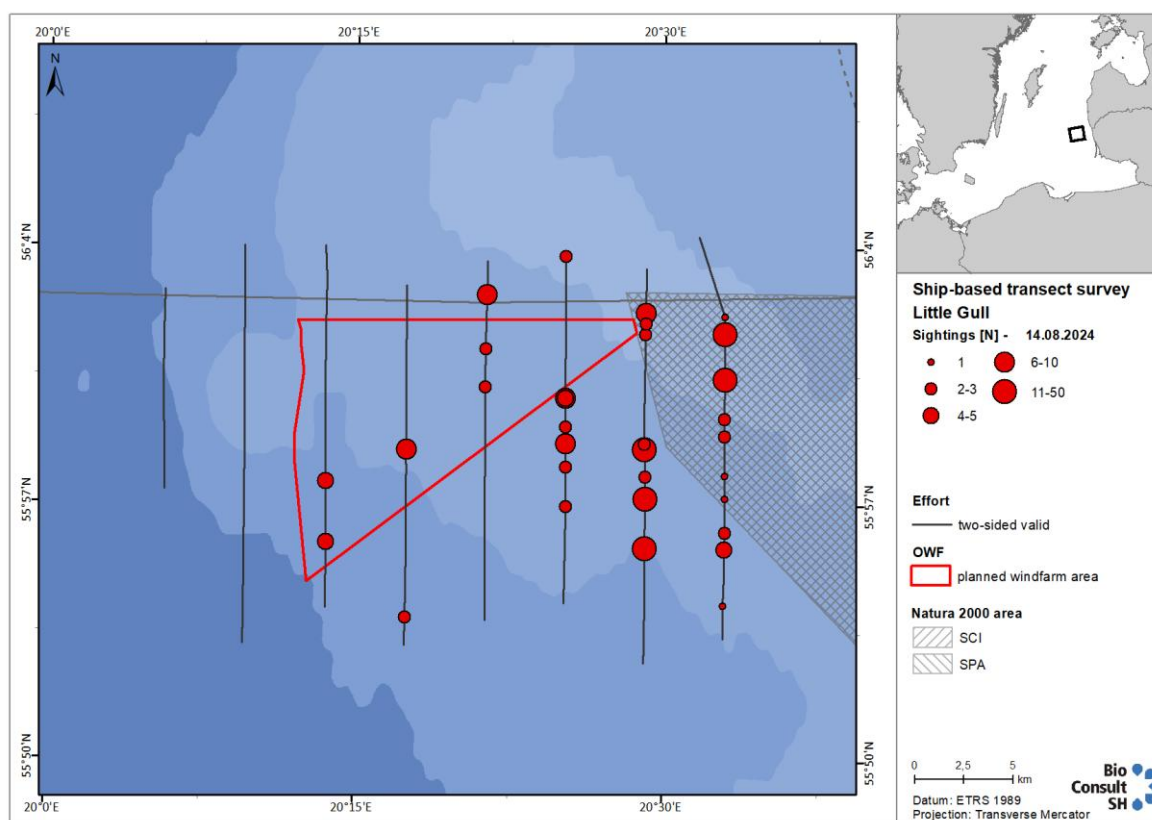
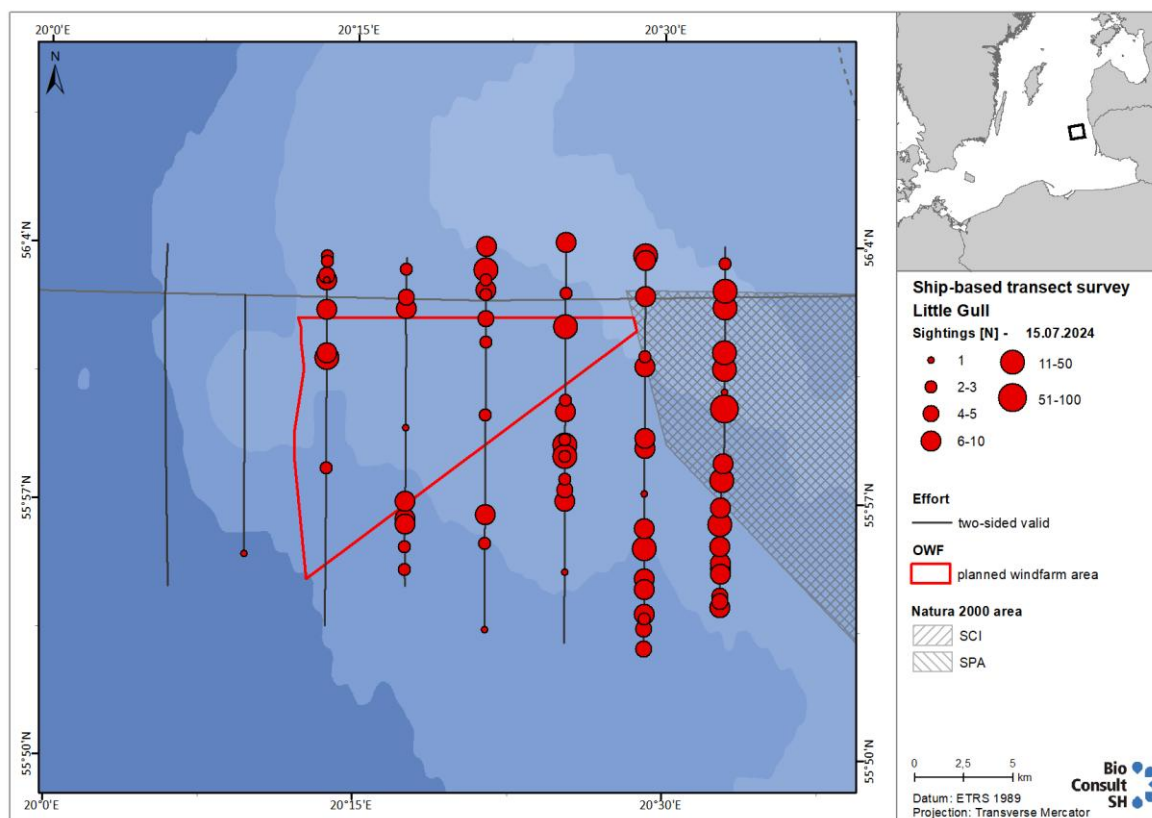
A.3.6 Little Gull (*Hydrocoloeus minutus*)

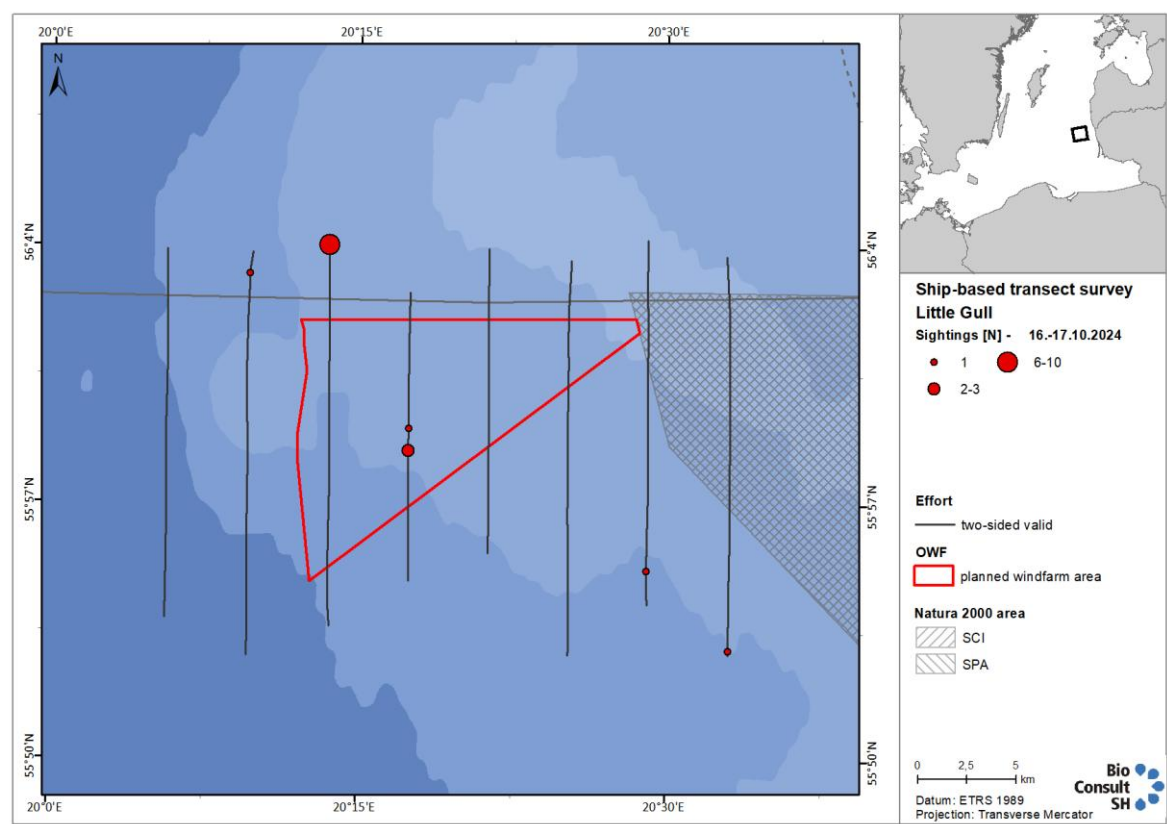
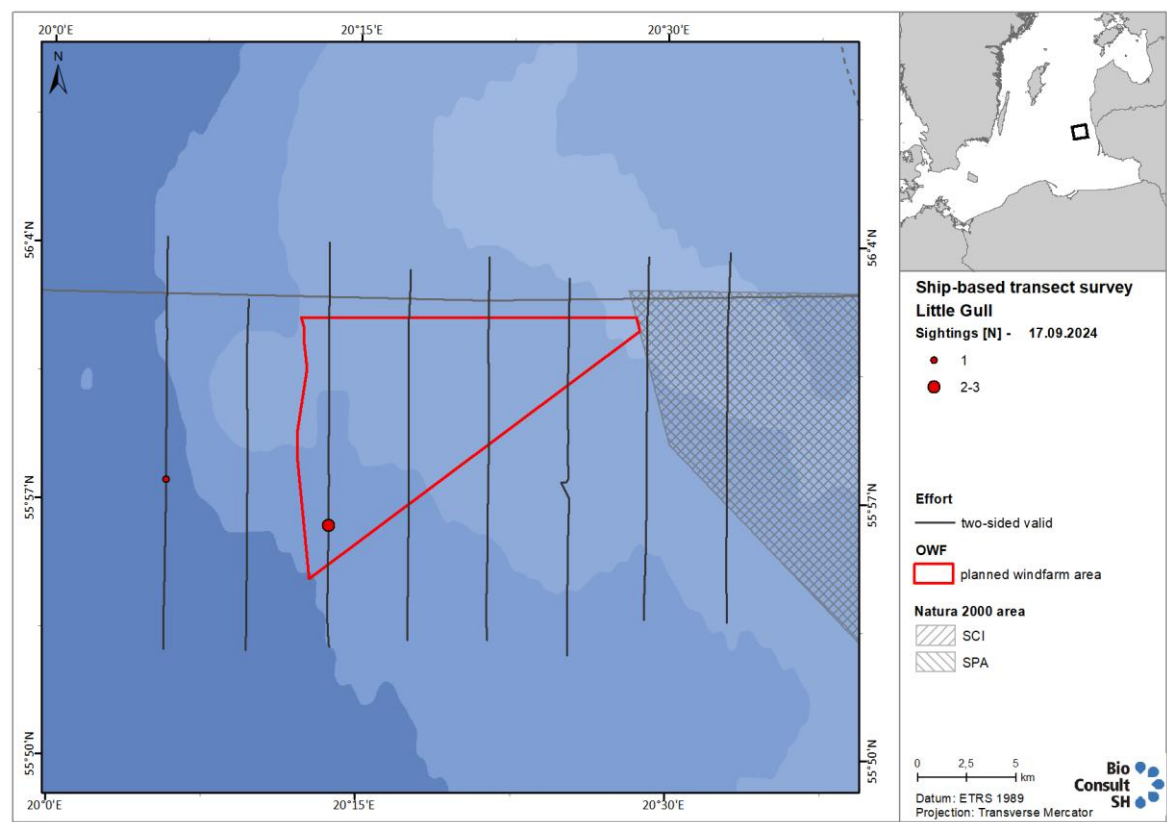




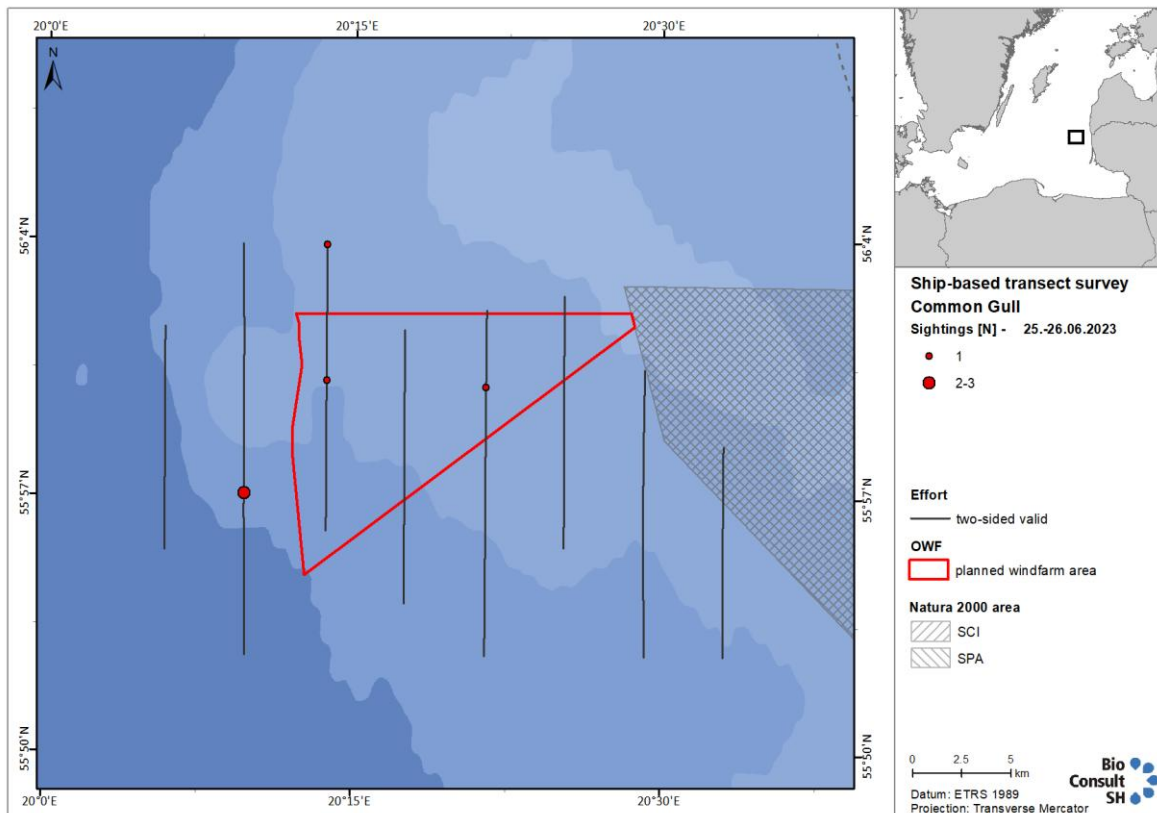
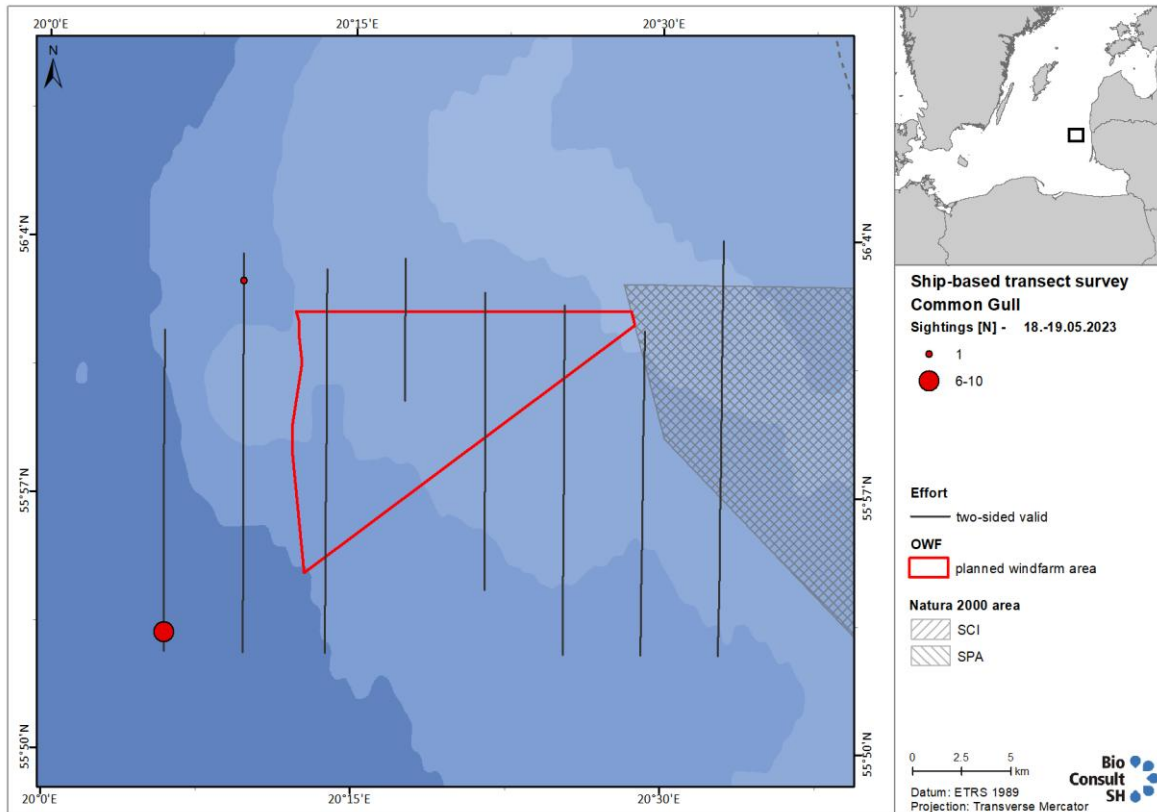


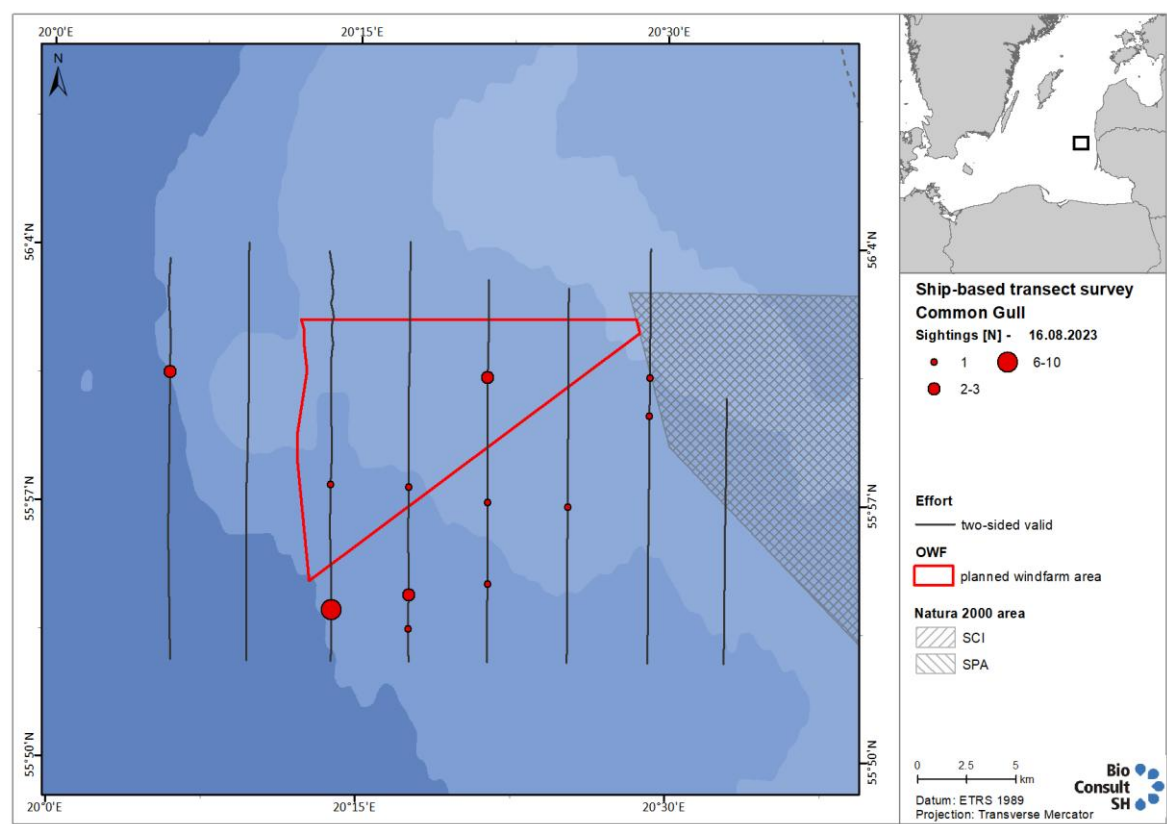
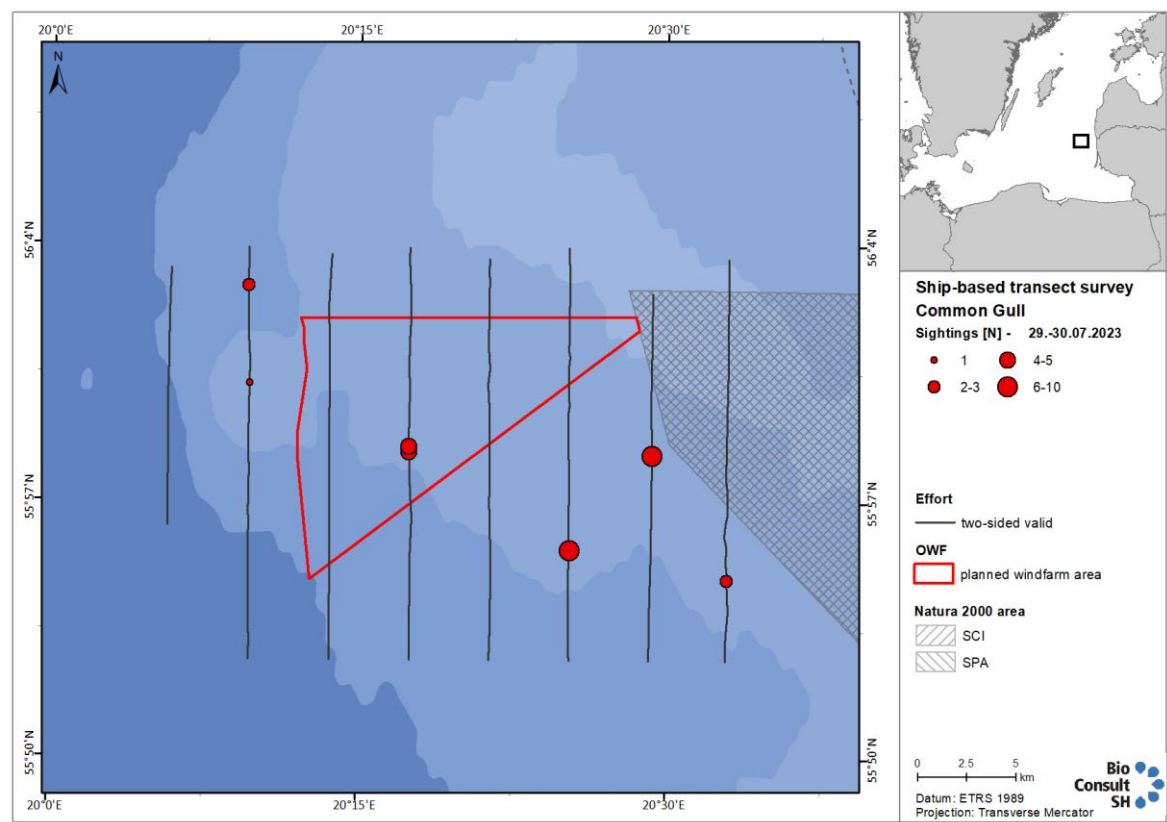


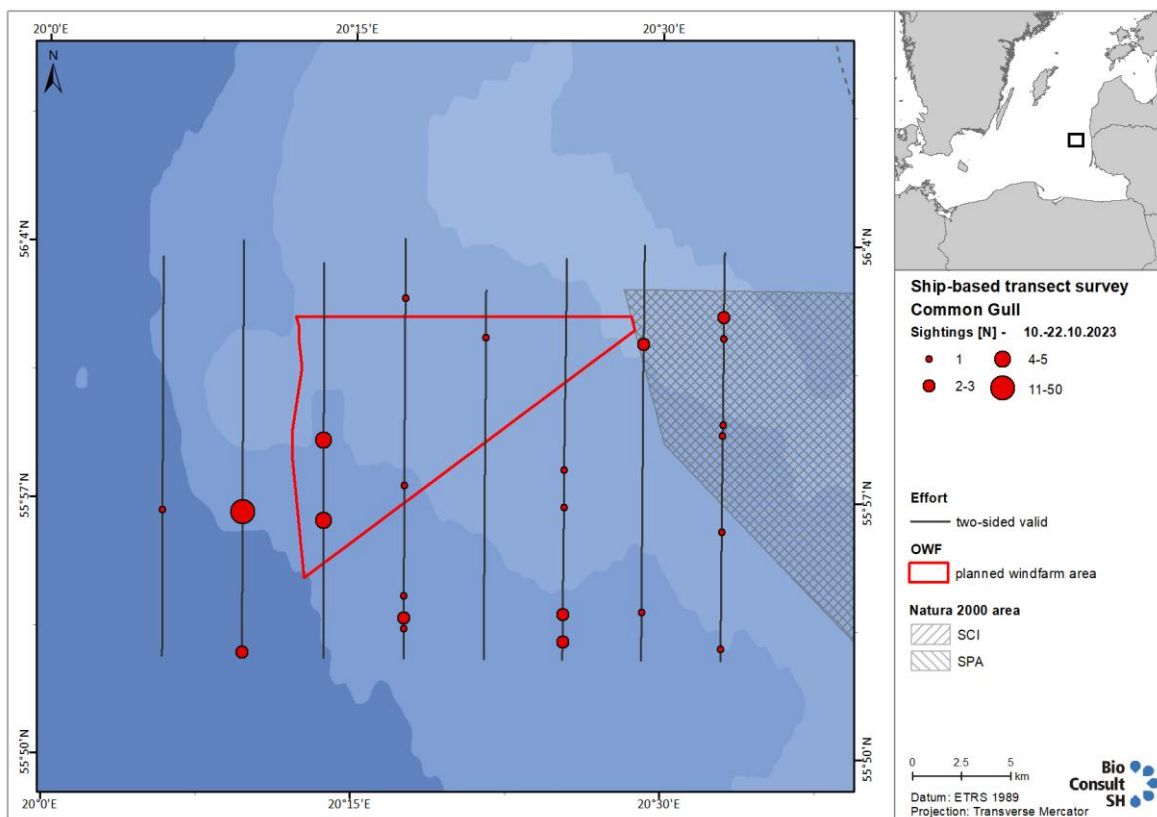
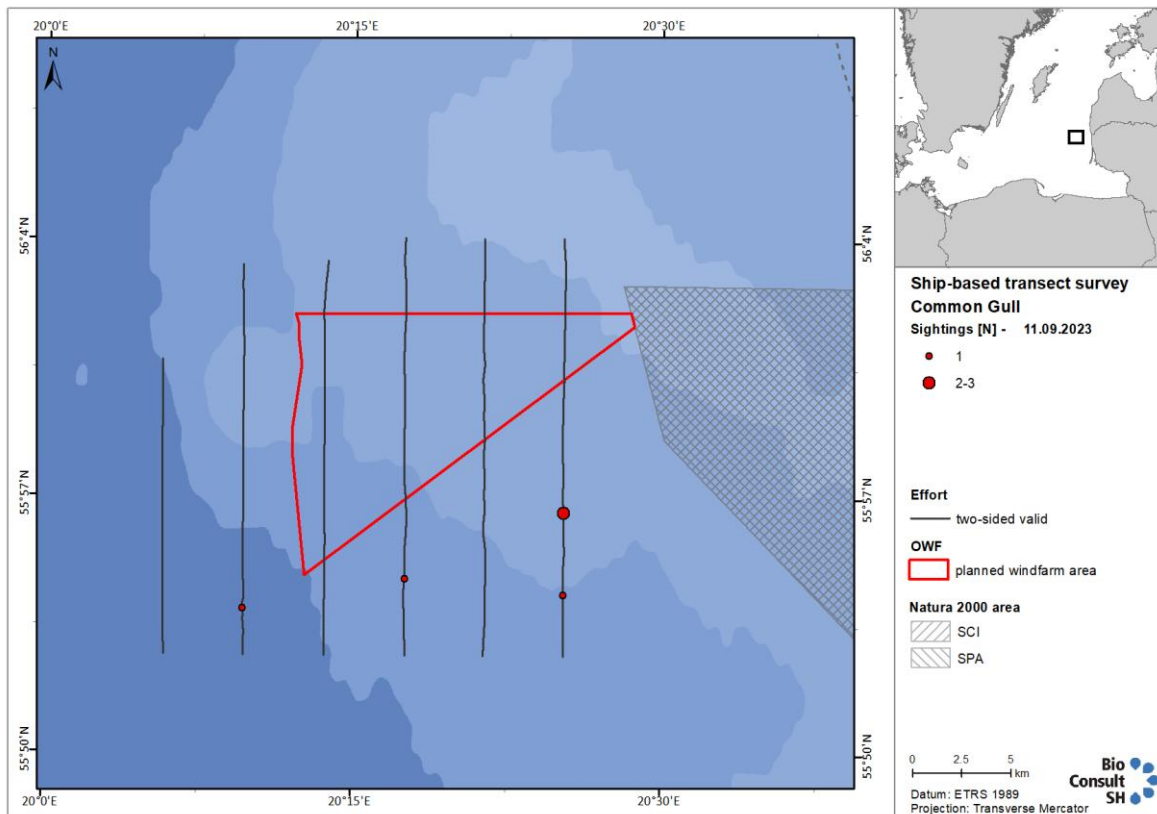


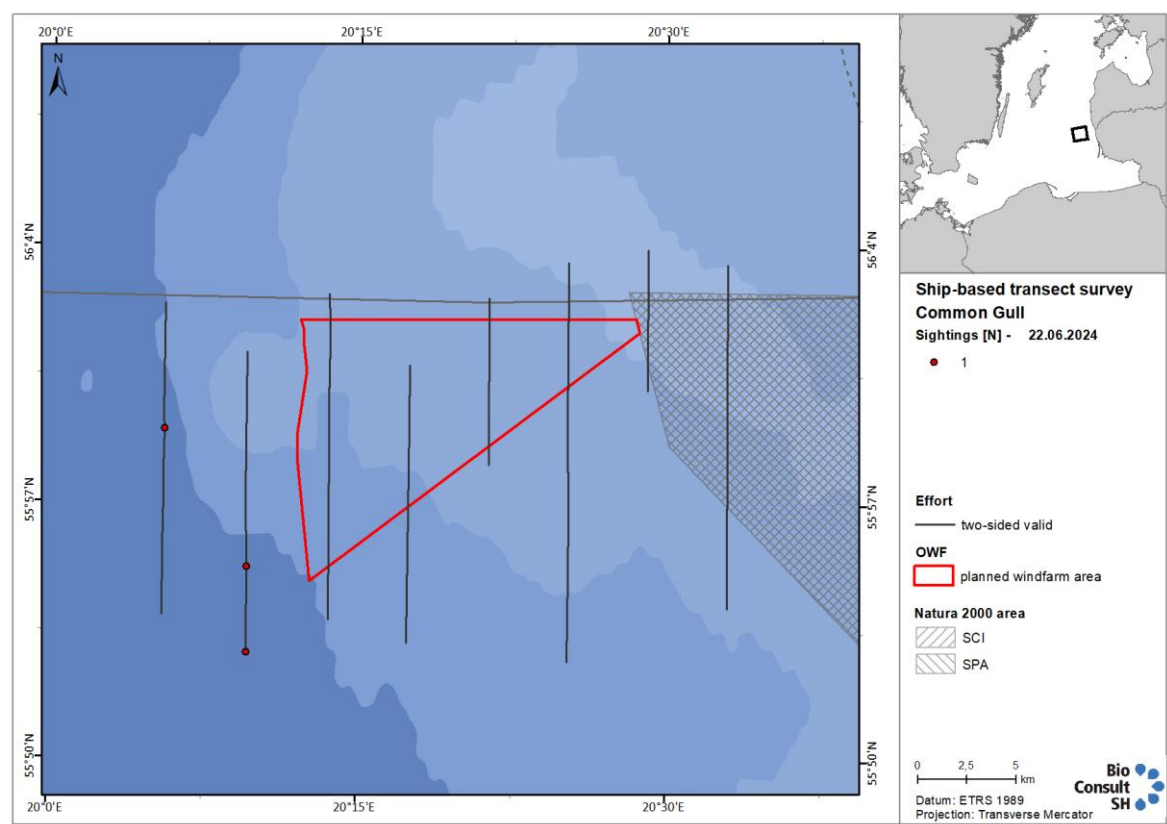
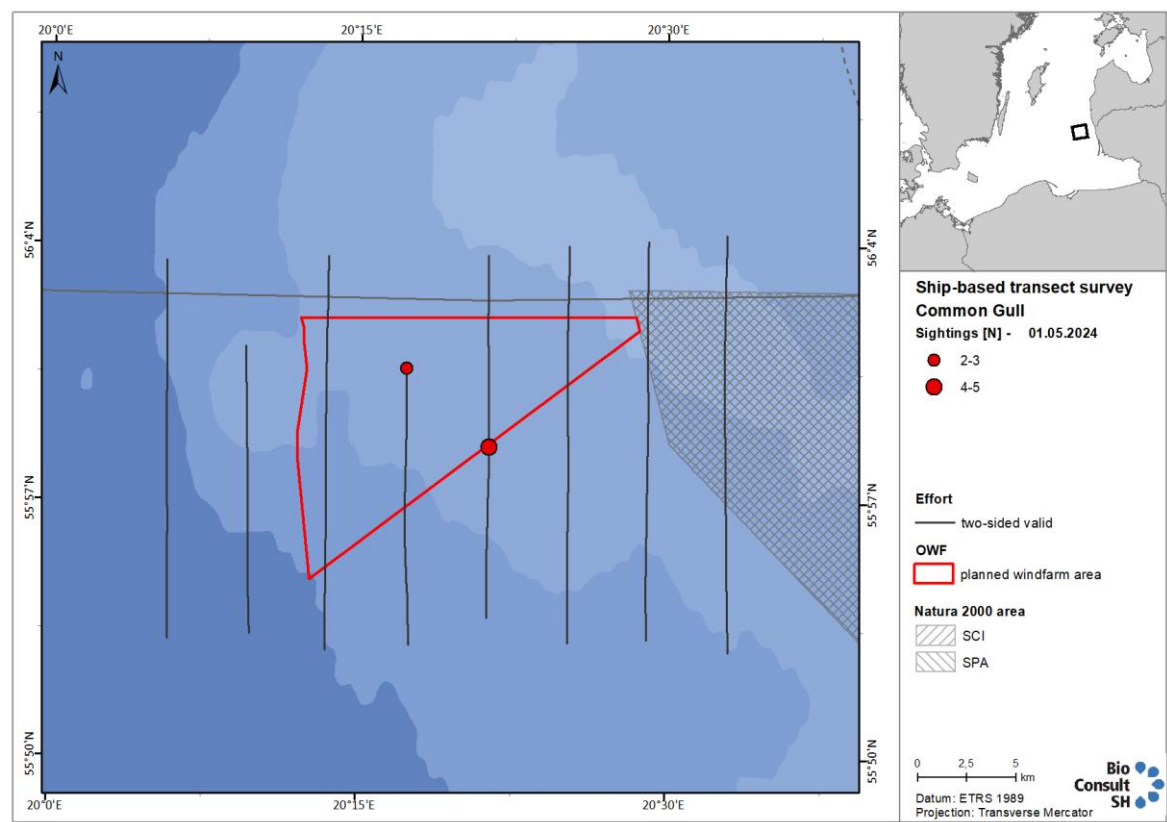


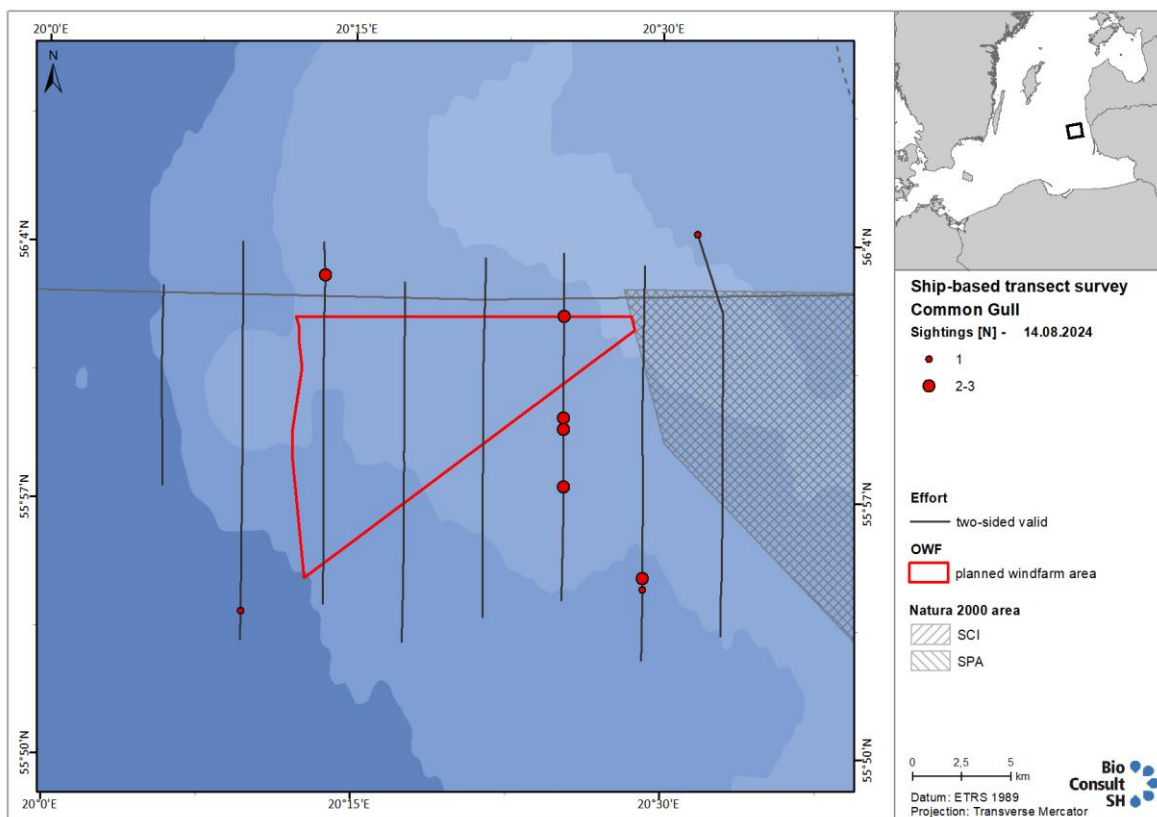
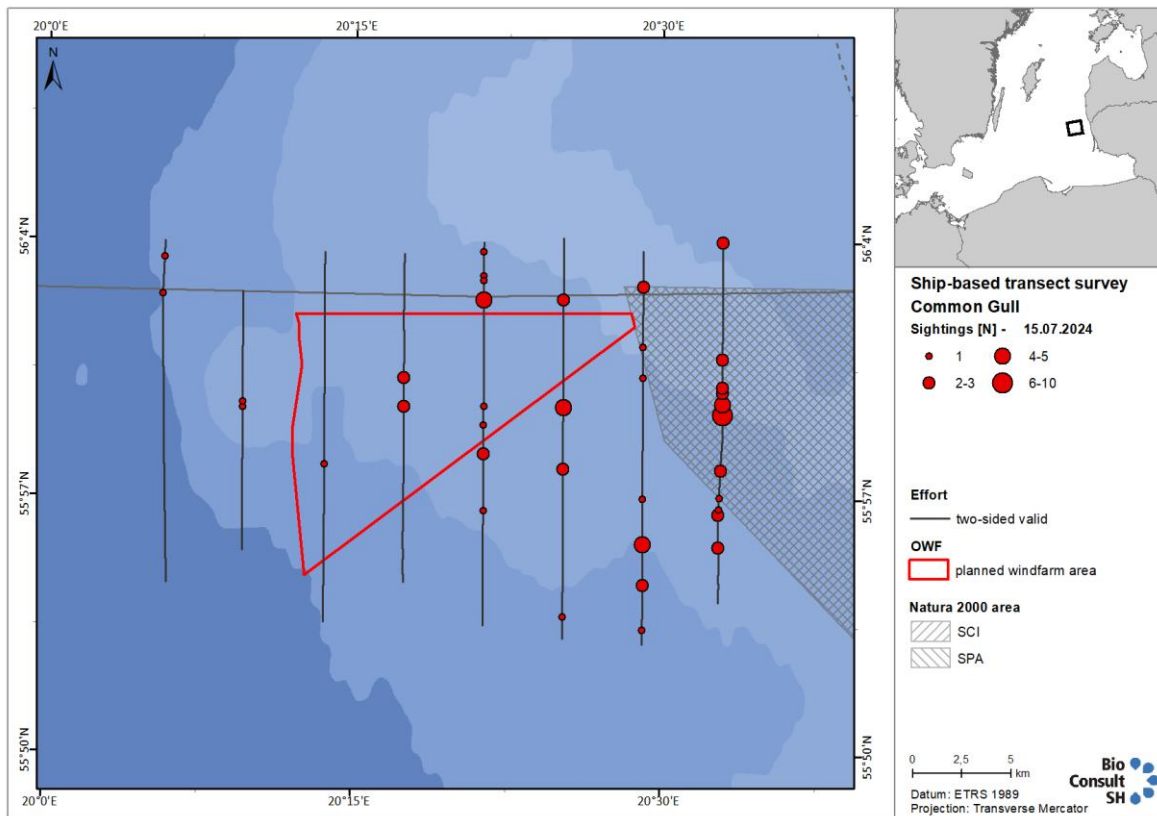
A.3.7 Common Gull (*Larus canus*)

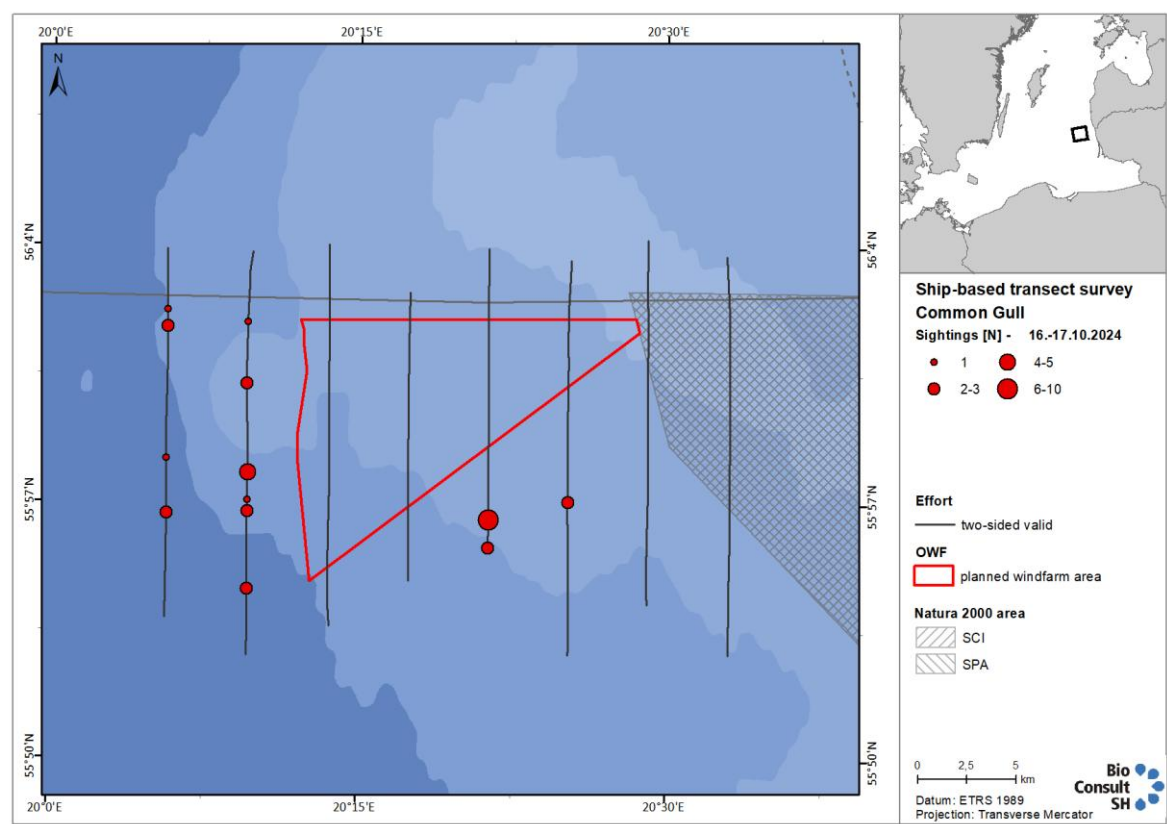
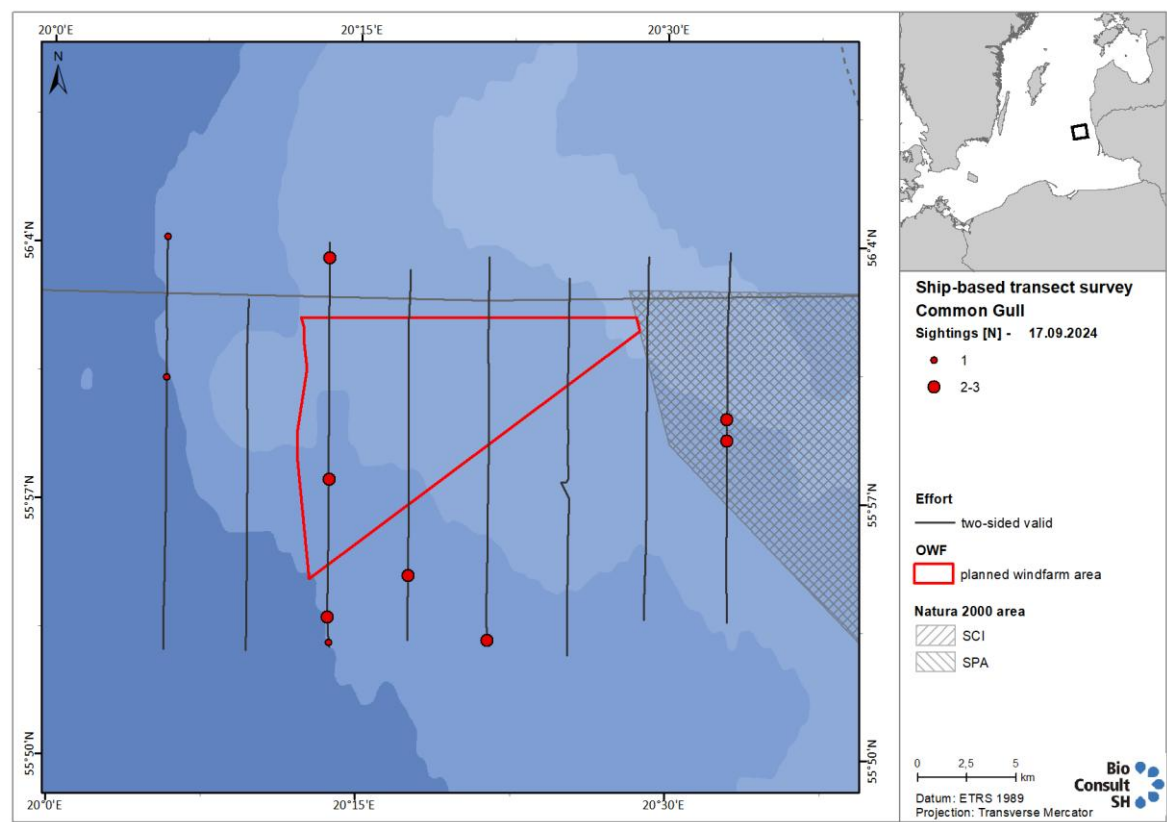




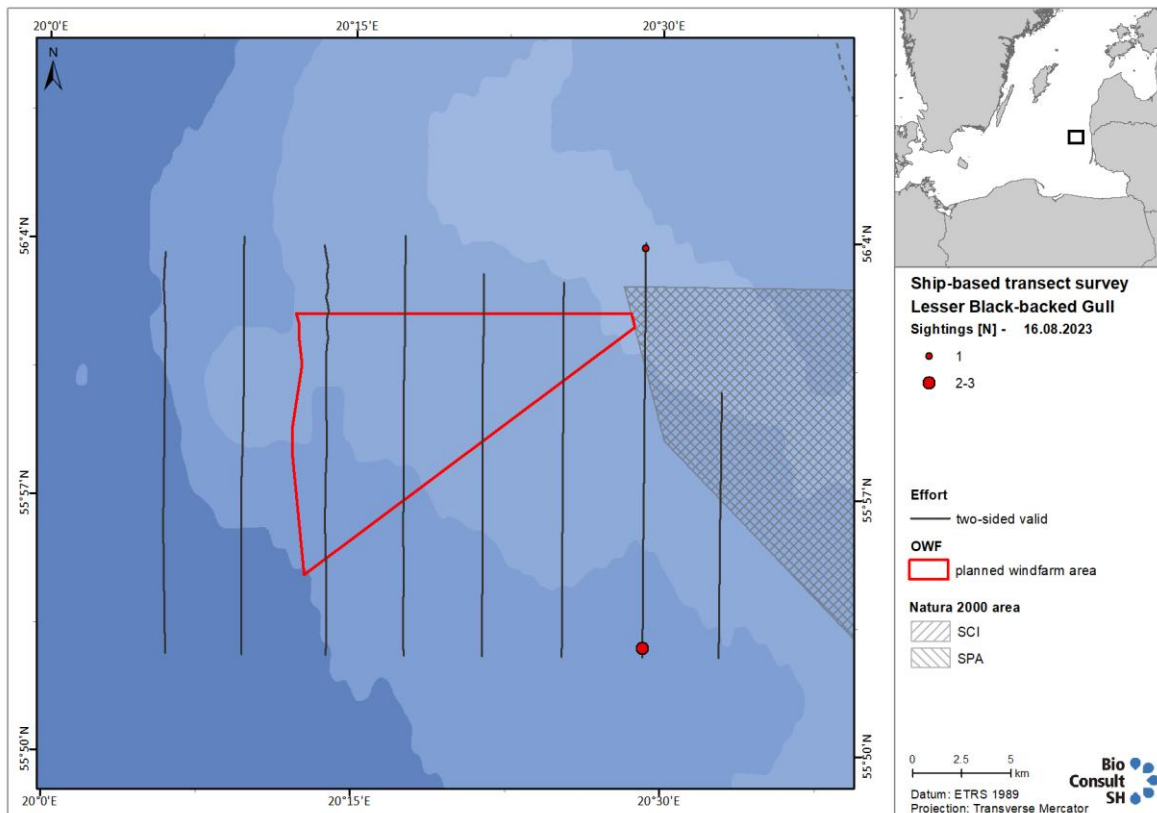
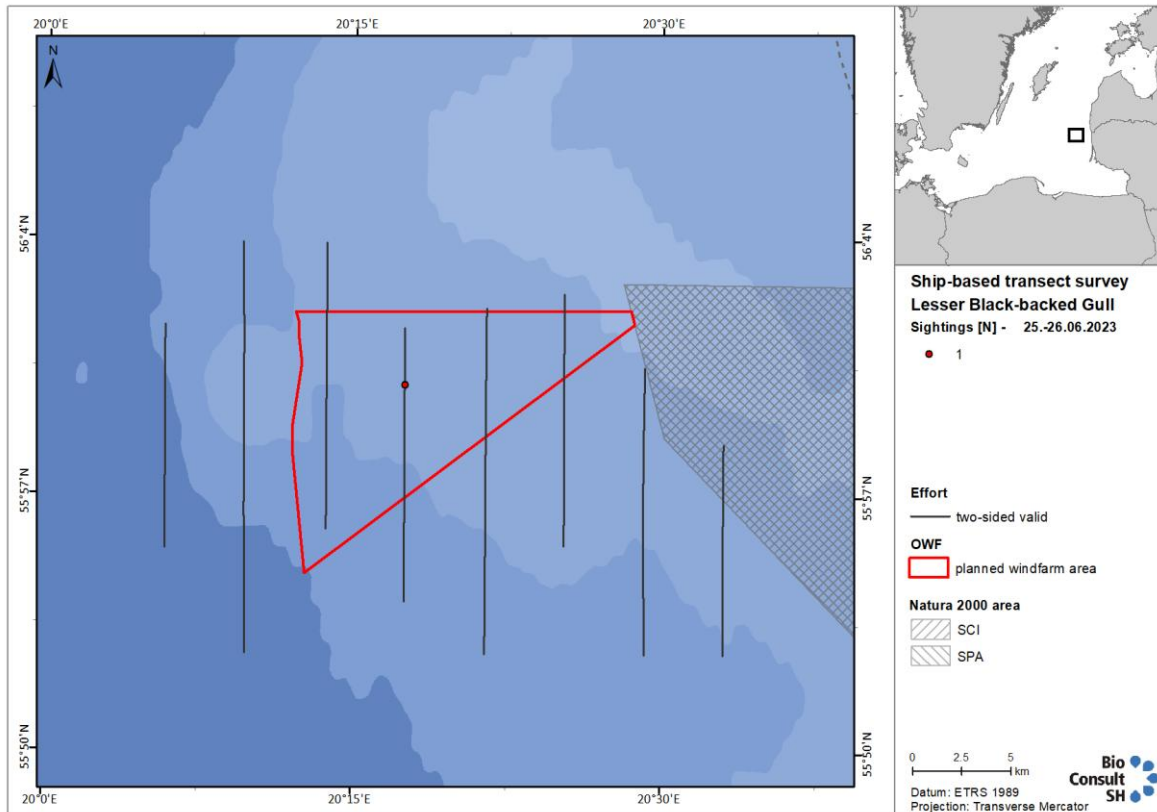


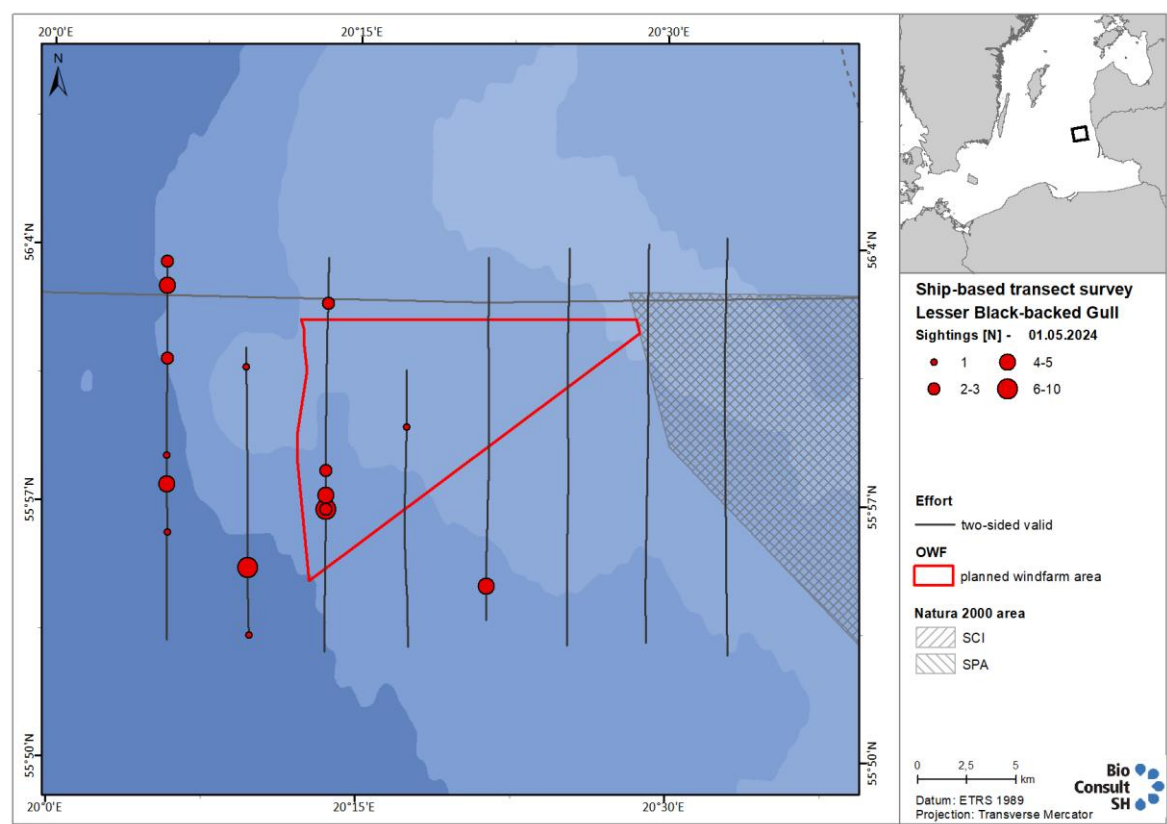
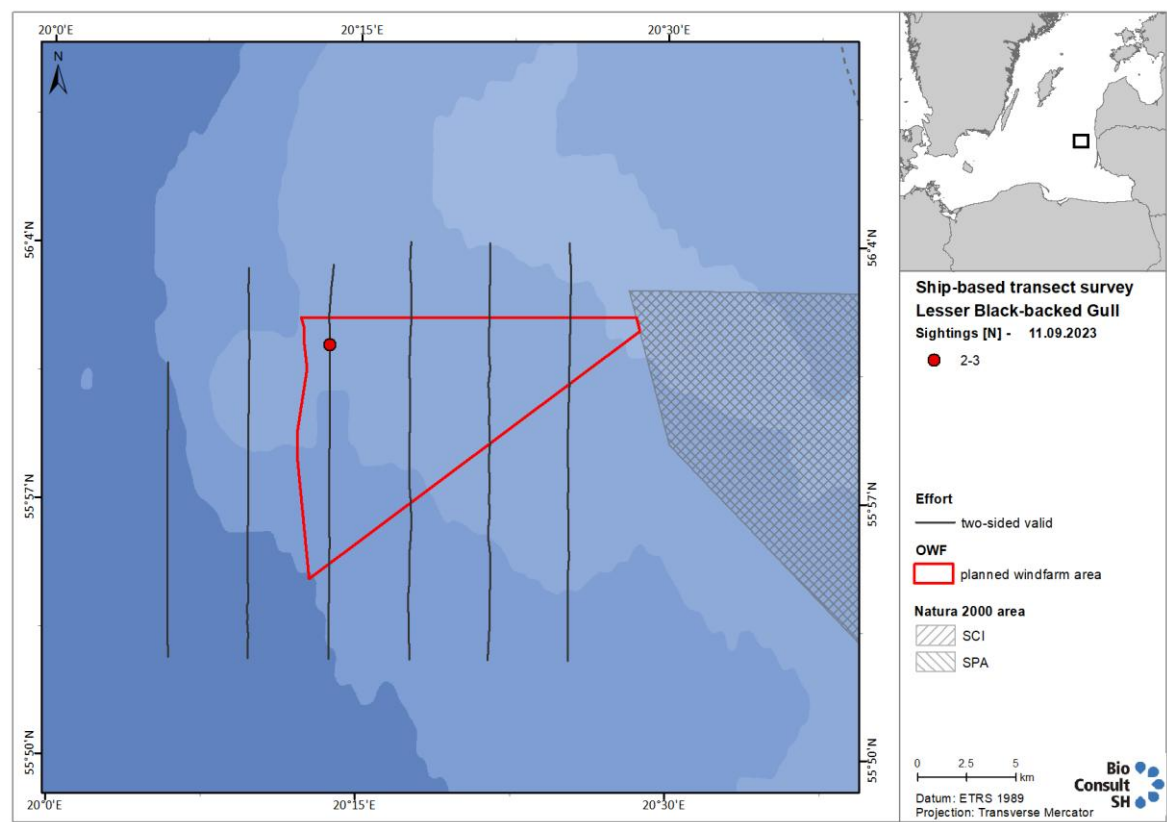


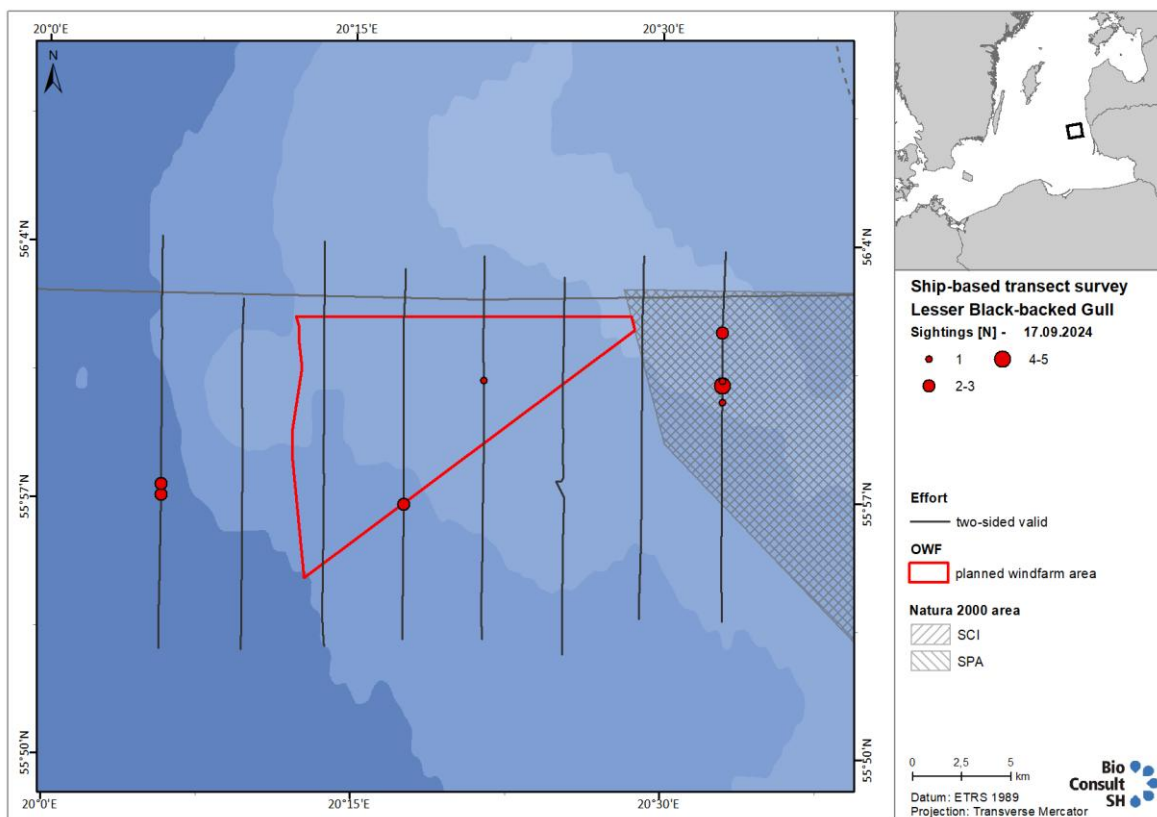
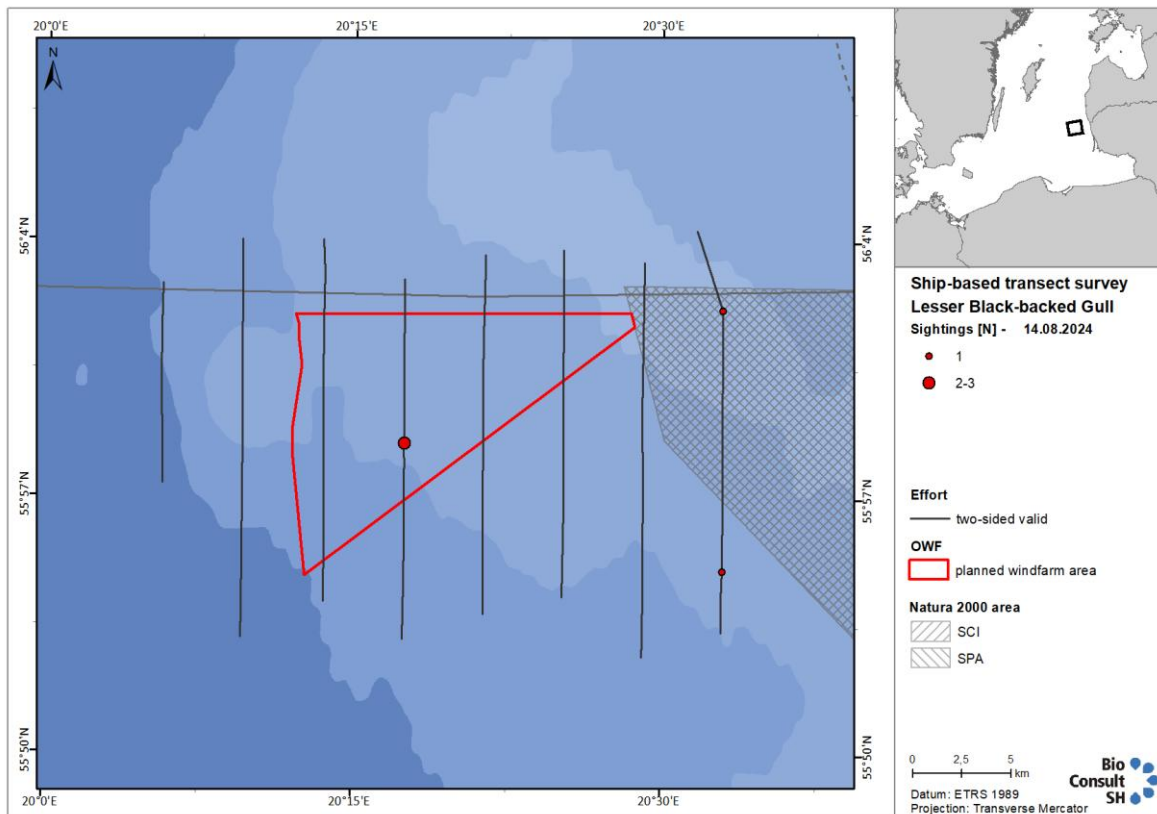




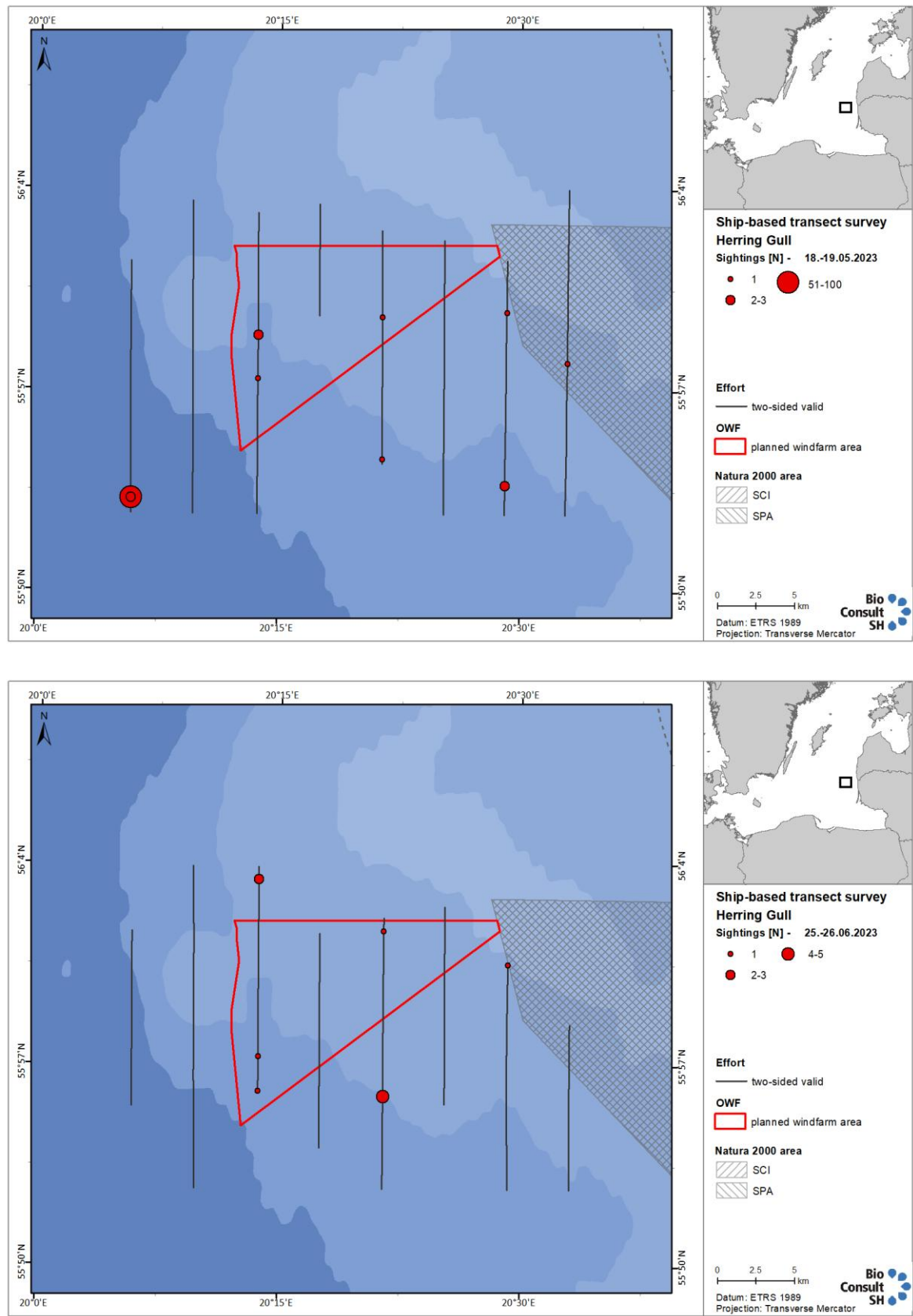
A.3.8 Lesser Black-backed Gull (*Larus fuscus*)

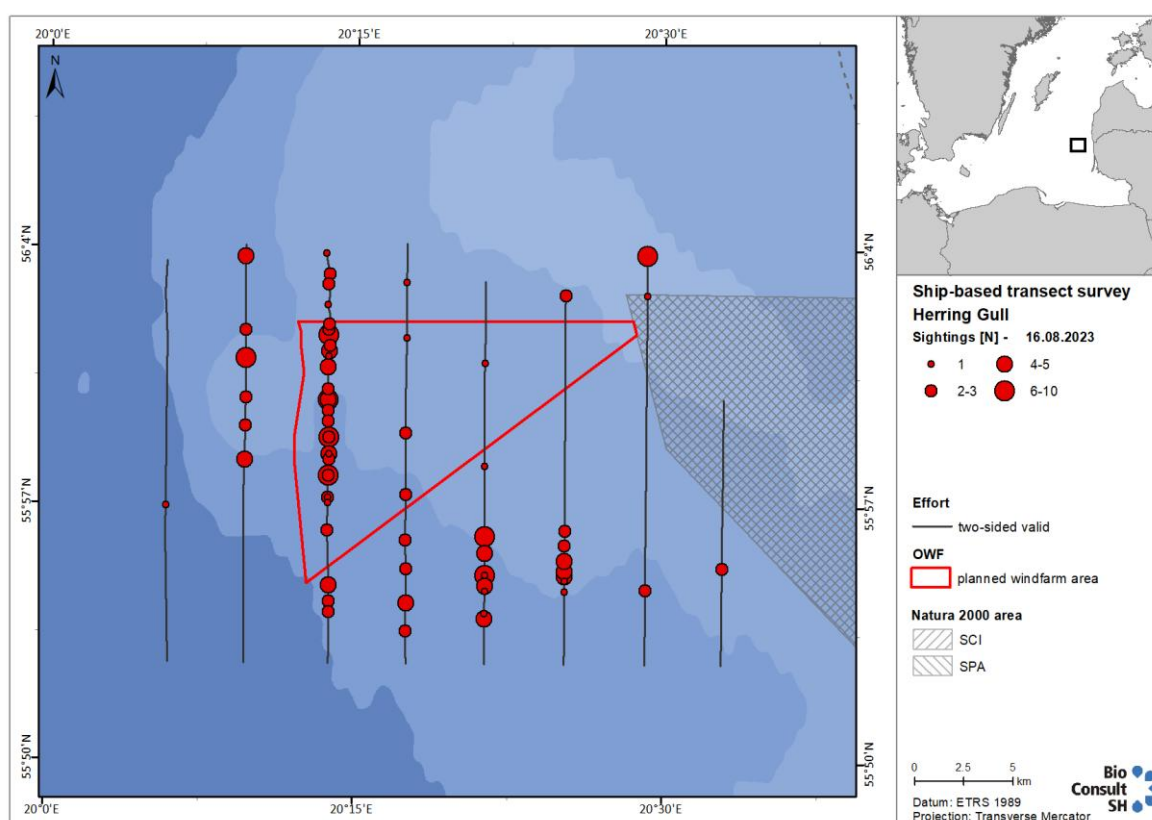
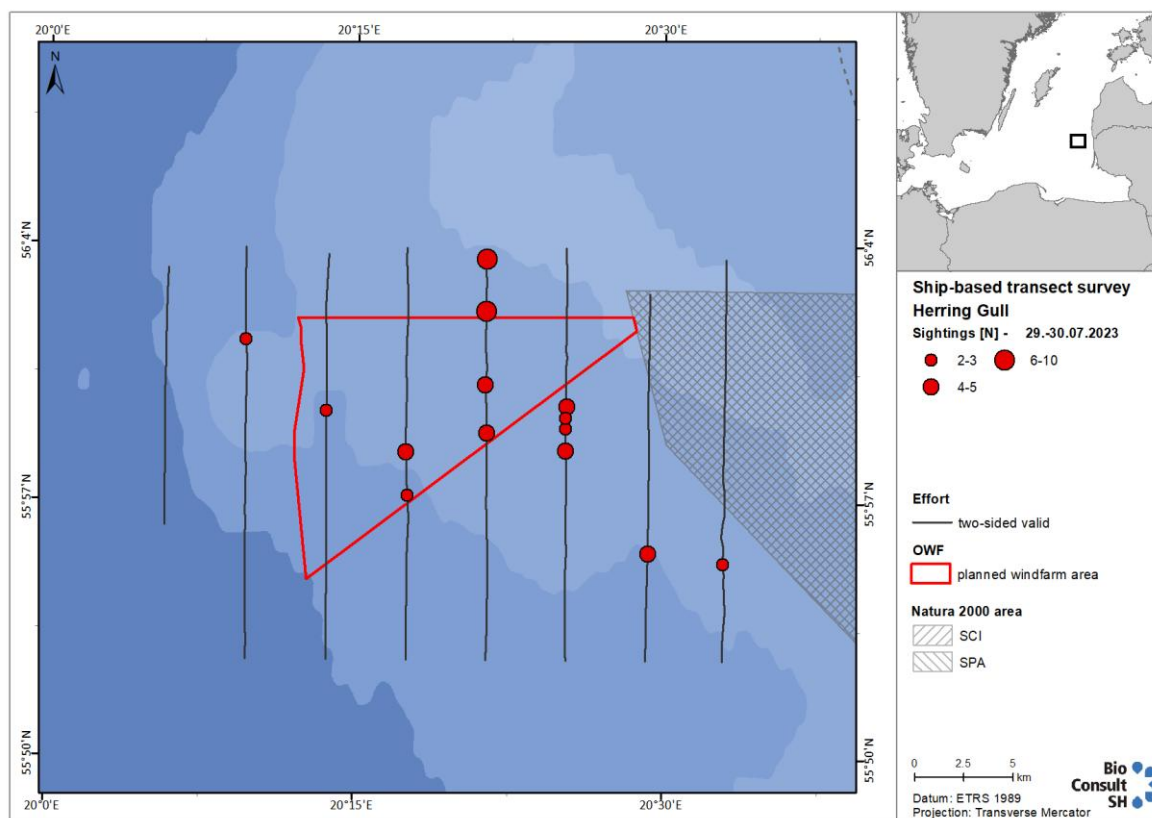


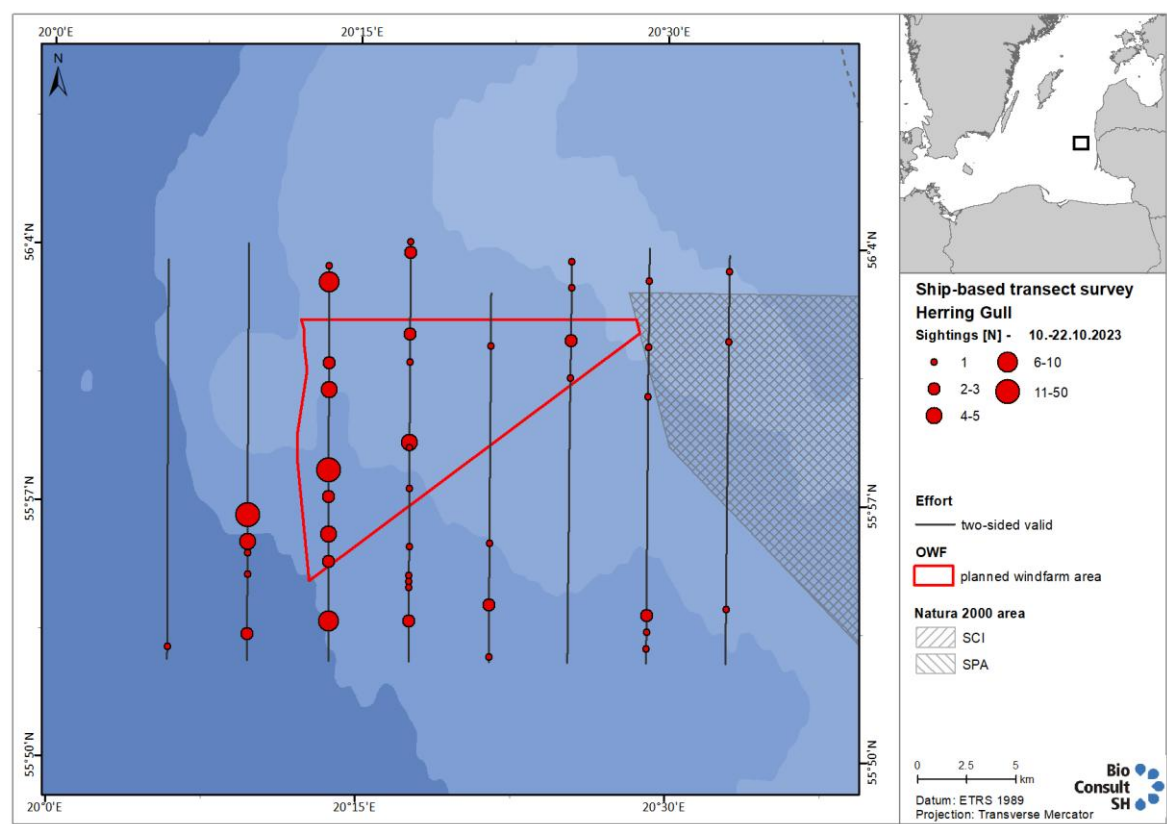
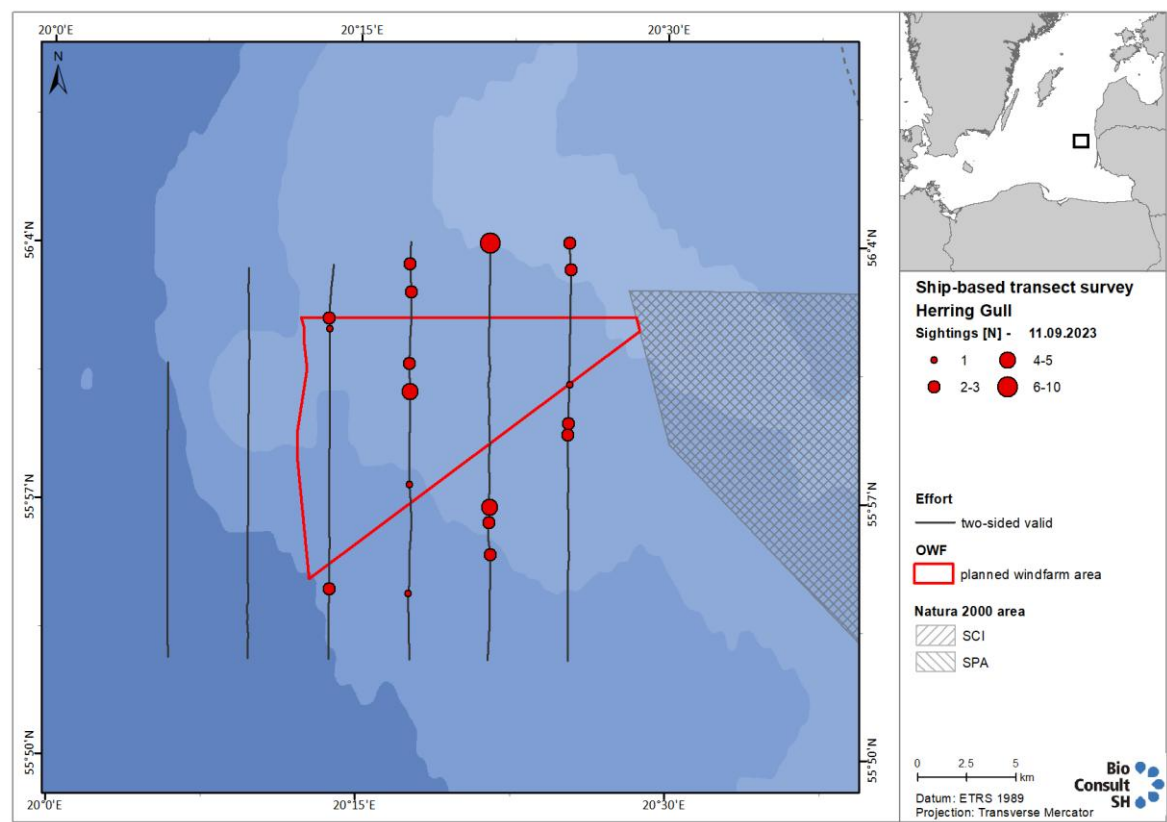


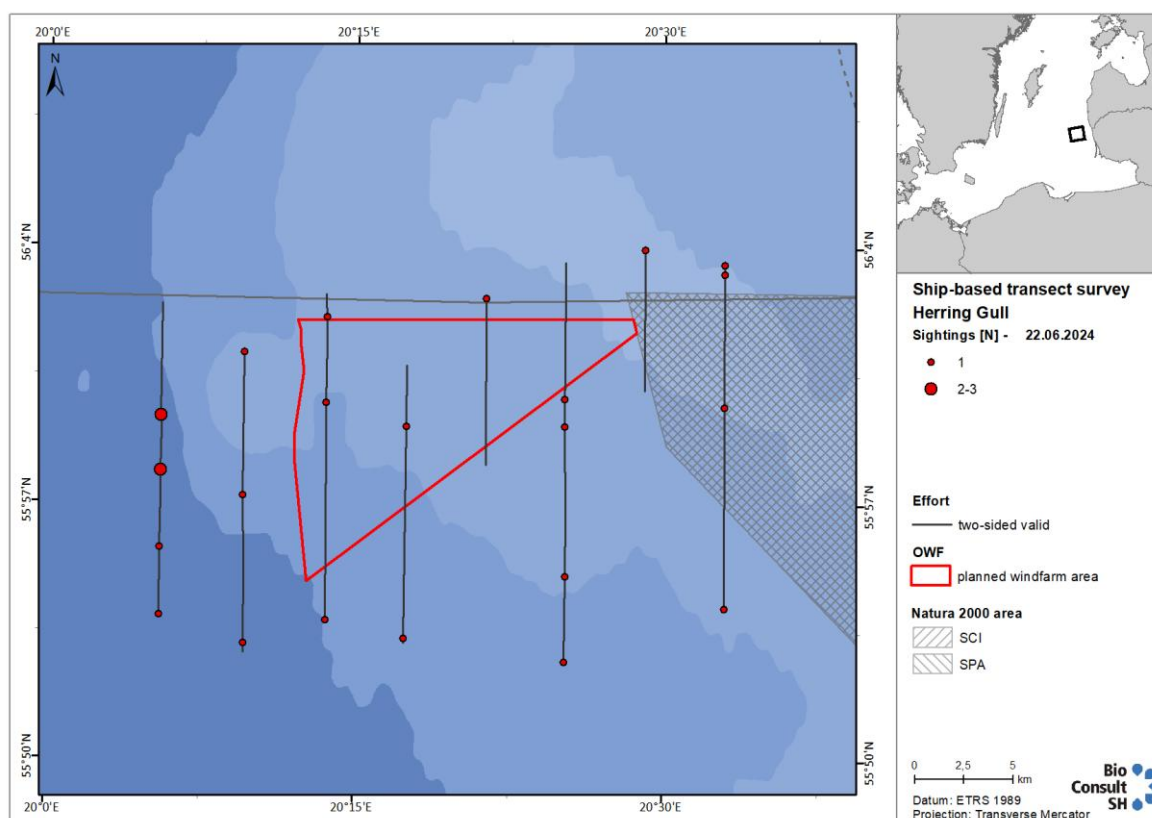
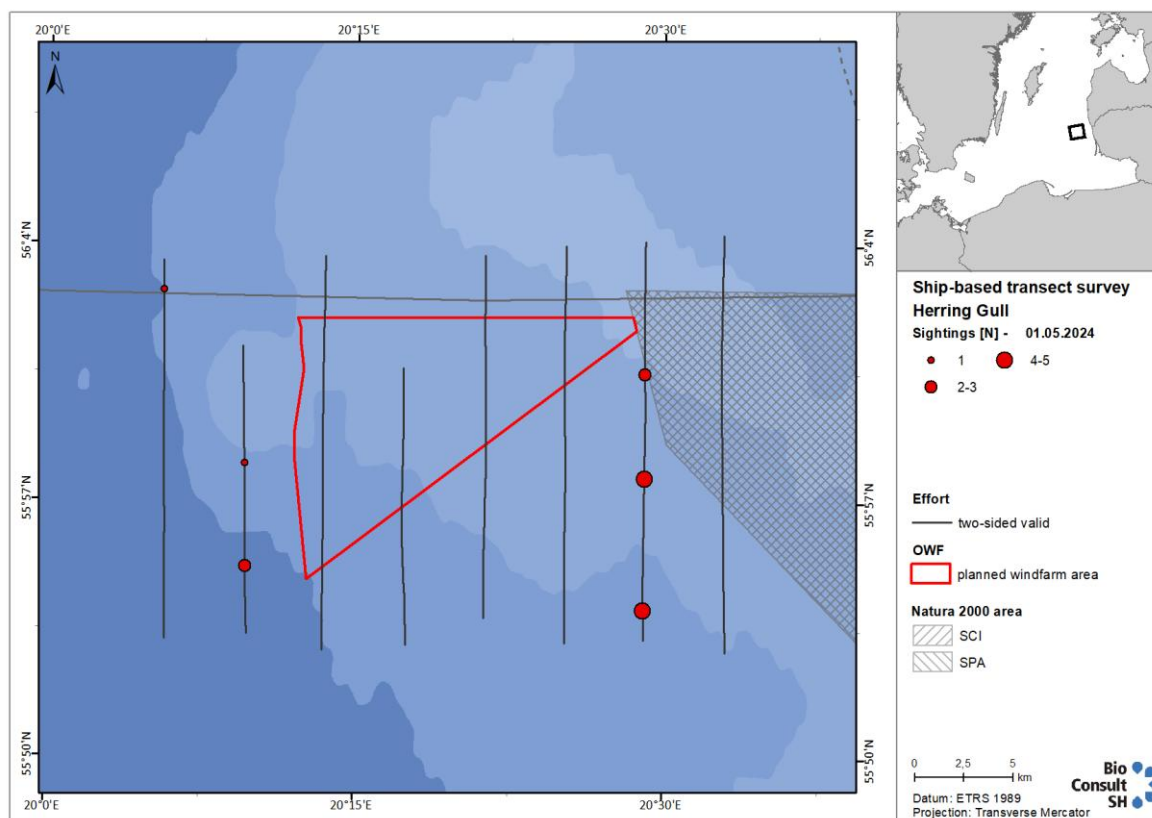


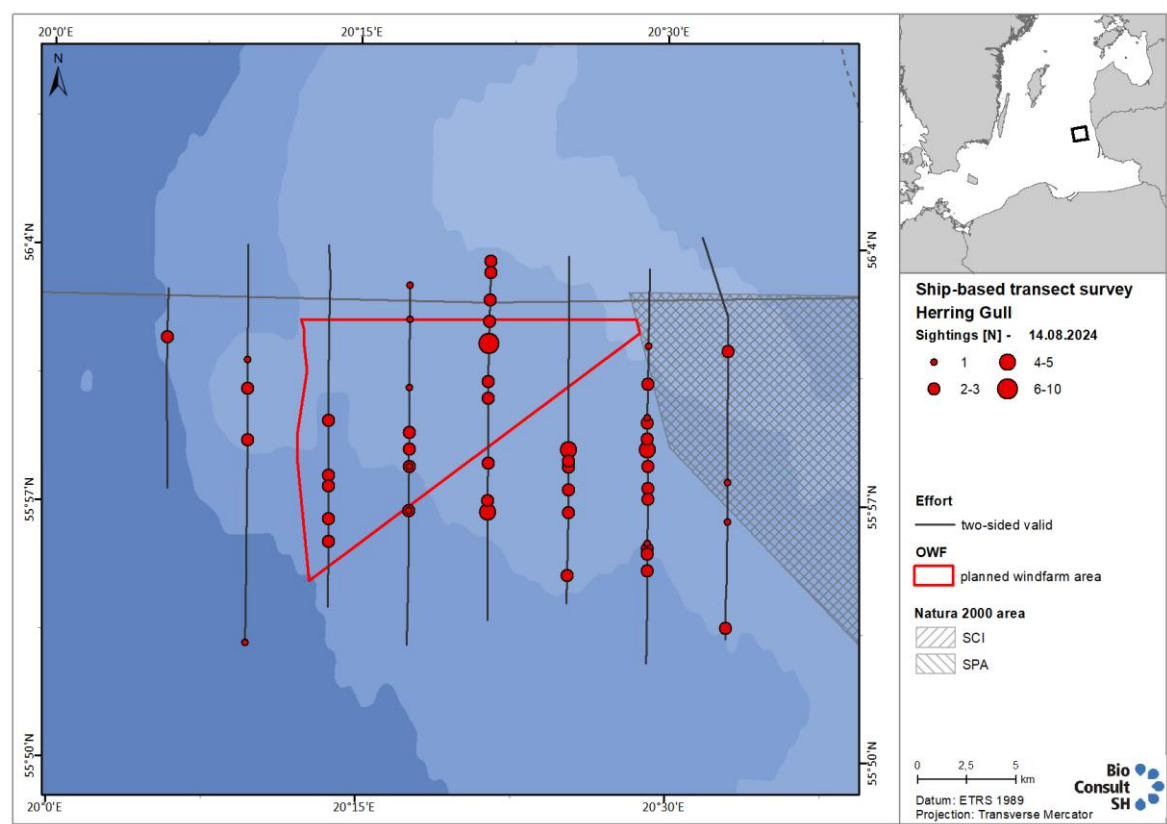
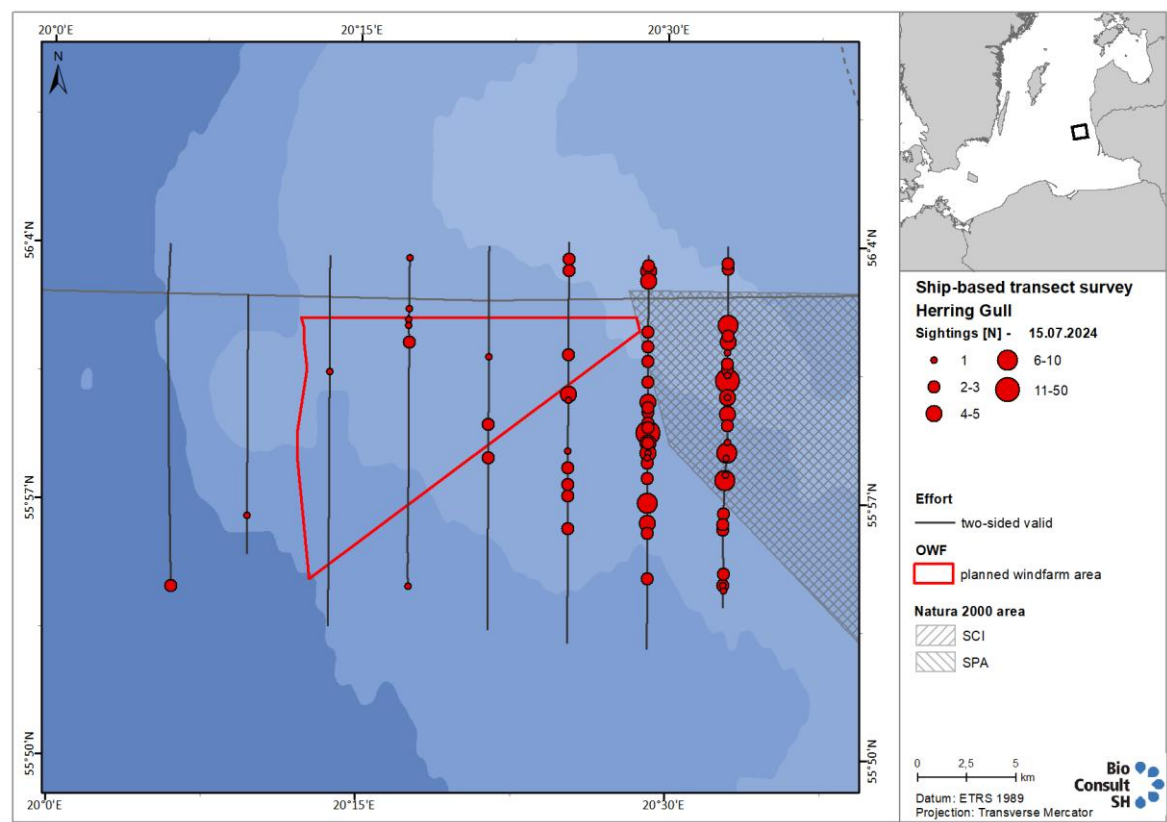
A.3.9 Herring Gull (*Larus argentatus*)

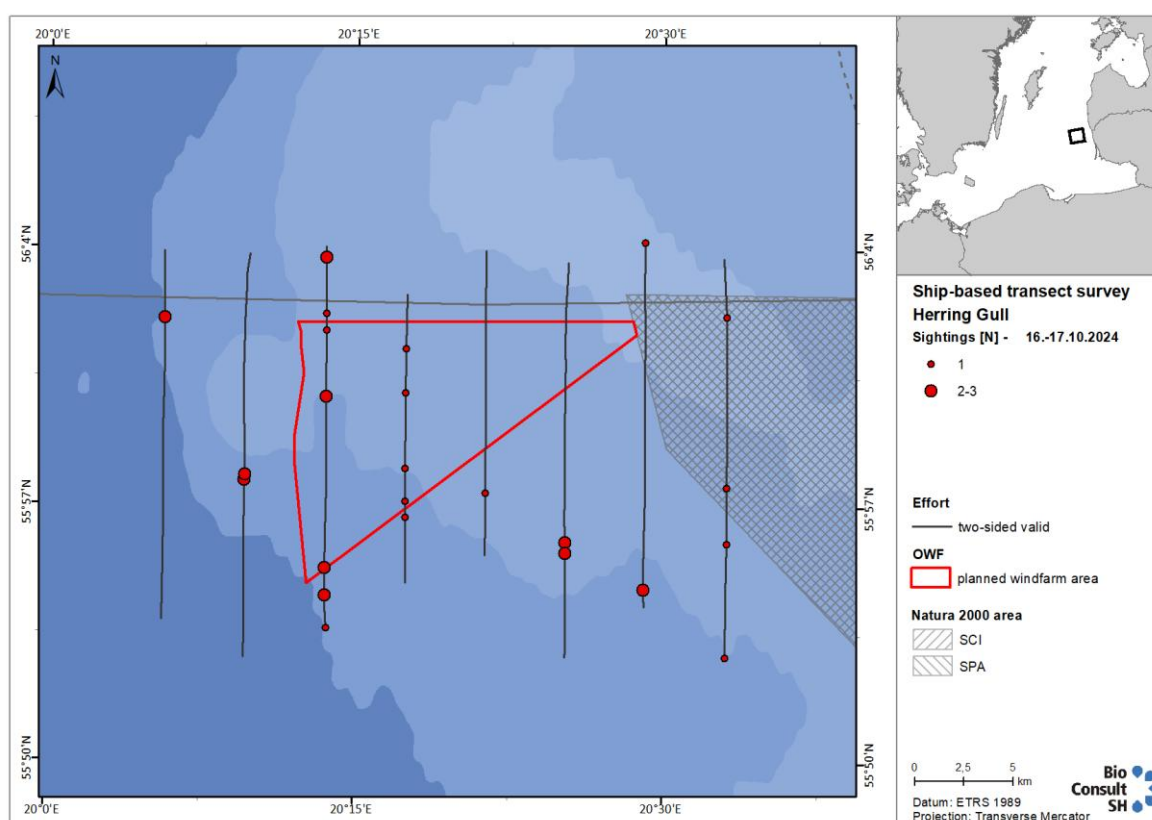
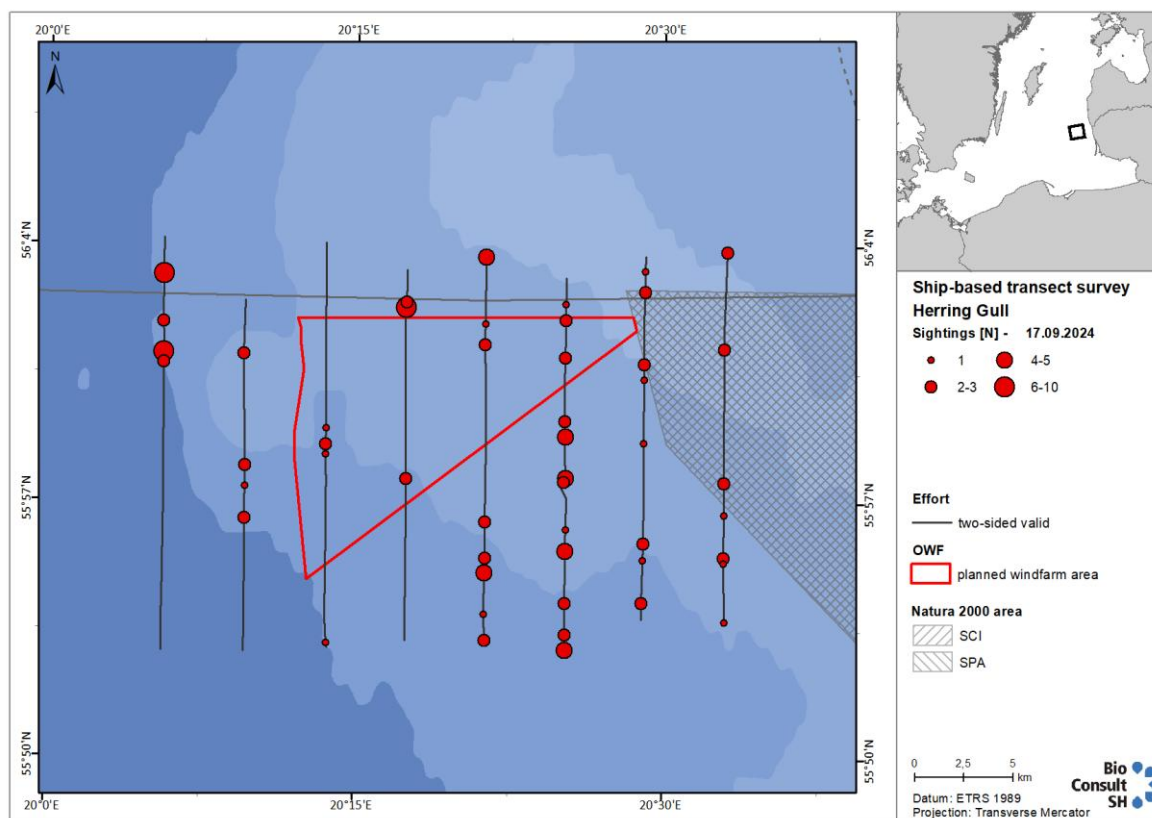




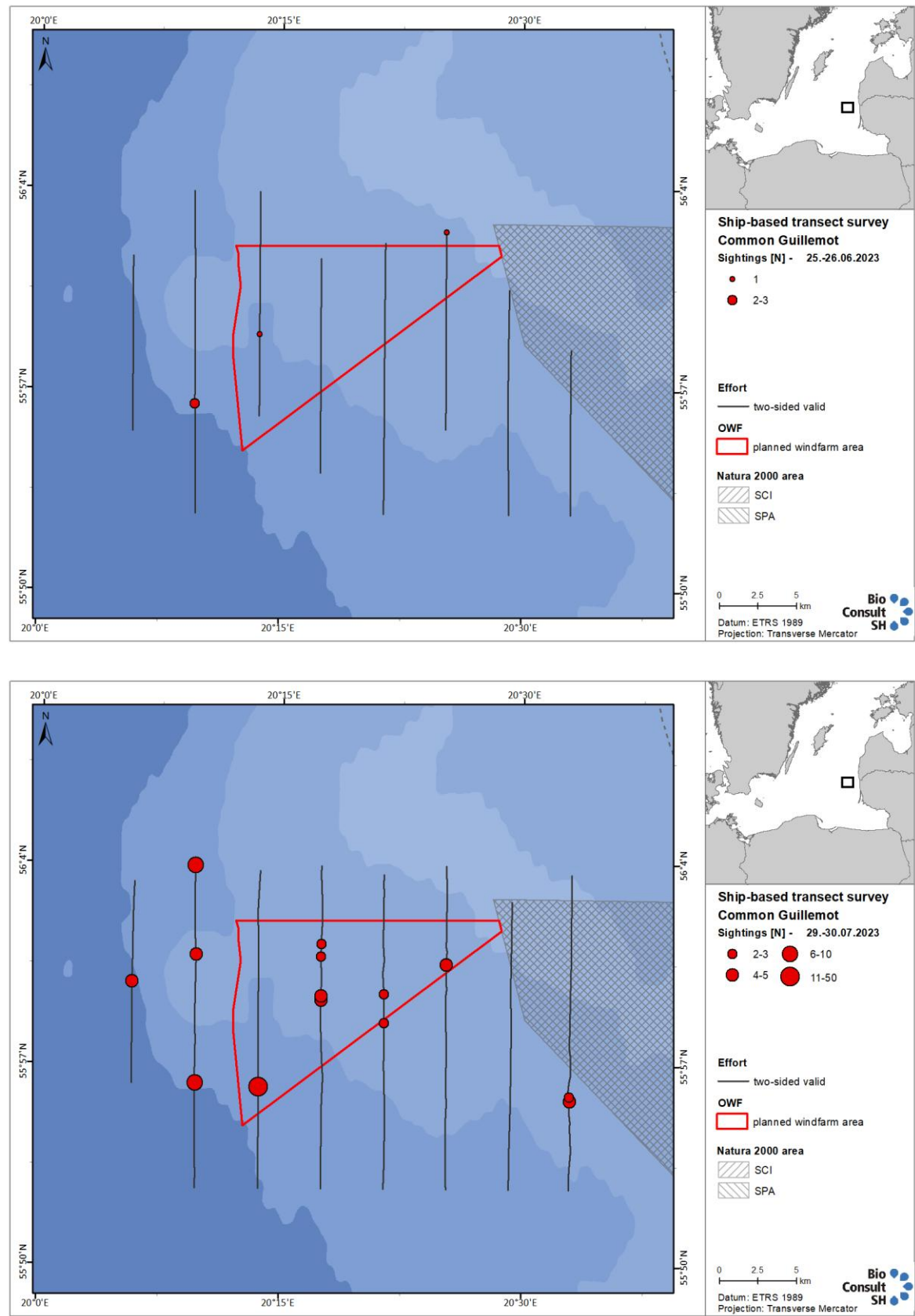


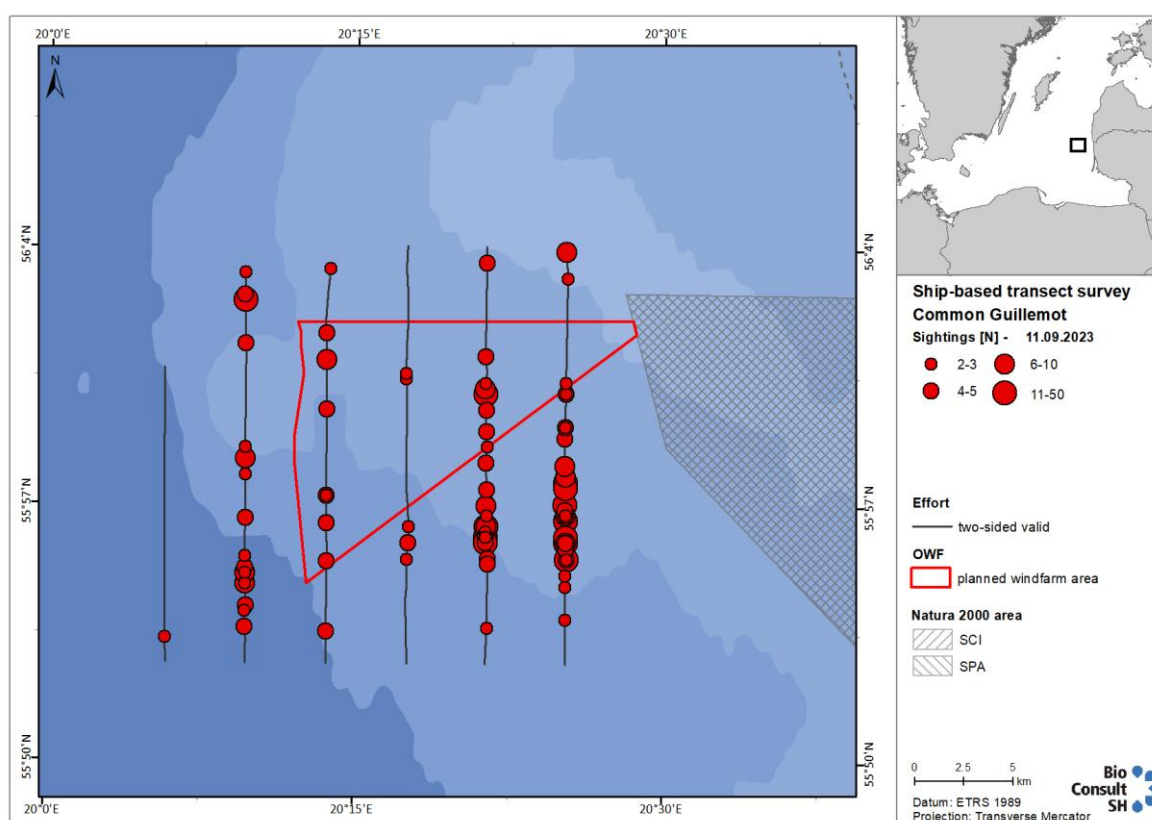
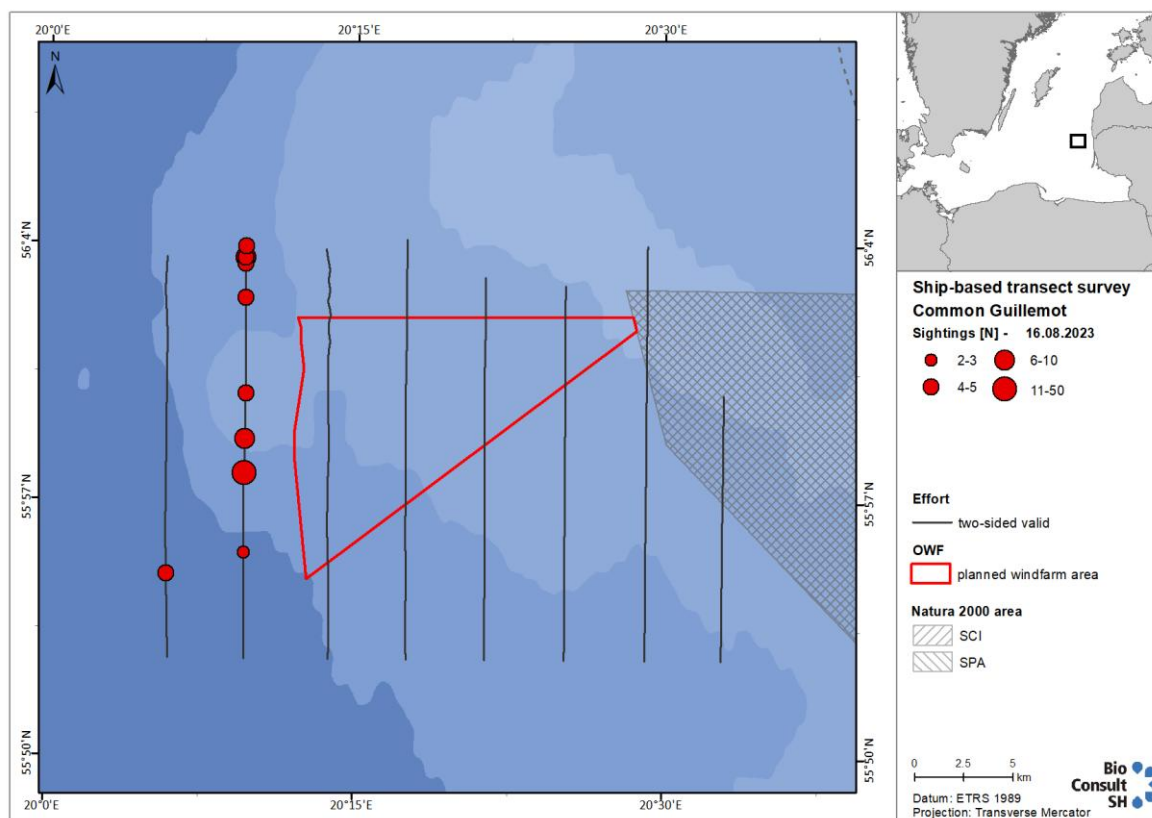


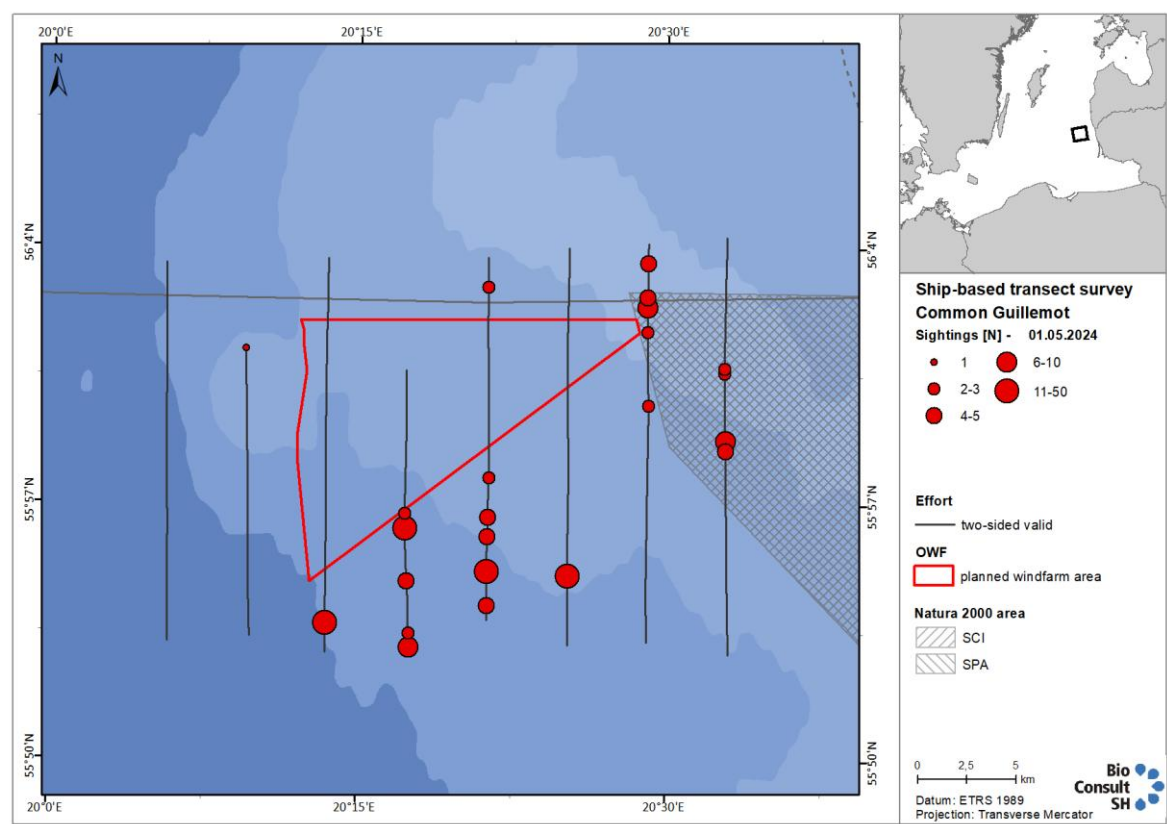
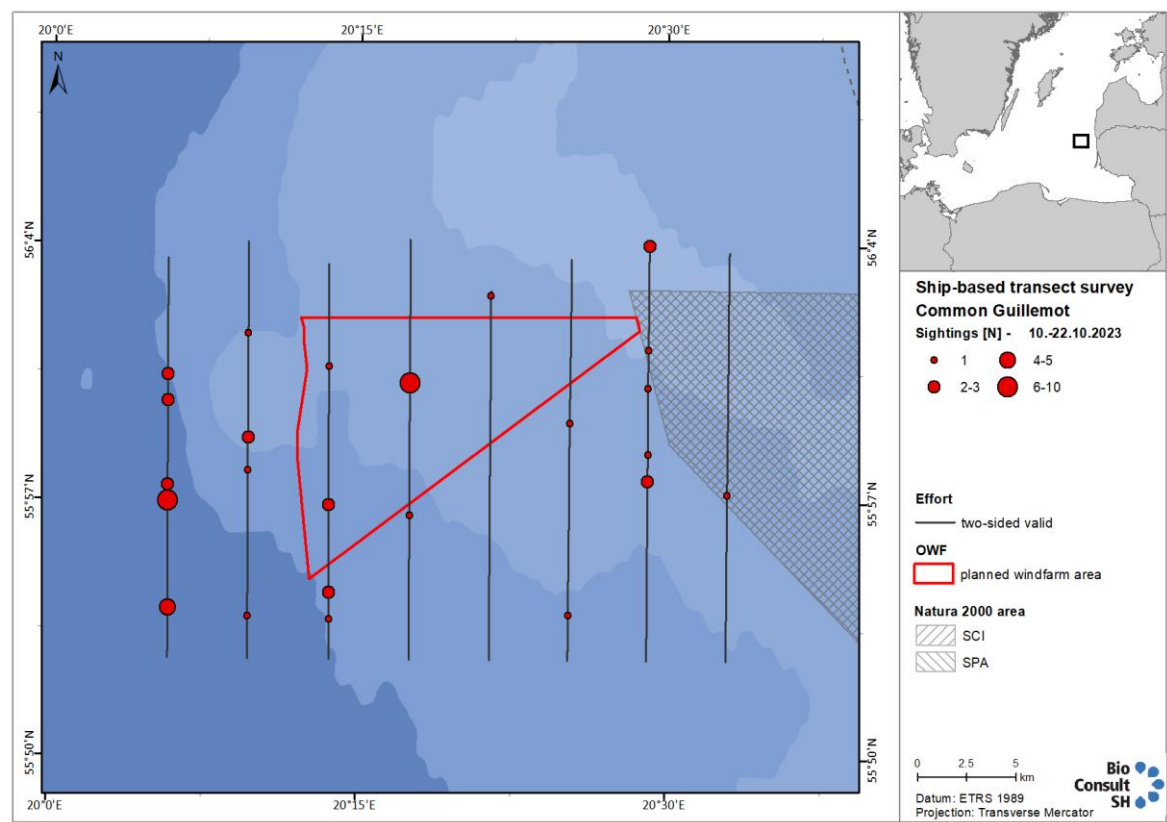


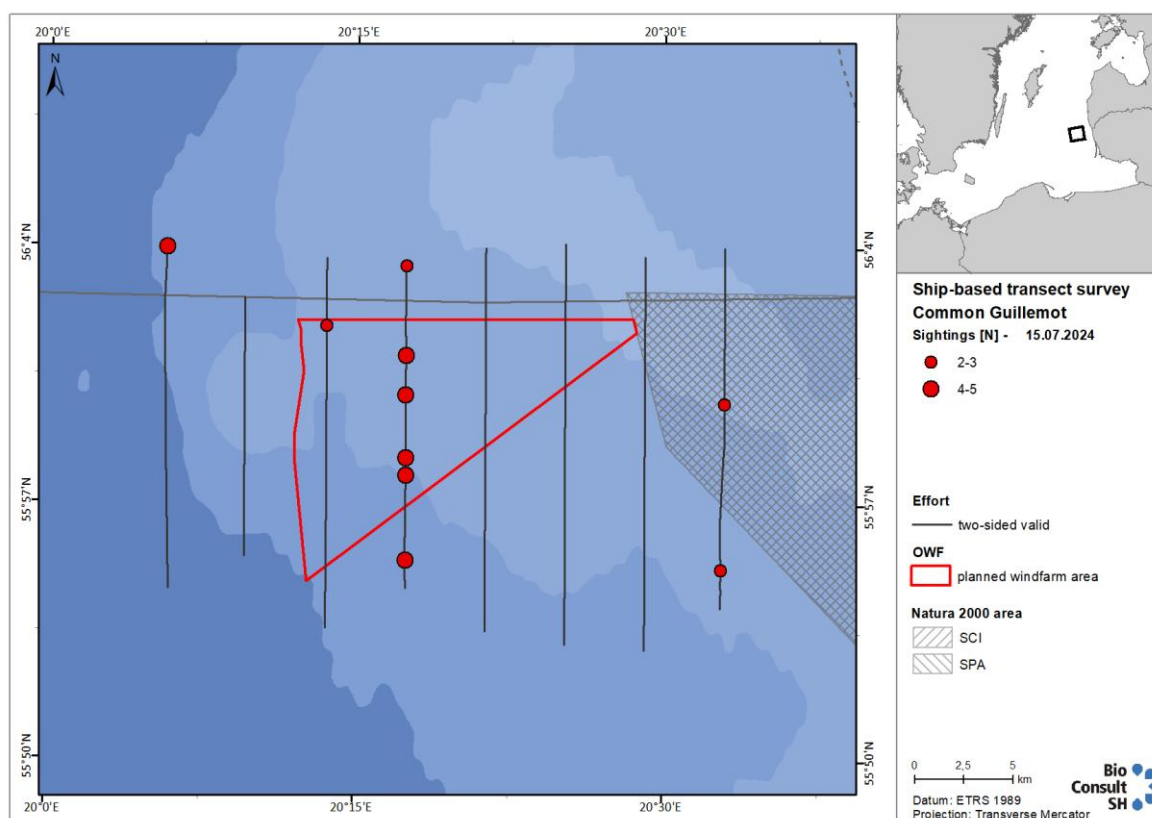
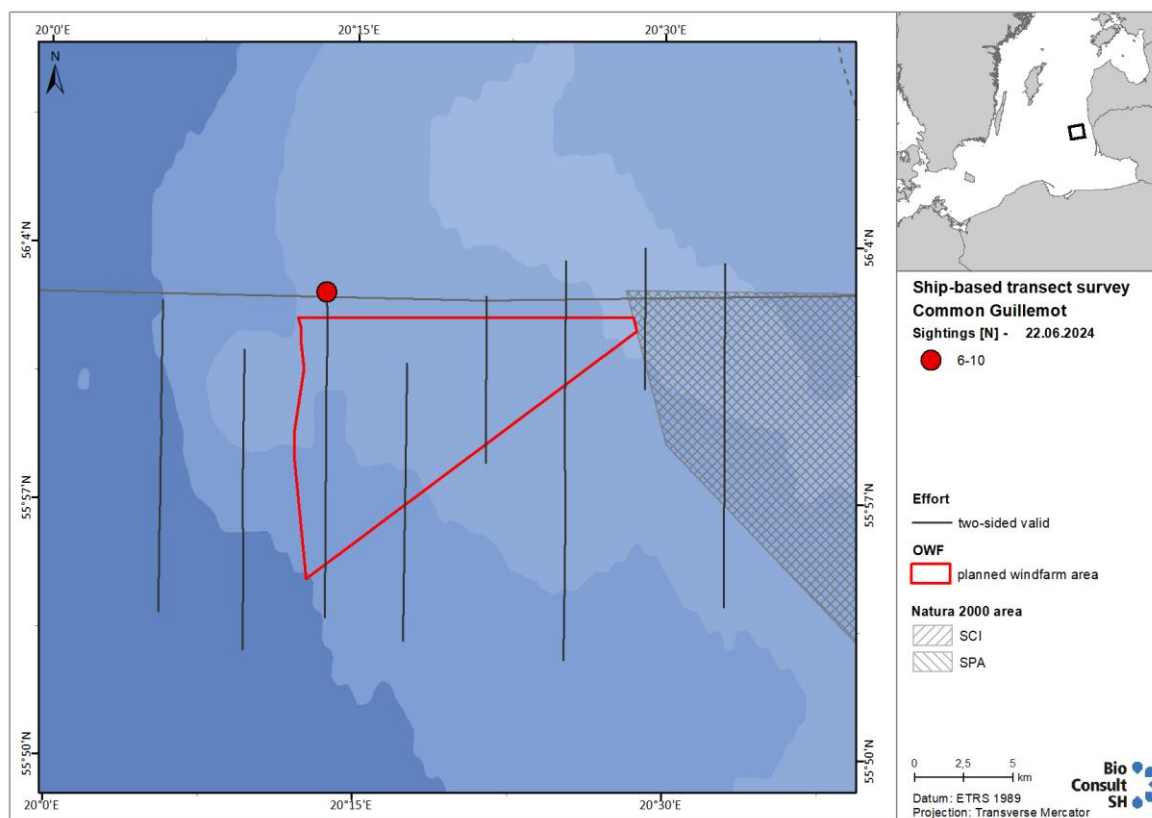


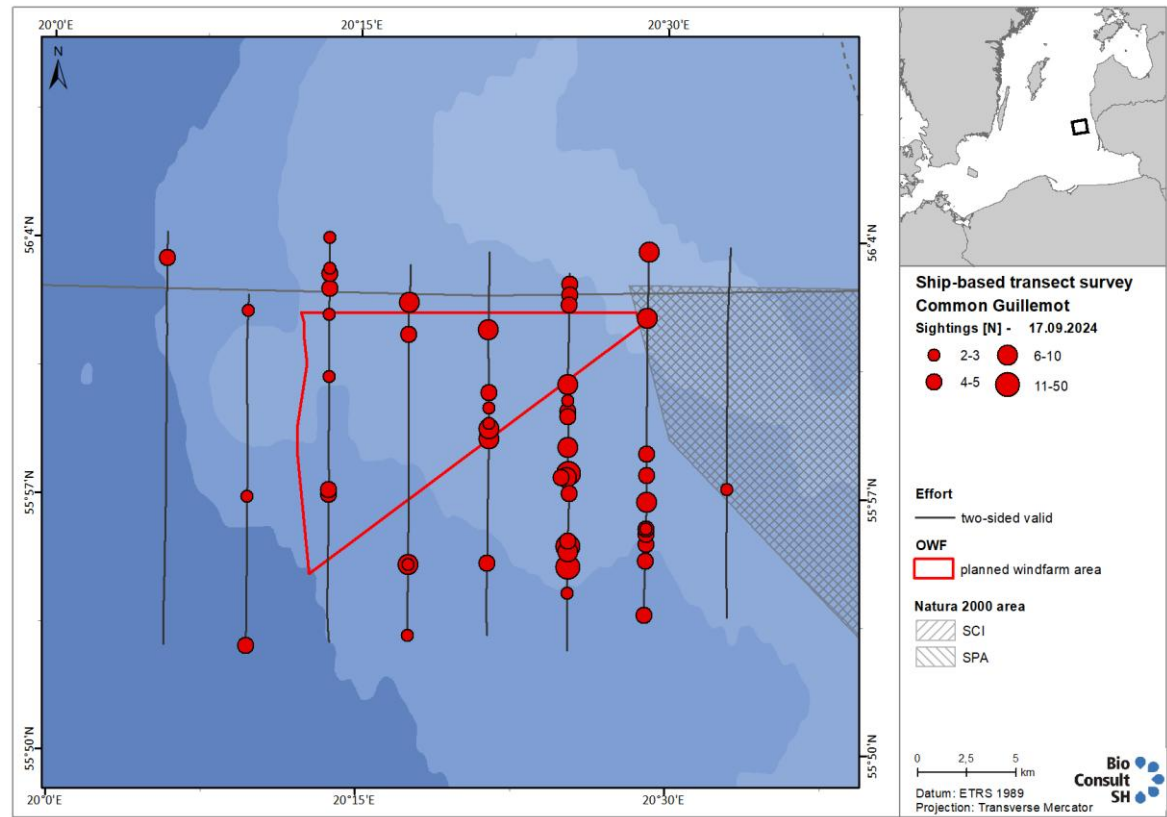
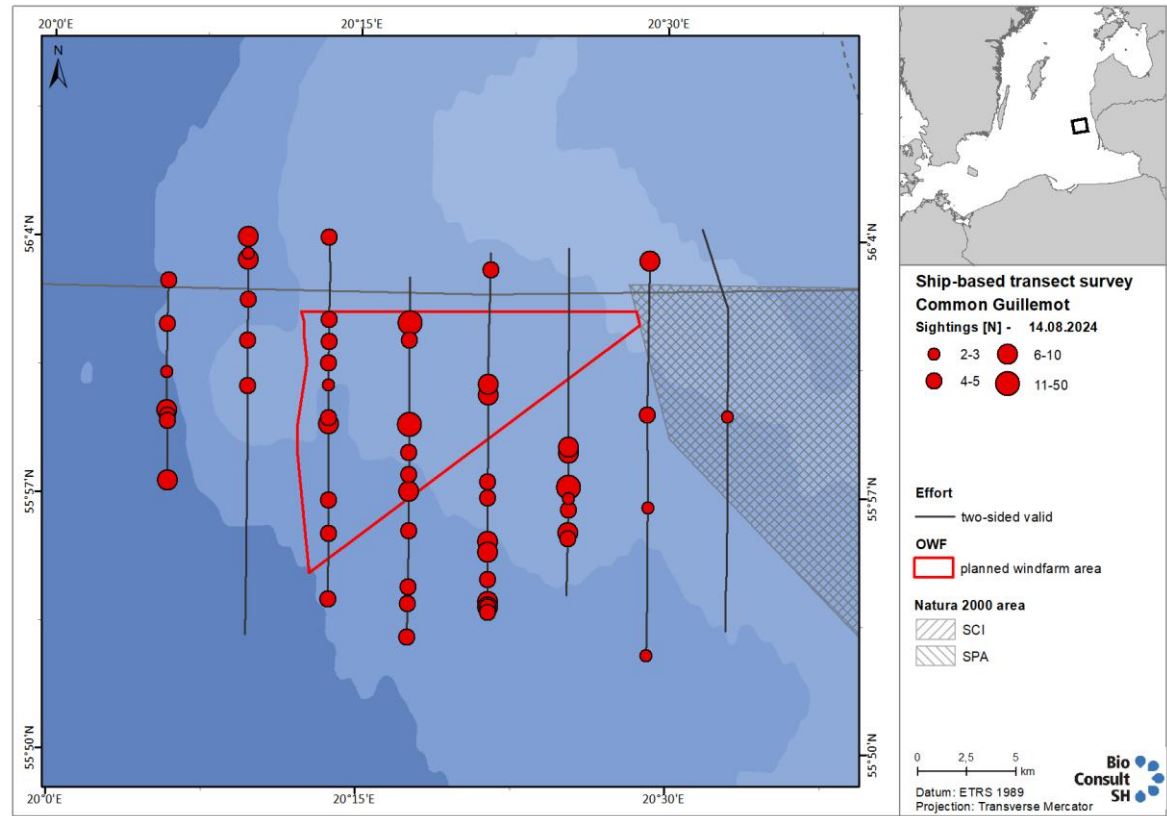
A.3.10 Common Guillemot (*Uria aalge*)

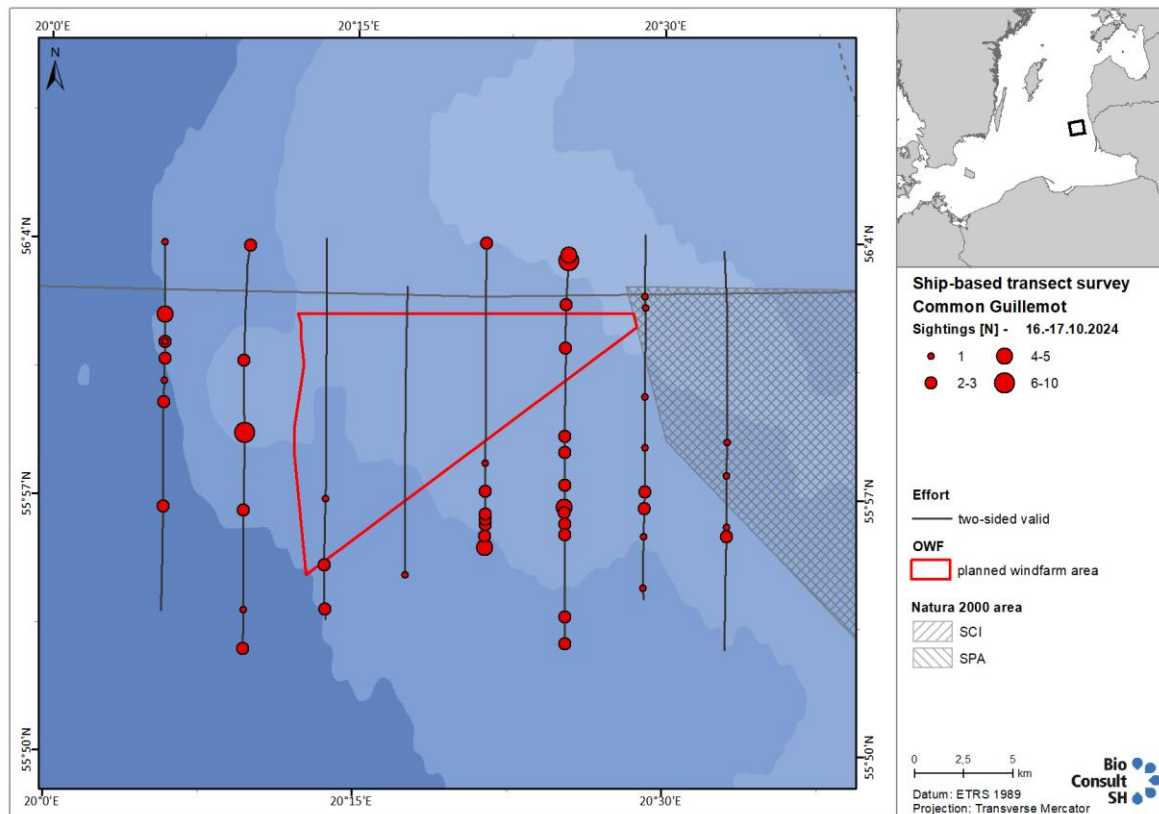












A.3.11 Razorbill (*Alca torda*)

