Aerial Survey Report Jammerland

Resting Birds and Marine Mammals

Final Report September 2020 - May 2022

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LIST OF ABBREVIATIONS

AEWA	African Eurasian Waterbird Agreement
BSH	Bundesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency of Germany)
EIA	Environmental Impact Assessment
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature and Natural Resources
OWF	Offshore wind farm
StUK	Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment (framework by the BSH)
UTC	Coordinated Universal Time
WGS	World Geodetic System

1 INTRODUCTION

On behalf of European Energy A/S, BioConsult SH conducted observer-based aerial surveys of an area of 441 km^2 in the Jammerland Bay to determine the abundance and spatial distribution of resting seabirds and marine mammals. In the time between September 2020 and May 2022 a total of 22 surveys have been carried out. In this final report, the results of these surveys are presented. This report in an update from the reports provided in June 2021 and November 2021, where the first 15 surveys (until August 2021) were presented. It has been decided to prolong the survey until May 2022 including an additional 7 survey flights.

2 METHODS

2.1 Aerial surveys

Visual aerial surveys were conducted to record resting bird and marine mammal abundances and distributions as part of an offshore wind farm environmental impact assessment. The survey covered the planned Jammerland wind farm and its surrounding area. This included coastal areas with shallow waters in the eastern and southwestern part of the survey area, as well as a channel with deep water reaching from the northwest to the south. The size of the total survey area was 441 km^2.

The survey was designed as a line transect survey following a standardized sampling protocol (DIEDERICHS ET AL. 2002; CAMPHUYSEN 2004; BSH 2013), that is commonly used during environmental Impact Assessment (EIA) studies (e.g. NOER ET AL. 2000; PETERSEN & FOX 2007). Previous aerial surveys conducted in the same study area applied the same method as the current study (2020). A study in the Inner Danish Baltic also applied a line transect design following similar methods (PETERSEN & NIELSEN 2011).

For safety reasons only twin-engine high-wing planes of the type Partenavia P-68 Observer with professional pilots by Bioflight A/S (Holte) were chartered for the aerial surveys. In this type of aircraft, the two main observers survey the area through so called bubble windows and the third observer is seated directly behind the two main observers (Figure 2.1).

Figure 2.1 Survey plane Partenavia P68 Observer. Photo: Kasper Roland Høberg.

A line transect methodology was used following the distance sampling approach of BUCKLAND ET AL. (2001). A total of 11 parallel transect lines in East-West orientation were used with a 2 km spacing between the lines, covering an area of 441 km^2. The length of individual transects ranged from 10.4 to 25.4 km. All survey flights were conducted at an altitude of 250 ft (76 m). Birds and marine mammals were recorded during the same survey flights.

The transect design for Jammerland is shown in Figure 2.2, the corresponding transect coordinates are listed in Table 2.1.

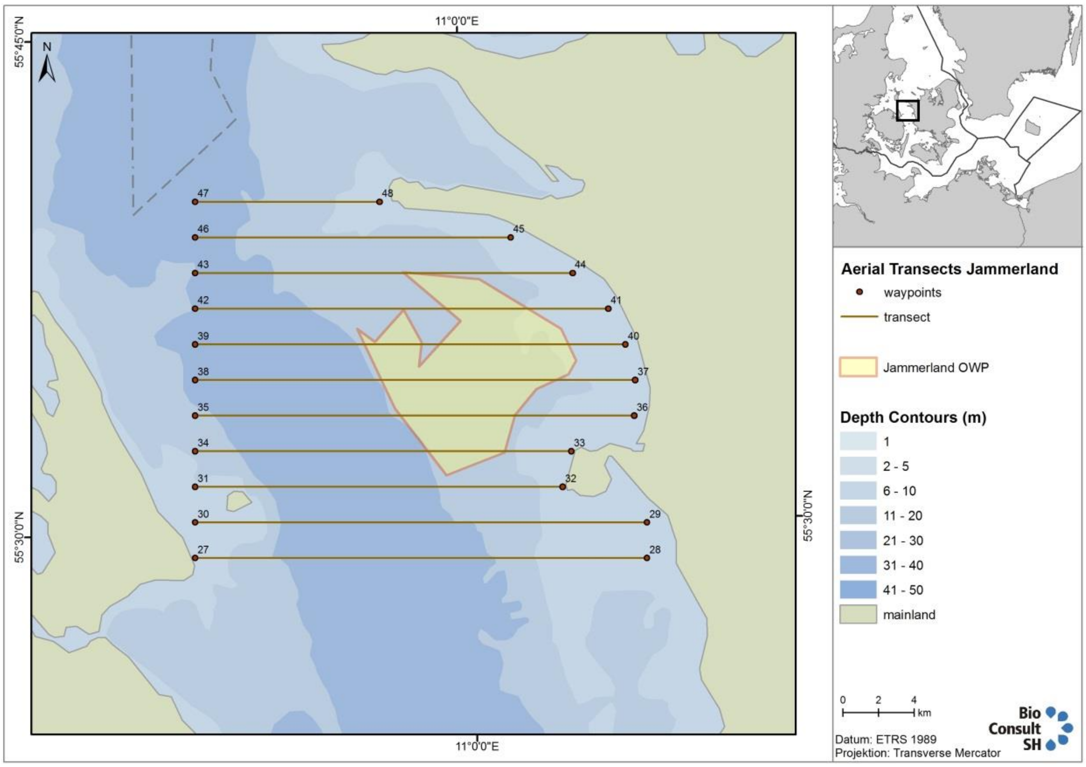

Figure 2.2 Aerial survey transect design for the Jammerland survey including the proposed wind farm area (outlined in red).

Table 2.1 Geographical coordinates (WGS 84: DD°MM'SS.SS") and length of flight transects in the Jammerland study area.

Transect	Starting Waypoint [Lat/Lon]	Ending Waypoint [Lat/Lon]	Length [km]	Sum [km]
1	55° 29.253' N, 10° 45.235' E	55° 28.869' N, 11° 9.319' E	25.38	25.38
2	55° 29.947' N, 11° 9.378' E	55° 30.332' N, 10° 45.283' E	25.38	50.76
3	55° 31.411' N, 10° 45.331' E	55° 31.104' N, 11° 4.933' E	20.64	71.40
4	55° 32.175' N, 11° 5.453' E	55° 32.490' N, 10° 45.379' E	21.13	92.53
5	55° 33.569' N, 10° 45.427' E	55° 33.195' N, 11° 8.872' E	24.66	117.19
6	55° 34.273' N, 11° 8.976' E	55° 34.648' N, 10° 45.476' E	24.71	141.90
7	55° 35.727' N, 10° 45.524' E	55° 35.361' N, 11° 8.526' E	24.18	166.07
8	55° 36.455' N, 11° 7.660' E	55° 36.805' N, 10° 45.572' E	23.20	189.28
9	55° 37.884' N, 10° 45.621' E	55° 37.567' N, 11° 5.805' E	21.19	210.47
10	55° 38.701' N, 11° 2.560' E	55° 38.963' N, 10° 45.669' E	17.73	228.20
11	55° 40.042' N, 10° 45.717' E	55° 39.894' N, 10° 55.586' E	10.35	238.55

Three experienced observers recorded birds and marine mammals during the surveys. Two main observers were sitting next to the bubble windows which also allow observations directly underneath the plane (see also Figure 2.3). The third observer was observing through a normal planar window in the back of the plane behind the main observers (no observations directly underneath the plane possible). The third observer changed seats between transect lines, depending on which side provided the better observation conditions (usually observing towards North). All observers used headsets and did not communicate with each other while on transect. In addition, the observers were continuously scanning the area for birds and marine mammals while on transect. For every observation the exact time was noted (UTC, synchronised with an on-board GPS) and recorded on a dictaphone.

2.1.1 Birds

Following the recommendations for sampling of densities in distance intervals (BUCKLAND ET AL. 2001), survey transects were subdivided into perpendicular bands to allow calculations of detection probabilities. Five standard bands were used (Figure 2.3): 0-44 m (Band D), 44-91 m (Band A1), 91-163 m (Band A2), 163-431 m (Band B) and 431-2,000 m (Band C; all distances are distances to the transect line), which corresponded to inclinations in degrees from horizon of 90-60° (Band D), 60-40° (Band A1), 40-25° (Band A2), 25-10° (Band B) and <10° (Band C). This number of bands is assumed to be the best compromise between obtaining accurate density data and the short period of time available for cognitive processing and recording of the information (e.g., species, position and behaviour). However, Band A1 and A2 might be merged into one single Band A spanning from 44-163 m.

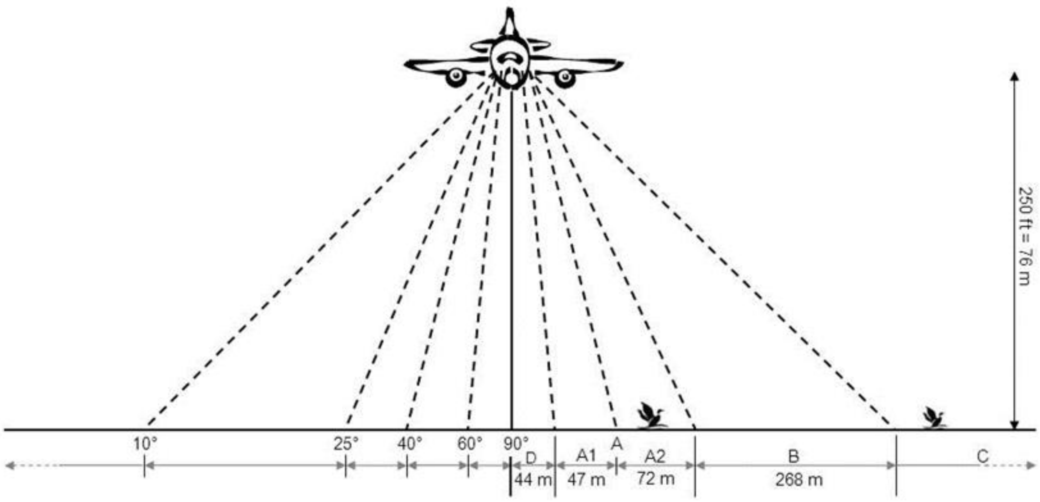

Figure 2.3 Standardised aerial survey method for counting resting birds.

From the angle and the aircraft altitude the perpendicular distance range of the sighting was calculated. For every observation the following information was recorded: Species or species group, number of birds, behavior, transect band and associations (e.g., with fishing vessels). The flight-track was logged at 3 second intervals by the GPS. Survey speed was approximately 100 kn (185 km/h, 115 mph) and flight altitude 250 ft (76 m). Further details on the aerial survey techniques used are described in DIEDERICHS et al. (2002) and CHRISTENSEN et al. (2003).

Weather conditions (sea state, glare, cloud reflections, cloud coverage, precipitation, and water turbidity) were recorded at the start of each transect line and whenever conditions changed. Additionally, all vessels and fishing equipment observed were recorded (including information on type, distance to the transect line and heading of the vessel).

Due to various reasons (e.g., weather conditions) the achieved survey effort varied slightly between survey flights. Data were only collected in good survey conditions (Douglas sea states up to Beaufort 4, visibility more than 5 km). Those parts of the survey with a recorded sea state above 4 were excluded from the data analysis. Furthermore, sections with strong glare (usually only on one side) were also excluded from the analysis.

2.1.2 Marine mammals

Each observer sampled the respective area continuously for Harbour Porpoises and other marine mammals. In case of a sighting, the detection time (UTC-synchronized with onboard-GPS) was recorded using a voice recorder. The sighting angle was measured using an inclinometer and recorded as well or the sightings were assigned to bands. Additionally, following information was recorded: group size, swimming speed and heading, number of offspring/calves, and any specific behavior. After each flight, data were transferred into a database.

Data for marine mammals were only collected in very good survey conditions (Douglas sea states below Beaufort 3, visibility more than 5 km). Sections with strong glare (usually only on one side) or high turbidity were excluded from the analysis. Because birds were also recorded above sea state 3 (but no higher than sea state 4), transect effort between birds and marine mammals can differ.

2.2 Data analysis

Usually, distance analyses are conducted with the objective to calculate species-specific distance detection functions for data collected during aerial transect surveys.

Yet, as the amount of data for most species was rather low, making correct calculations was rather difficult and most possibly could lead to biased estimations. Thus, no distance correction has been performed. Instead, bird densities were calculated from the number of birds recorded by both main observers within Band A1 and A2 (Band A), assuming that no birds have been missed in these distance bands. Estimating bird densities from observations in Band A is a standard method to obtain bird densities from visual aerial surveys when a distance correction is not feasible (DIEDERICHS ET AL.

2002; BSH 2013). For estimating the density of birds only sightings of the two main observers (those seating at the bubble windows) were incorporated in the data set.

For the calculation of values across seasons and the presentation of the grid density maps, season specific occurrence of the species and species groups have been taken from the StUK 4 (BSH 2013) and from Garthe et al. (2007). See Table 2.2 for details.

For marine mammals, numbers were considered insufficient for further population density analysis. This was also due to the methodology of using a low flight height which was optimized to count birds. Thus, total numbers observed (in all transect bands not only within Band A) are presented. For Harbour Porpoise, numbers were corrected using the correction factors of TEILMANN et al. (2013) to calculate number of animals per 100 km transect distance.

Only data of transects or parts of transects with optimal counting conditions were analysed (see Chap. 2.1). From here on, these transects or parts of a transect will be referred to as "valid sections".

Table 2.2 Definitions of seasons for seabirds in the German North and Baltic Sea. Taken from Garthe et al. (2007).

Species	Spring / spring migration	Summer / breeding period	Autumn / Autumn migra-tion	Winter
Red -throated Diver	01.03.–30.04.	01.05.–15.09.	16.09.–31.10.	01.11.–29.02.
Great Cormorant	01.02.–31.03.	01.04.–31.07.	01.08.–31.10.	01.11.–31.01.
Common Eider	01.03.–30.04.	01.05.–31.08.	01.09.–30.11.	01.12.–29.02.
Common Scoter	01.03.–31.05.	01.06.–30.09.	01.10.–30.11.	01.12.–29.02.
Velvet Scoter	01.03.–31.05.	01.06.–31.08.	01.09.–30.11.	01.12.–29.02.
Red-breasted Merganser	01.03.–30.04.	01.05.–31.08.	01.09.–30.11.	01.12.–29.02.
Black-headed Gull	01.03.–30.04.	01.05.–30.06.	01.07.–31.10.	01.11.–29.02.
Common Gull	01.03.–15.05.	16.05.–15.07.	16.07.–31.10.	01.11.–29.02.
Herring Gull	01.03.–15.05.	16.05.–15.07.	16.07.–31.10.	01.11.–29.02.
Common Guillemot	01.03.–15.04.	16.04.–15.07.	16.07.–30.09.	01.10.–29.02.
Razorbill	01.03.–15.04.	16.04.–30.06.	01.07.–30.09.	01.10.–29.02.

3 RESULTS

3.1 Completed flights

Overall, 22 survey flights were completed between September 2020 and May 2022 (Table 3.1). A total transect distance of 5,280.3 km was covered. Out of this distance approx. 517.7 km were validated as only one-sided (9.8 %) whereas 4,760.9 km were validated for both sides (90.2 %).

*Table 3.1 Completed survey flights in the Jammerland area and valid transect effort calculations and area coverage for both birds and mammals. Total effort area [km²] = effort [km]*119m Band A width.*

Flight date	Transect length [km]	Transect effort birds [km]	Transect effort birds [km²]	Area coverage birds [%]	Transect effort marine mammals [km]	Transect effort marine mammals [km²]	Area coverage marine mammals [%]
15.09.2020	241.1	482.0	57.4	13.0	322.3	38.4	8.7
12.10.2020	239.5	479.0	57.0	12.9	196.8	23.4	5.3
14.11.2020	244.4	488.4	58.1	13.2	246.9	29.4	6.7
29.11.2020	243.9	440.3	52.4	11.9	39.5	4.7	1.1
13.12.2020	241.3	478.3	56.9	12.9	357.3	42.5	9.6
09.01.2021	254.4	508.7	60.5	13.7	288.2	34.3	7.8
02.02.2021	240.3	475.6	56.6	12.8	121.0	14.4	3.3
14.02.2021	241.5	434.1	51.7	11.7	329.9	39.3	8.9
23.03.2021	241.8	483.1	57.5	13.0	301.8	35.9	8.1
14.04.2021	237.6	475.1	56.5	12.8	263.5	31.4	7.1
27.04.2021	240.9	454.4	54.1	12.3	416.9	49.6	11.2
15.05.2021	239.9	478.7	57.0	12.9	478.7	57.0	12.9
16.06.2021	236.7	469.8	55.9	12.7	236.7	28.2	6.4
09.07.2021	237.6	453.8	54.0	12.2	453.8	54.0	12.2
11.08.2021	239.6	467.5	55.6	12.6	398.0	47.4	10.7
22.09.2021	236.5	458.3	54.5	12.4	346.9	41.3	9.4
02.11.2021	233.1	464.6	55.3	12.5	377.7	44.9	10.2
06.01.2022	237.6	359.6	42.8	9.7	359.6	42.8	9.7
26.02.2022	238.7	364.4	43.4	9.8	364.4	43.4	9.8
18.03.2022	237.9	474.5	56.5	12.8	474.5	56.5	12.8
20.04.2022	237.6	397.4	47.3	10.7	360.2	42.9	9.7
08.05.2022	238.4	451.8	53.8	12.2	451.8	53.8	12.2
Total	**5,280.3**	**10,039.4**	**1,194.8**	**ø 12.3**	**7,186.4**	**855.5**	**ø 8.8**

3.2 Abundance and distribution of birds

During the study period a total of 141,941 birds, comprising 31 species, were recorded in the Jammerland Bay area (Table 3.2). Within Band A, 35,686 individuals belonging to 27 species were recorded. The most abundant species (Band A) was Common Eider which represented 67% of all species. Common Scoter was the second most abundant species (22.1%) whereas Great Cormorant, the third most common species just represented 2.1% of all species. All other species contributed less than 2% of the total abundance of birds detected within Band A (Figure 3.1).

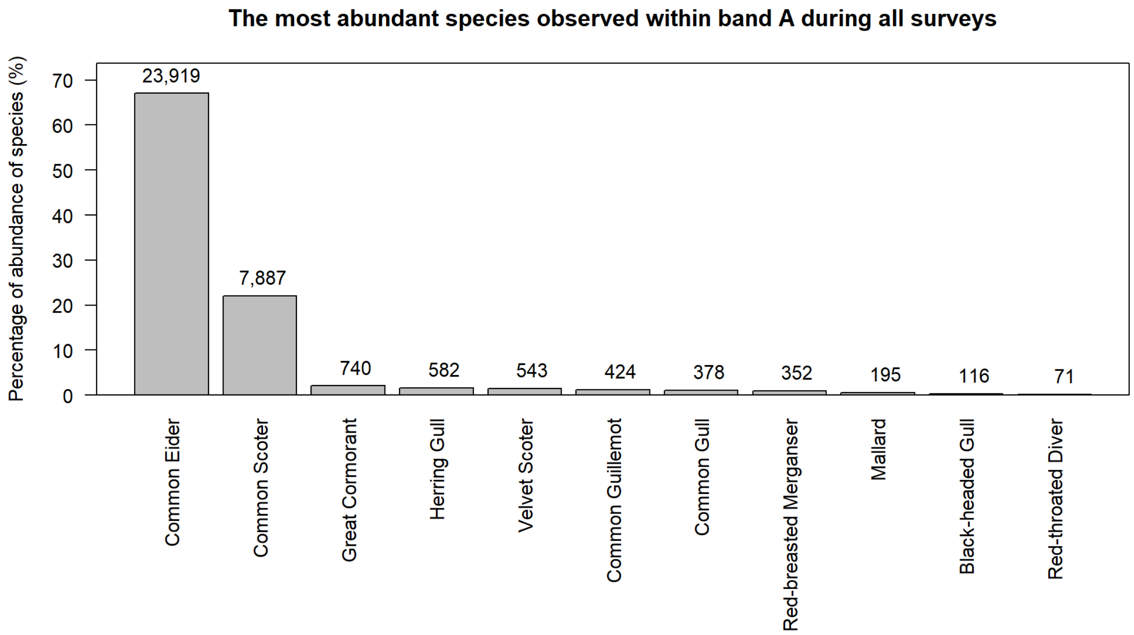

Figure 3.1 *Percentage of the most abundant species observed within band A during all surveys in the Jammerland Bay area. Numbers above the bars indicate the total number of individuals recorded for each species during all 22 aerial surveys. These 11 species are further described in chapter 3.2.*

All birds recorded by the two main observers in Band A were used as the basis for further density analysis. Details of total bird counts and species observed can be found in Table 3.2. Bird distribution maps include sightings in all bands by the main observers. These are listed in the appendix (A.1) and are presented either on species level or combined in species groups, depending on the observed numbers.

Table 3.2 Bird counts of all species during 22 aerial surveys in the Jammerland Bay area between September 2020 and May 2022. Presented are numbers of birds recorded in all bands as well as Band A, by both main observers under valid conditions.

Species	Scientific name	Danish name	Aerial Surveys	
			All bands	Band A
Red-throated Diver	*Gavia stellata*	Rødstrubet Lom	130	71
Great Crested Grebe	*Podiceps cristatus*	Toppet Lappedykker	16	14
Red-necked Grebe	*Podiceps grisegena*	Gråstrubet Lappedykker	6	4
unidentified grebe	*Podicipedidae*		37	22
Northern Gannet	*Morus bassanus*	Sule	3	0
Great Cormorant	*Phalacrocorax carbo*	Skarv	2,837	740
Mute Swan	*Cygnus olor*	Knopsvane	57	44
Whooper Swan	*Cygnus cygnus*	Sangsvane	13	0
Greylag Goose	*Anser anser*	Grågås	313	70
Barnacle Goose	*Branta leucopsis*	Bramgås	2,083	3
Brent Goose	*Branta bernicla*	Knortegås	5	1
Common Shelduck	*Tadorna tadorna*	Gravand	2	1
Eurasian Wigeon	*Mareca penelope*	Pibeand	97	21
Mallard	*Anas platyrhynchos*	Gråand	278	195
Unidentified diving duck			45	0
Common Eider	*Somateria mollisima*	Ederfugl	80,636	23,919
Long-tailed Duck	*Clangula hyemalis*	Havlit	11	5
Common Scoter	*Melanitta nigra*	Sortand	48,544	7,887
Velvet Scoter	*Melanitta fusca*	Fløjlsand	2,674	543
Unidentified scoter	*Melanitta sp.*		13	3
Unidentified sea duck			59	0
Common Goldeneye	*Bucephala clangula*	Hvinand	81	53
Red-breasted Merganser	*Mergus serrator*	Toppet Skallesluger	475	352
Unidentified merganser	*Mergus sp.*		7	3
Dunlin	*Calidris alpina*	Almindelig Ryle	30	0
Black-headed Gull	*Chroicocephalus ridibundus*	Hættemåge	209	116
Common Gull	*Larus canus*	Stormmåge	544	378
Lesser Black-backed Gull	*Larus fuscus*	Sildemåge	54	19
Herring Gull	*Larus argentatus*	Sølvmåge	1,707	582
Great Black-backed Gull	*Larus marinus*	Svartbag	43	11
Unidentified large gull			102	44
Unidentified gull	*Larus sp.*		34	16
Sandwich Tern	*Thalasseus sandvicensis*	Splitterne	7	6

Species	Scientific name	Danish name	Aerial Surveys	
			All bands	Band A
Common/Arctic tern	*Sterna hirundo/Sterna paradisaea*	Fjordterne/Havterne	3	0
Common Guillemot	*Uria aalge*	Lomvie	578	424
Razorbill/ Common Guillemot	*Alca torda / Uria aalge*	Lomvie/Alk	139	89
Razorbill	*Alca torda*	Alk	15	14
Black Guillemot	*Cepphus grylle*	Tejst	45	33
Skylark	*Alauda arvensis*	Sanglærke	4	0
Unidentified songbird	Passeriformes	sangfugl	3	2
Unidentified bird	Aves	fugl	2	1
Total			**141,941**	**35,686**

In addition, a total of 39 Harbour Porpoises, 15 Harbour Seals and 1 unidentified pinniped (Grey/Harbour Seal) were recorded in the Jammerland Bay area during the survey period. The survey area covered by marine mammal observations varied between 1.1 - 12.9 % of the total area with a mean of 8.8 % (Table 3.1). Further details and distribution maps regarding marine mammals can be found in Chapter 3.3.

The following chapters describe all waterbird species considered relevant for the EIA in the marine areas of Jammerland. Species were selected based on their conservation status and their abundance in the study area (species in Figure 3.1). Each species description is followed by a distribution map of abundances during each season within the total study period. Seasons are species-specific, so refer to Table 2.2 if details on the assignment of seasons are needed. Maps of all surveys can be found in the appendix. Information on species range and population size is given according to the most recent data (AEWA CSR 8) of species factsheets from Wetlands International (http://wpe.wetlands.org, accessed on 03.11.2021). Conservation status is based on BIRDLIFE INTERNATIONAL (2017), IUCN Red List Europe (BIRDLIFE INTERNATIONAL 2021)and Annex I of the EU Bird Directive (EUROPEAN UNION 2010).

3.2.1 Red-throated Diver

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

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

During the 22 surveys in the Jammerland area, a total of 71 Red-throated Divers were recorded within Band A, while no Black-throated Divers were observed. Usually, in the North Sea and in the Kattegat the majority of the divers recorded are Red-throated Divers, while in the eastern parts of the Danish Baltic areas Black-throated Divers were found to comprise the greater proportion of all birds (PETERSEN & NIELSEN 2011).

During the current Jammerland surveys, Red-throated Divers mainly occurred during winter and spring (Figure 3.2). During autumn, no birds were recorded in any of the years and for the summer season, a few individuals were recorded only during one survey in September 2020. Density estimates varied between 0 and 0.32 ind./km^2 with the highest density in March 2022 (Table 3.3).

Table 3.3 Numbers of observed Red-throated Divers during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km^2. Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.09.2020	57.4	4	0.07	31
12.10.2020	57.0	0	0	0
14.11.2020	58.1	6	0.10	46
29.11.2020	52.4	2	0.04	17
13.12.2020	56.9	2	0.04	15
09.01.2021	60.5	15	0.25	109
02.02.2021	56.6	2	0.04	16

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
14.02.2021	51.7	5	0.10	43
23.03.2021	57.5	0	0	0
14.04.2021	56.5	0	0	0
27.04.2021	54.1	0	0	0
15.05.2021	57.0	0	0	0
16.06.2021	55.9	0	0	0
09.07.2021	54.0	0	0	0
11.08.2021	55.6	0	0	0
22.09.2021	54.5	0	0	0
02.11.2021	55.3	4	0.07	32
06.01.2022	42.8	2	0.05	21
26.02.2022	43.4	6	0.14	61
18.03.2022	56.5	18	0.32	141
20.04.2022	47.3	5	0.11	47
08.05.2022	53.8	0	0	0

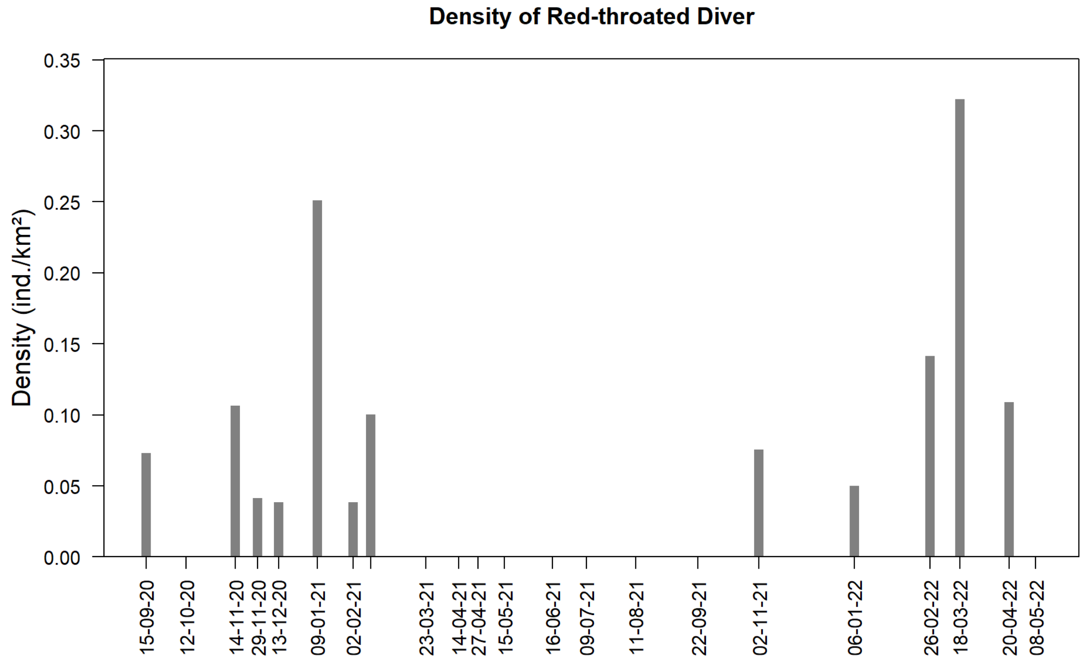

Figure 3.2 Densities of Red-throated Divers during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

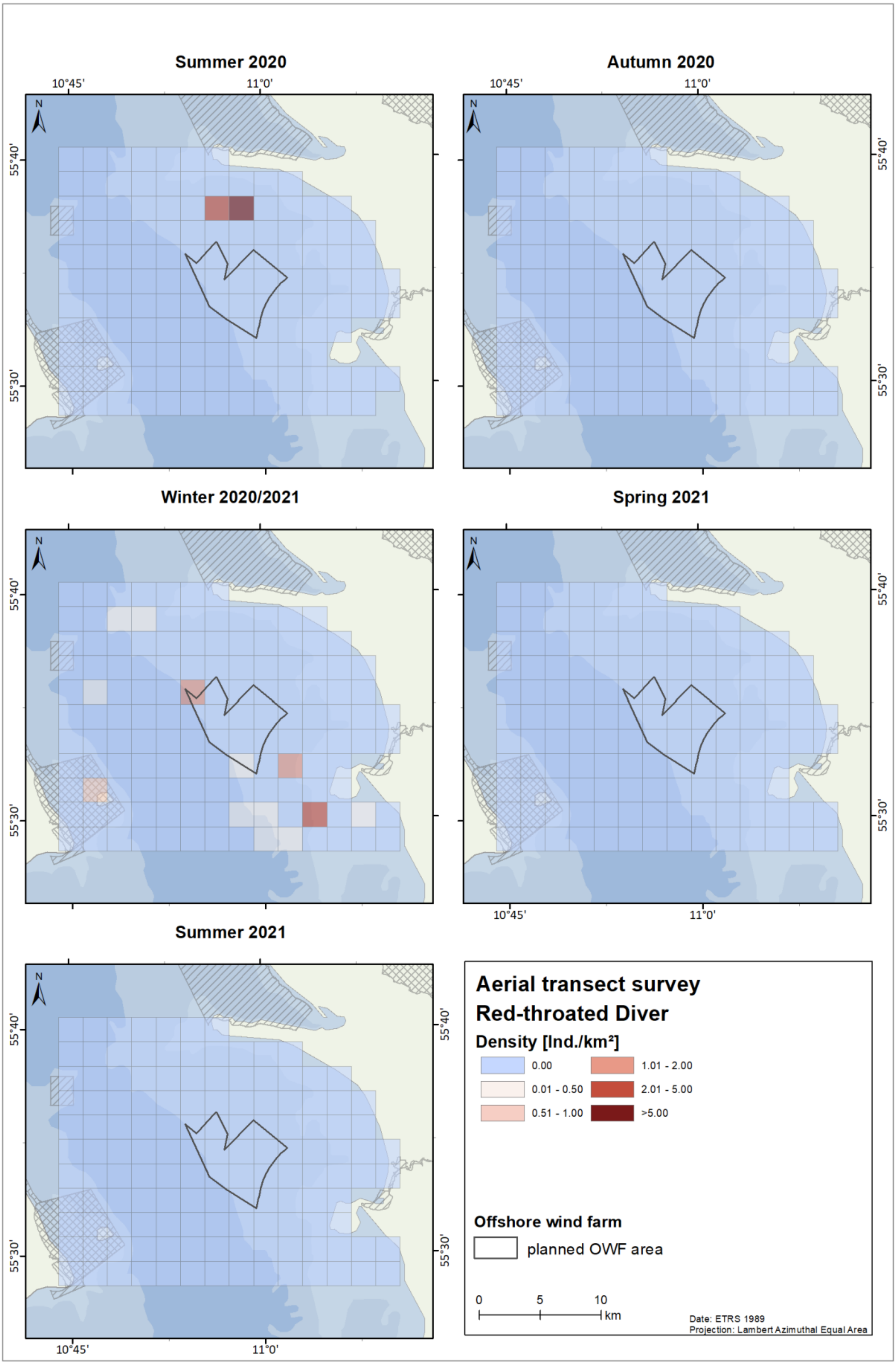

Figure 3.3 *Seasonal distribution of Red-throated Divers in the Jammerland area between summer 2020 and summer 2021.*

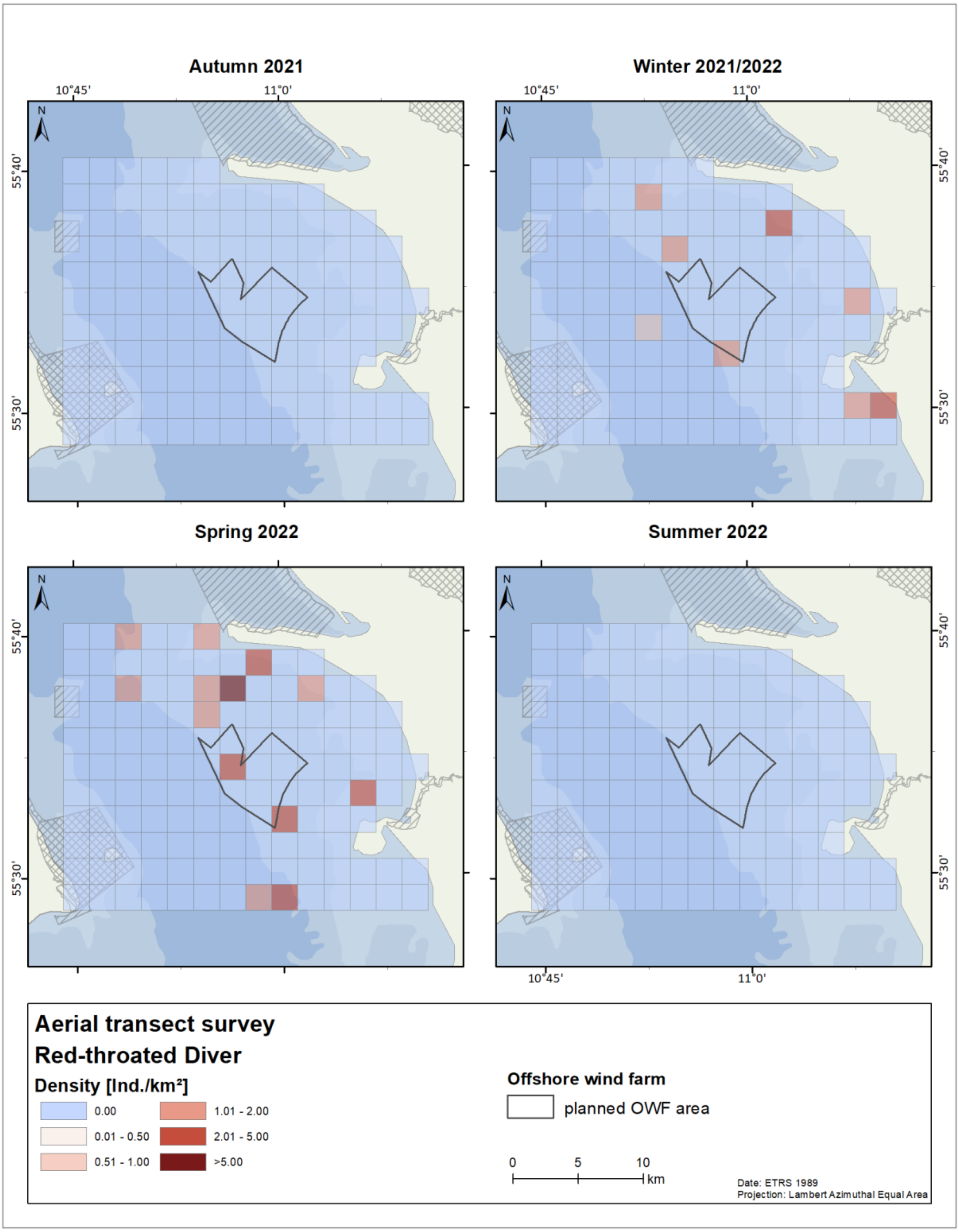

Figure 3.4 Seasonal distribution of Red-throated Divers in the Jammerland area between autumn 2021 and summer 2022.

During most seasons, Red-throated Diver distribution was limited to only a few grid cells (Figure 3.3, Figure 3.4). In spring 2022, Red-throated Divers were more abundant with sightings extending from the northern to the southern part of the study area. A few sightings were also made within or close to the planned OWF. For all distribution maps see appendix A.1.1.

3.2.2 Great Cormorant

Great Cormorant – *Phalacrocorax carbo*	**DK: Skarv**
Biogeographic population: North-west Europe (ssp. carbo); North and central Europe (ssp. sinensis);	
Breeding range: Iceland, Norway, Britain, Ireland (ssp. carbo); North and central Europe (ssp. sinensis);	
Wintering / core non-breeding range: North and middle Europe, Mediterranean Sea	
Population size: 86,000 – 110,000 & 610,000 – 740,000 (ssp. carbo & sinensis)	
1% value: 1,200 & 6,200 (ssp. carbo & sinensis)	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: Non-SPEC[E] IUCN Red List Category: Least Concern
Trend: DEC & INC	Trend quality: Good/Good
Key food: fish	

Density and distribution of Great Cormorants in the Jammerland area

Cormorants were the third-most abundant species during aerial surveys. Two subpopulations, *P. c. carbo and P. c. sinensis*, can occur in the study area during wintering (DURINCK ET AL. 1994; SKOV ET AL. 2011).

During the 22 surveys in the Jammerland area, a total of 740 Great Cormorants were recorded (Band A). Individuals were recorded during all surveys but in summer, numbers were somewhat lower than in the other seasons (Figure 3.5). The highest density was recorded during the first flight of February 2021, with 2,74 ind./km² (Table 3.4). During the other surveys, densities ranged between 0.05 and 2.22 ind./km².

Table 3.4 Numbers of observed Great Cormorants during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	67	1.17	515
12.10.2020	57.0	3	0.05	23
14.11.2020	58.1	79	1.36	599
29.11.2020	52.4	3	0.06	25
13.12.2020	56.9	59	1.04	457
09.01.2021	60.5	14	0.23	102

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
02.02.2021	56.6	155	2.74	1,208
14.02.2021	51.7	41	0.79	350
23.03.2021	57.5	7	0.12	54
14.04.2021	56.5	32	0.57	250
27.04.2021	54.1	31	0.57	253
15.05.2021	57.0	3	0.05	23
16.06.2021	55.9	9	0.16	71
09.07.2021	54.0	46	0.85	376
11.08.2021	55.6	18	0.32	143
22.09.2021	54.5	14	0.26	113
02.11.2021	55.3	123	2.22	981
06.01.2022	42.8	4	0.09	41
26.02.2022	43.4	8	0.18	81
18.03.2022	56.5	6	0.11	47
20.04.2022	47.3	8	0.17	75
08.05.2022	53.8	10	0.19	82

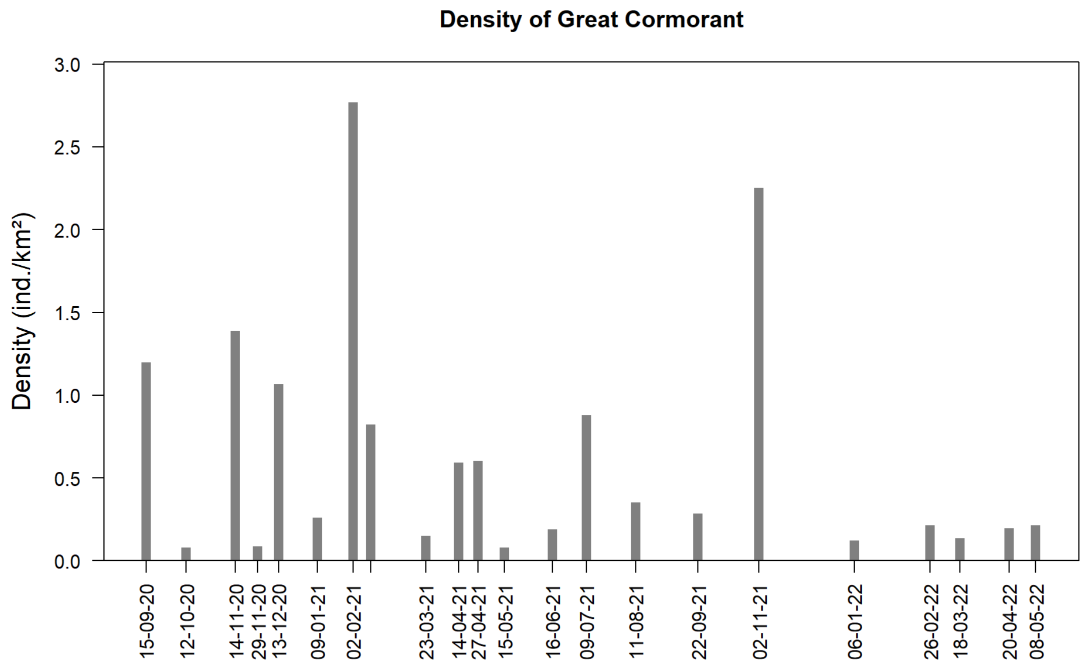

Figure 3.5 Densities of Great Cormorant during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

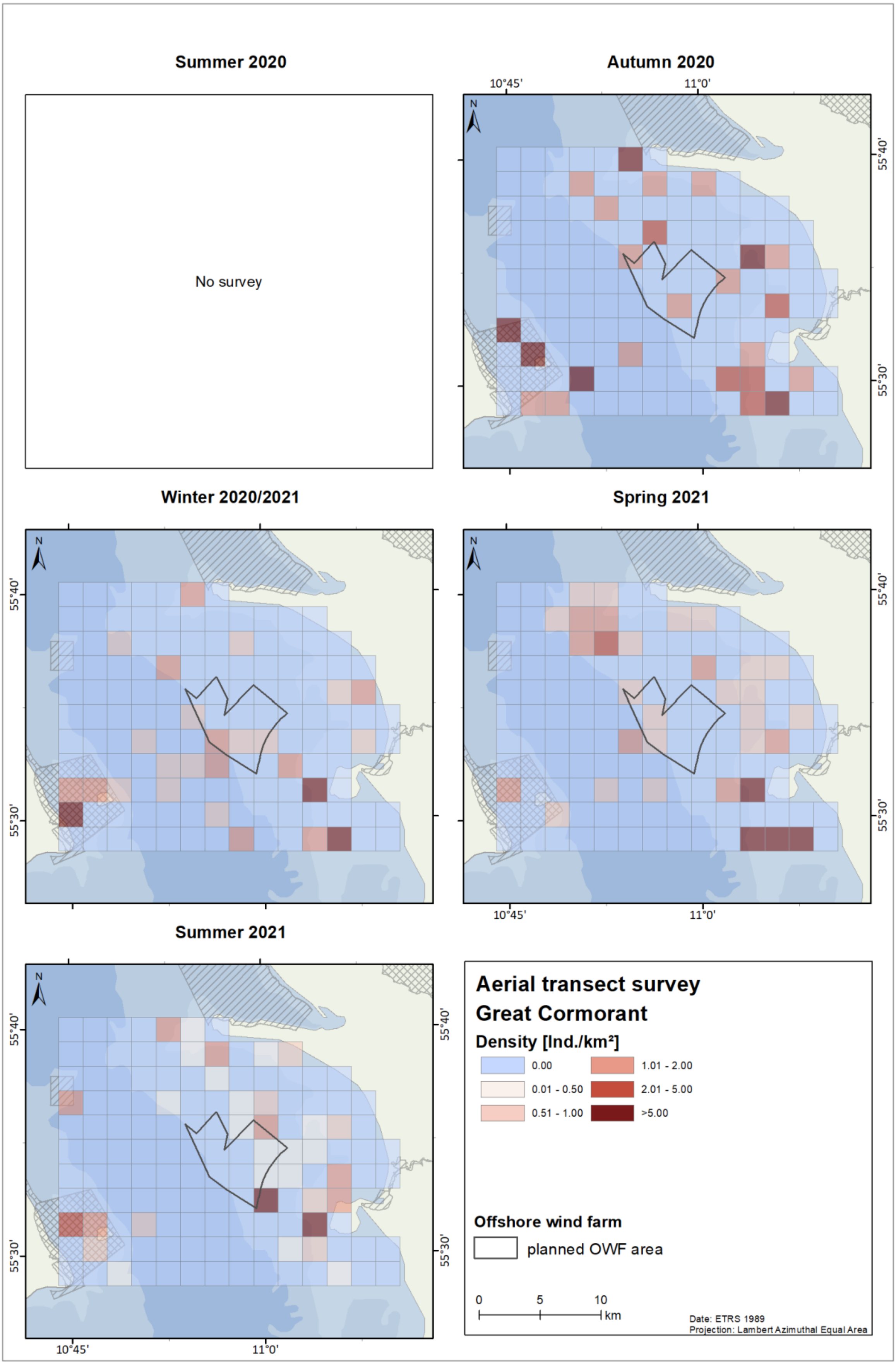

Figure 3.6 Seasonal distribution of Great Cormorants in the Jammerland area between summer 2020 and summer 2021.

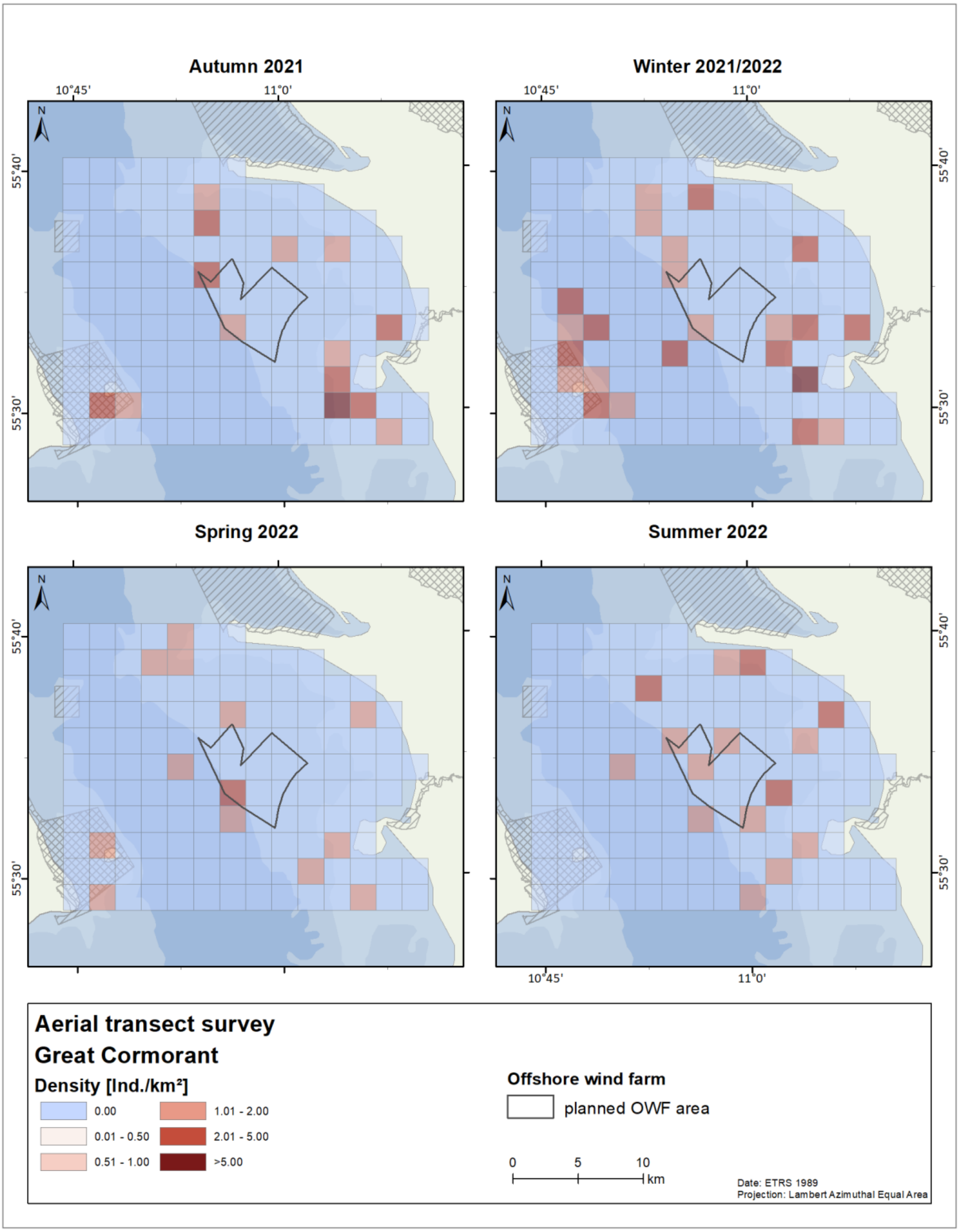

Figure 3.7 Seasonal distribution of Great Cormorants in the Jammerland area between autumn 2021 and summer 2022.

Great Cormorants were distributed throughout the study area, with the highest densities in shallow waters or near the coast (Figure 3.6 and Figure 3.7). Some individuals were, however, also recorded in the area of the planned OWF and in the channel with deep water. The distribution was rather similar across seasons, suggesting that preferred areas are used throughout the year. For all distribution maps see appendix A.1.5.

3.2.3 Mallard

Mallard – *Anas platyrhynchos*	**DK: Gråand**
Biogeographic population: N-W Europe	
Breeding range: N-W Europe	
Wintering / core non-breeding range: N-W Europe E to the Baltic	
Population size: 4,500,000-7,100,000	
1% value: 53,000	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: NonSPEC IUCN Red List Category: Least Concern
Trend: DEC	Trend quality: good
Key food: omnivorous, opportunistic	

Density and distribution of Mallards in the Jammerland area

During the 22 surveys a total of 195 Mallards were recorded (Band A). Mallards were mostly present during winter and absent during summer (Table 3.2). The highest density was recorded during the first flight in February 2021, with 1.45 ind./km² (Table 3.5, Figure 3.8). Densities during the other surveys ranged between 0 and 0.62 ind./km².

Table 3.5 Numbers of observed Mallards during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	0	0.00	0
12.10.2020	57.0	0	0.00	0
14.11.2020	58.1	2	0.03	15
29.11.2020	52.4	0	0.00	0
13.12.2020	56.9	2	0.04	15
09.01.2021	60.5	22	0.36	160
02.02.2021	56.6	82	1.45	639
14.02.2021	51.7	32	0.62	273
23.03.2021	57.5	4	0.07	31
14.04.2021	56.5	0	0.00	0
27.04.2021	54.1	0	0.00	0
15.05.2021	57.0	0	0.00	0

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
16.06.2021	55.9	0	0.00	0
09.07.2021	54.0	0	0.00	0
11.08.2021	55.6	0	0.00	0
22.09.2021	54.5	0	0.00	0
02.11.2021	55.3	1	0.02	8
06.01.2022	42.8	25	0.58	258
26.02.2022	43.4	25	0.58	254
18.03.2022	56.5	0	0.00	0
20.04.2022	47.3	0	0.00	0
08.05.2022	53.8	0	0.00	0

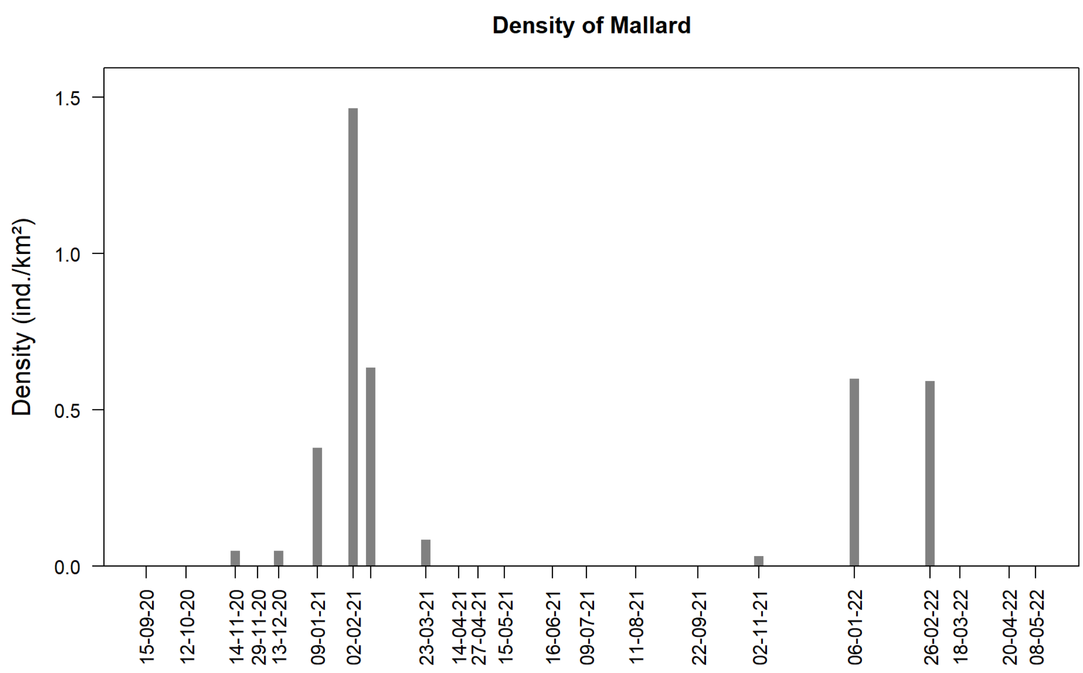

Figure 3.8 Densities of Mallards during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Mallards were observed only locally in autumn, winter and spring mainly in the shallow coastal waters up to a depth of about 5 m (Figure 3.9, Figure 3.10). In winter 2020/2021, a conglomeration of higher densities was observed near the coast in the south of the survey area. For all pinpoint maps see appendix A.1.9.

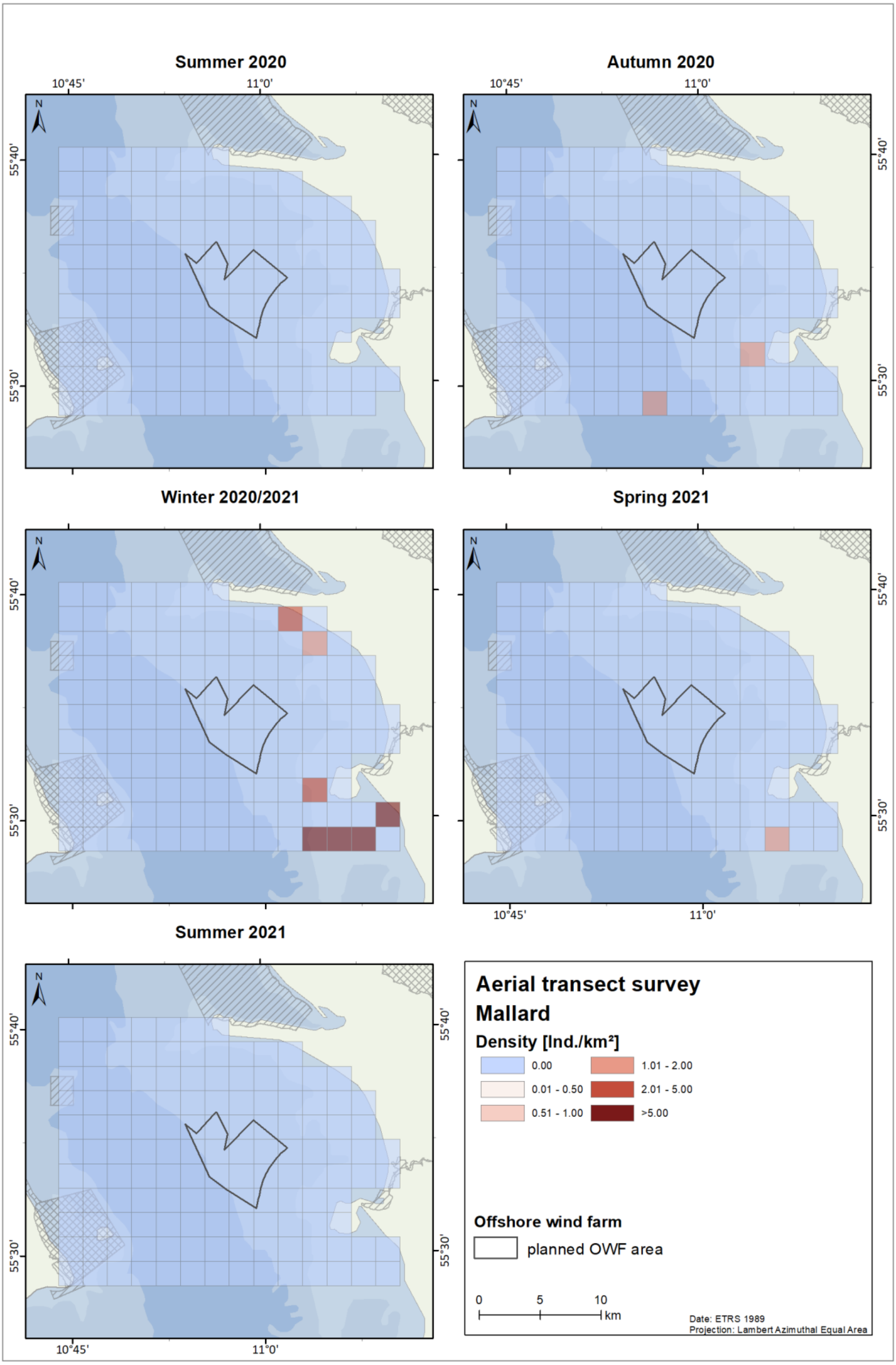

Figure 3.9 Seasonal distribution of Mallards in the Jammerland area between summer 2020 and summer 2021.

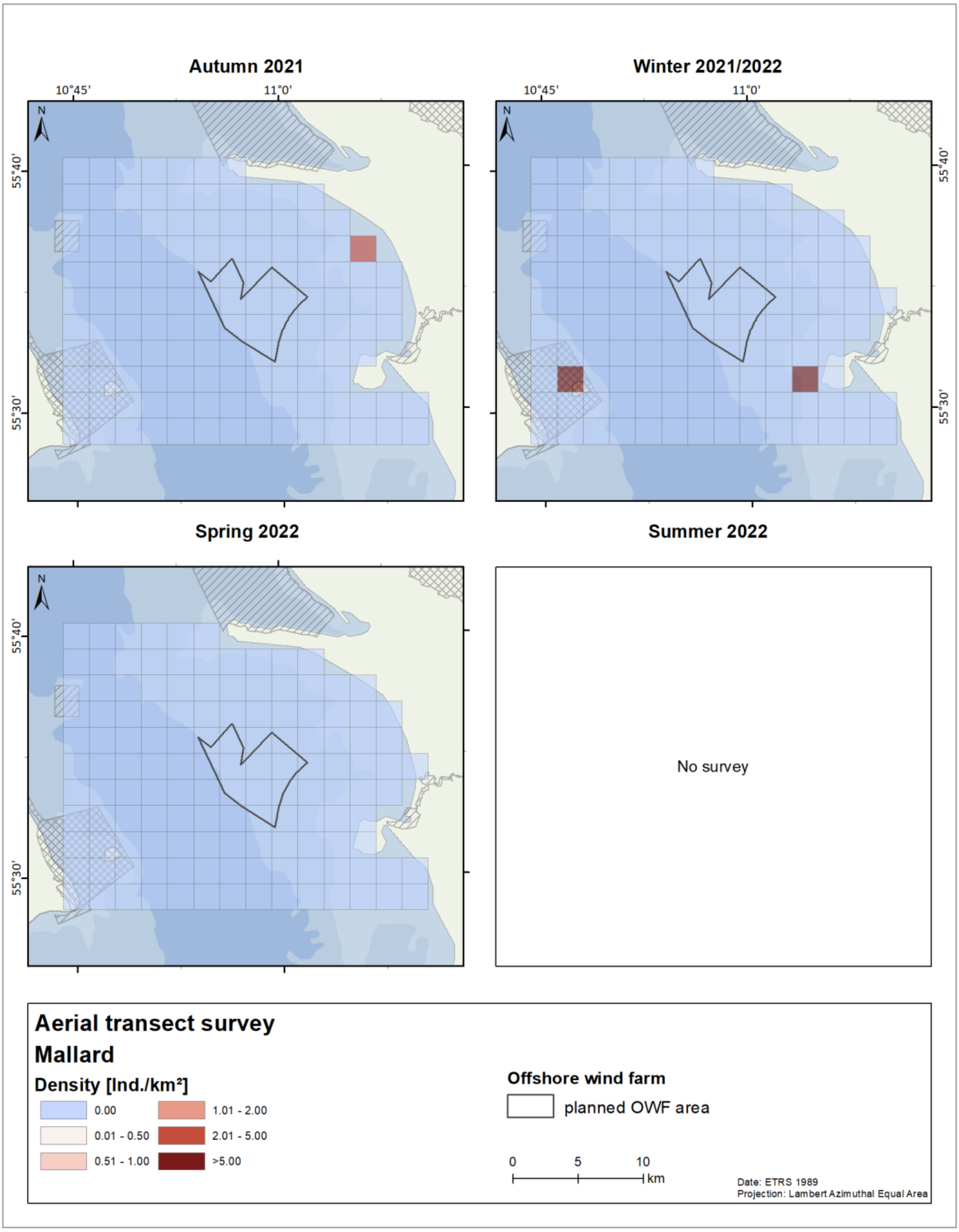

Figure 3.10 Seasonal distribution of Mallards in the Jammerland area between autumn 2021 and summer 2022.

3.2.4 Common Eider

Common Eider – *Somateria mollissima*	**DK: Ederfugl**
Biogeographic population: *S. m. mollissima*, Baltic, Wadden Sea	
Breeding range: Baltic and Wadden Sea	
Wintering / core non-breeding range: Baltic and Wadden Sea	
Population size: 560,000 - 930,000	
1% value: 7,200	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 1 IUCN Red List Category: Endangered
Trend: DEC	Trend quality: Good
Key food: molluscs	

Density and distribution of Common Eiders in the Jammerland area

Denmark represents one of the most important wintering area for Common Eiders from the Baltic/Wadden Sea (PETERSEN & NIELSEN 2011), especially the inner Danish waters in the Baltic are highly frequented, while few birds are found in water depths beyond 20 m (PETERSEN & NIELSEN 2011; SKOV ET AL. 2011). In the Jammerland study area, in 2014, densities of max. 128 ind/km^2 of Common Eiders were recorded (BAER ET AL. 2015).

During the 22 surveys in the Jammerland area, a total of 23,919 Common Eiders were counted (Band A). Individuals were observed during all surveys, but the highest densities were reached during winter (Table 3.2). The by far highest Common Eider numbers were recorded during one survey in January 2022, with 5,715 recorded individuals (Figure 3.11). This translates into a density of 133.56 ind./km^2 and a total population estimate of 58,900 Common Eiders in the study area (Table 3.6). Estimated densities during the other surveys ranged between 1.02 and 63.94 ind./km².

Table 3.6 Numbers of observed Common Eiders during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km^2. Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.09.2020	57.4	457	7.97	3,513
12.10.2020	57.0	810	14.21	6,267
14.11.2020	58.1	3,718	63.97	28,211
29.11.2020	52.4	519	9.90	4,368
13.12.2020	56.9	558	9.80	4,324

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
09.01.2021	60.5	770	12.72	5,609
02.02.2021	56.6	1,013	17.90	7,893
14.02.2021	51.7	1,841	35.64	15,718
23.03.2021	57.5	832	14.47	6,382
14.04.2021	56.5	155	2.74	1,209
27.04.2021	54.1	55	1.02	449
15.05.2021	57.0	176	3.09	1,362
16.06.2021	55.9	206	3.68	1,625
09.07.2021	54.0	655	12.13	5,349
11.08.2021	55.6	121	2.17	959
22.09.2021	54.5	1,211	22.20	9,792
02.11.2021	55.3	1,879	33.98	14,987
06.01.2022	42.8	5,715	133.56	58,900
26.02.2022	43.4	2,187	50.44	22,243
18.03.2022	56.5	706	12.50	5,514
20.04.2022	47.3	181	3.83	1,688
08.05.2022	53.8	154	2.86	1,263

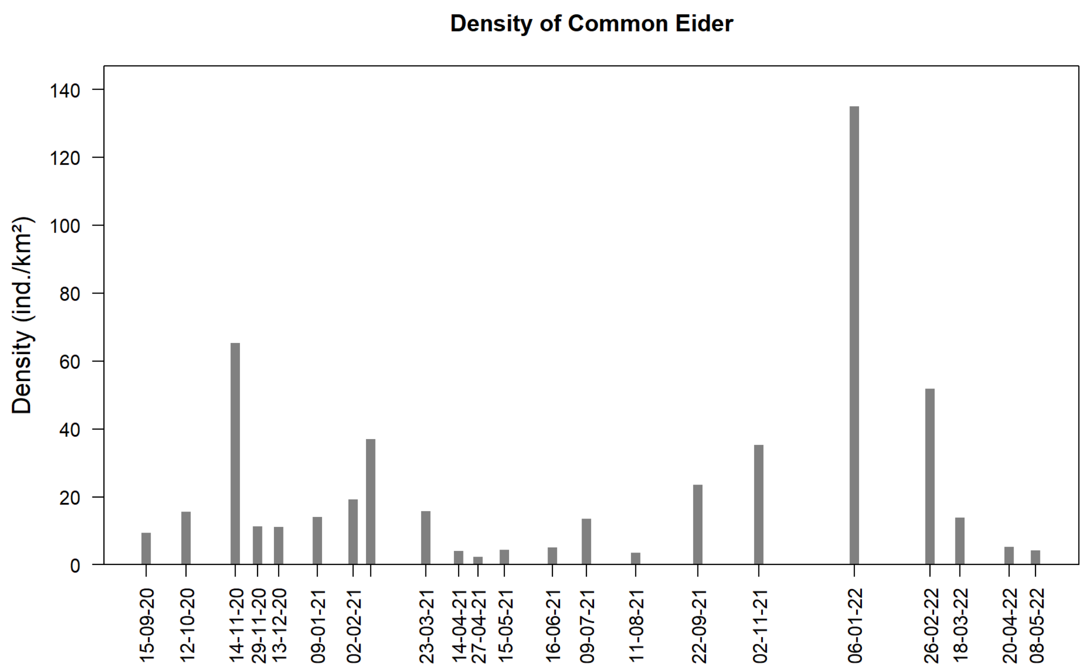

Figure 3.11 Densities of Common Eiders during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

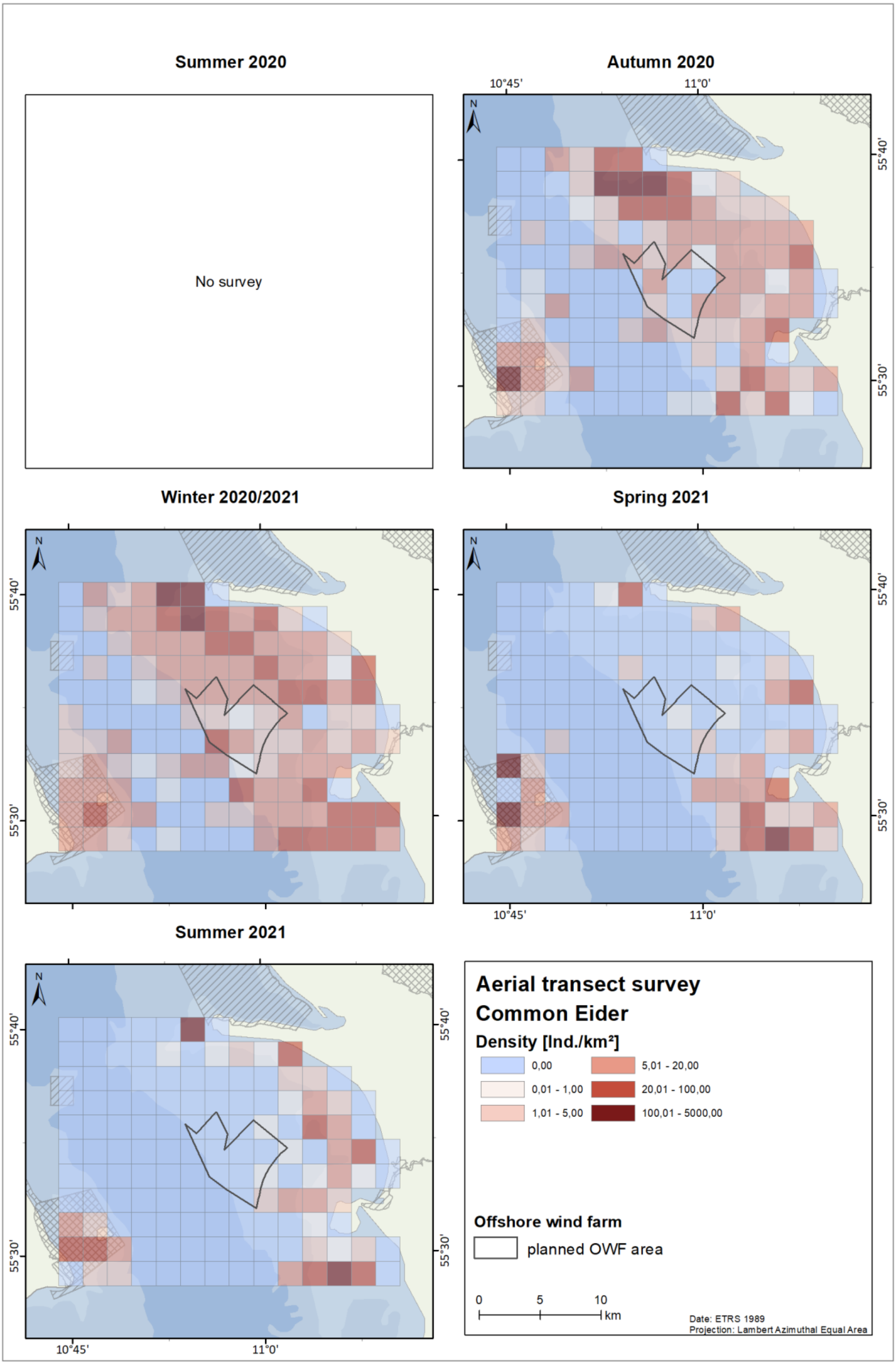

Figure 3.12 Seasonal distribution of Common Eiders in the Jammerland area between summer 2020 and summer 2021.

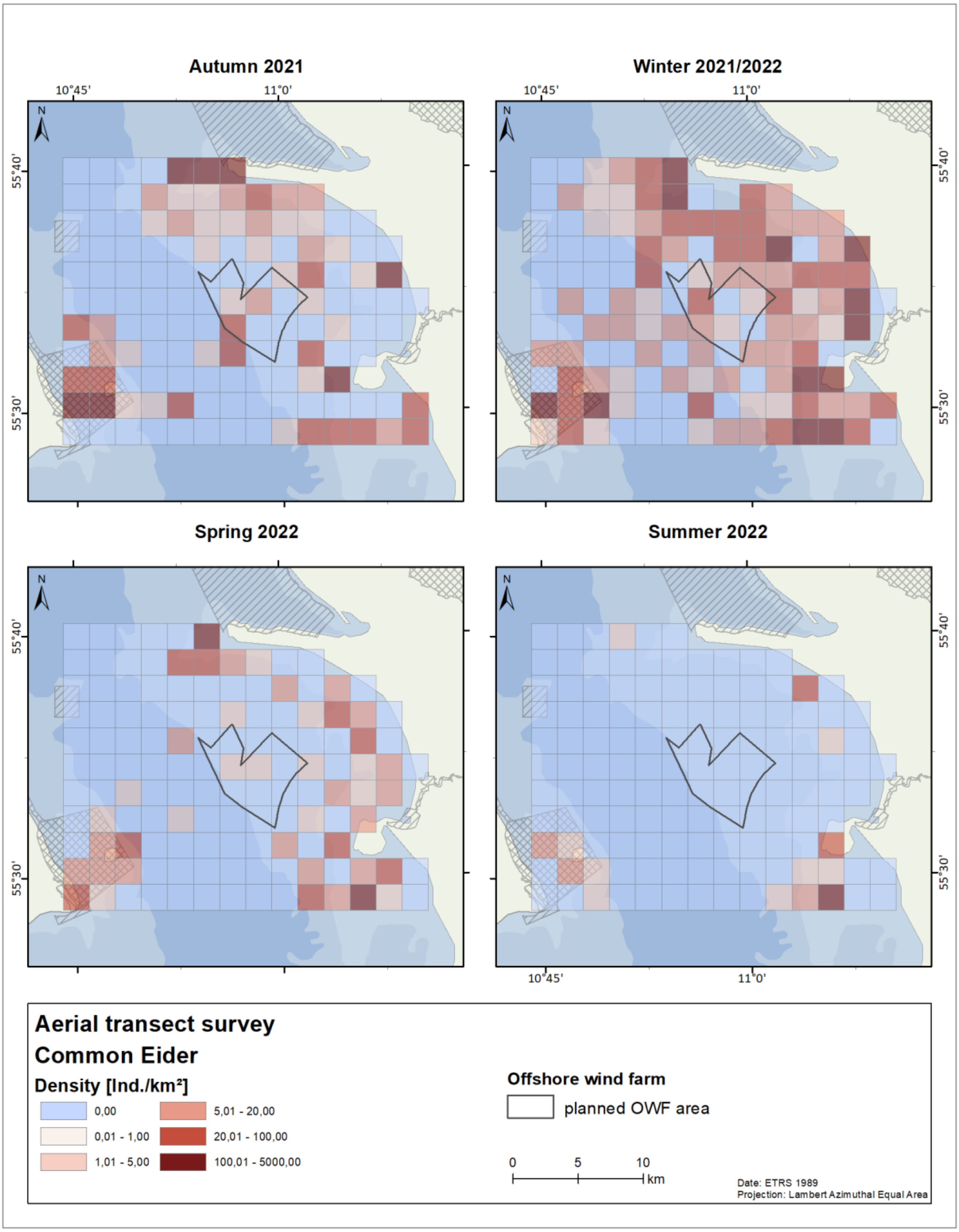

Figure 3.13 Seasonal distribution of Common Eiders in the Jammerland area between autumn 2021 and summer 2022.

Common Eiders were abundant during autumn and winter. Especially during winter, all shallow waters were densely populated by Common Eider, with a distinct gap in the distribution where a deep channel crosses the study area. The overall highest densities were found along the north-eastern transects (Figure 3.12, Figure 3.13). But also in the southern parts, east and west of the deep-water channel, grid cells with high densities occurred regularly. Flocks of more than 100 individuals were regularly found. Common Eiders were also found in the area of the planned OWF, but in lower densities as compared to more coastal locations. For all distribution maps see appendix A.1.10.

3.2.5 Common Scoter

Common Scoter – *Melanitta nigra*	**DK: Sortand**
Biogeographic population: *M .n. nigra,* W Siberia & N Europe/W Europe & NW Africa	
Breeding range: W Siberia, Scandinavia, Iceland, Scotland and Ireland	
Wintering / core non-breeding range: Baltic, E Atlantic S to Mauritania	
Population size: 687,000 – 815,000	
1% value: 7,500-	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: Non-SPEC IUCN Red List Category: Least Concern
Trend: INC	Trend quality: Reasonable
Key food: molluscs, annelids, crustaceans	

Density and distribution of Common Scoter in the Jammerland area

Previous studies have shown that the vast majority of wintering Common Scoters are found in the north of the Danish Baltic, while the eastern parts of the inner Danish waters showed the lowest densities of 0 - 5 ind./km^2 (Petersen & Nielsen 2011). However, during the current study as well as during surveys in 2014 (Baer et al. 2015), the Common Scoter was the second most abundant species in the Jammerland area. In 2014, the highest density was found in November, with 17.40 ind./km².

Table 3.7 Numbers of observed Common Scoters during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km^2. Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.09.2020	57.4	130	2.27	1,001
12.10.2020	57.0	24	0.42	185
14.11.2020	58.1	791	13.60	5,998
29.11.2020	52.4	252	4.81	2,121
13.12.2020	56.9	491	8.62	3,801
09.01.2021	60.5	971	16.03	7,069
02.02.2021	56.6	240	4.24	1,870

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
14.02.2021	51.7	704	13.62	6,006
23.03.2021	57.5	1,498	26.04	11,484
14.04.2021	56.5	14	0.25	110
27.04.2021	54.1	4	0.07	31
15.05.2021	57.0	1	0.02	9
16.06.2021	55.9	0	0	0
09.07.2021	54.0	0	0	0
11.08.2021	55.6	3	0.05	22
22.09.2021	54.5	60	1.1	485
02.11.2021	55.3	940	17.0	7,497
06.01.2022	42.8	290	6.8	2,989
26.02.2022	43.4	525	12.1	5,340
18.03.2022	56.5	924	16.4	7,217
20.04.2022	47.3	14	0.3	131
08.05.2022	53.8	11	0.2	90

In the current study, the highest numbers of Common Scoter were reached in March 2021, with 1,498 recorded individuals. A total of 7,887 animals were recorded in Band A during the 22 surveys. The highest density of 26.04 ind./km² in March corresponds to a total population estimate of 11,491 Common Scoters in the study area (Table 3.7). Densities during the other surveys ranged between 0 and 17.0 ind./km². The lowest densities occurred in the warm months starting from April (Figure 3.14).

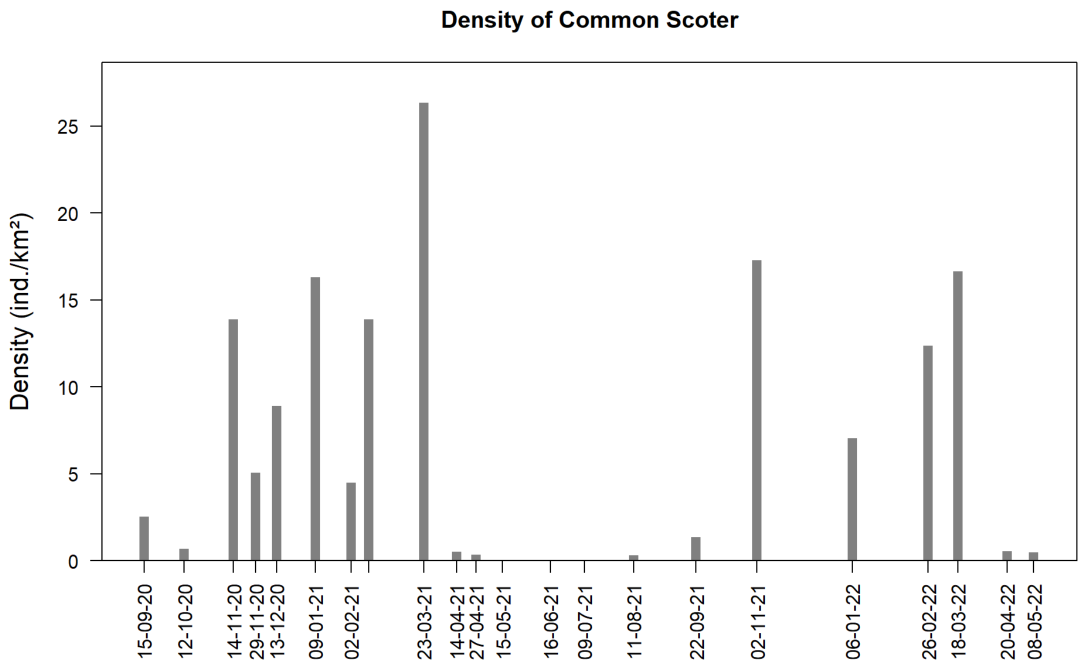

Figure 3.14 Densities of Common Scoters during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

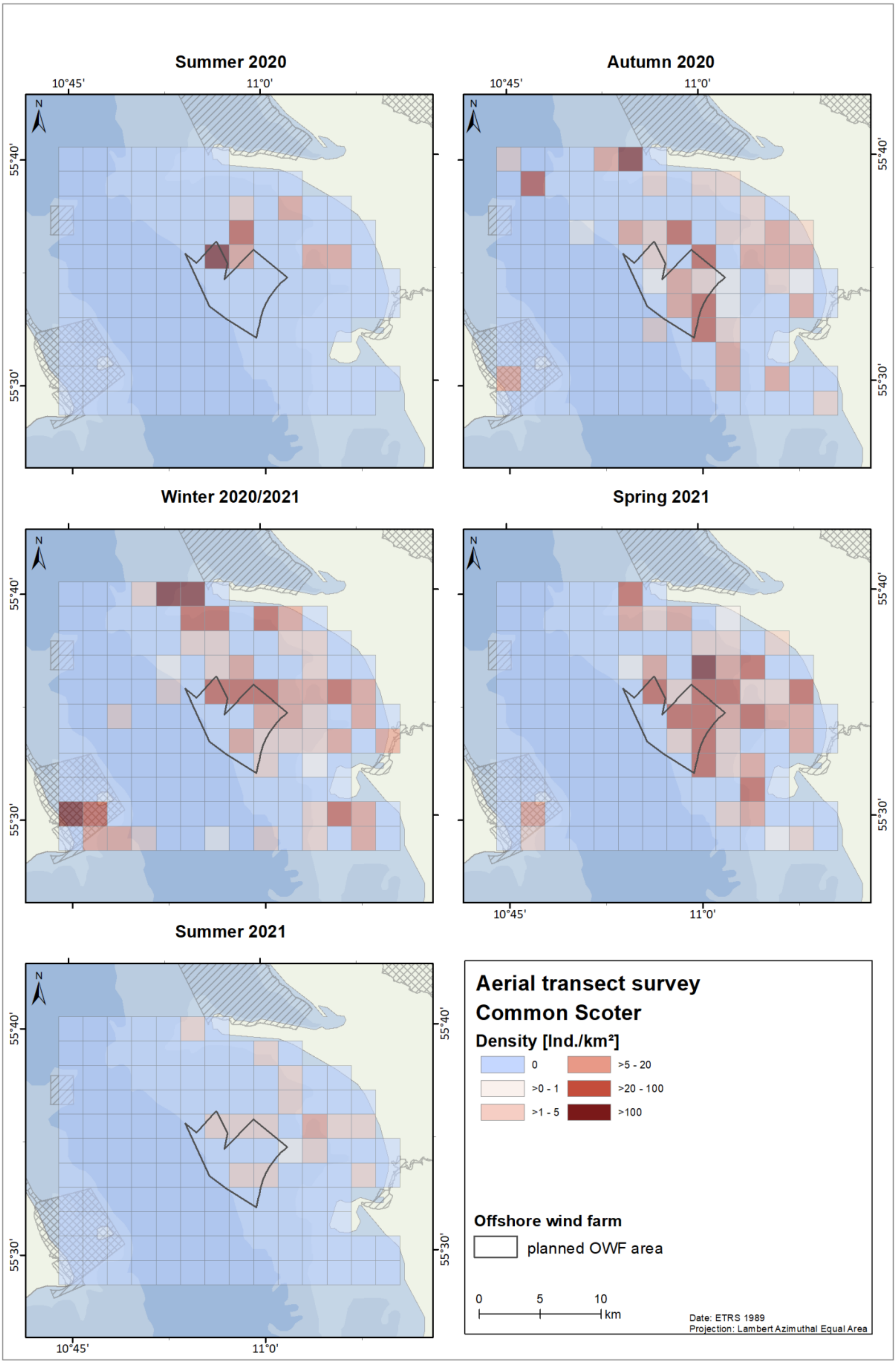

Figure 3.15 Seasonal distribution of Common Scoters in the Jammerland area between summer 2020 and summer 2021.

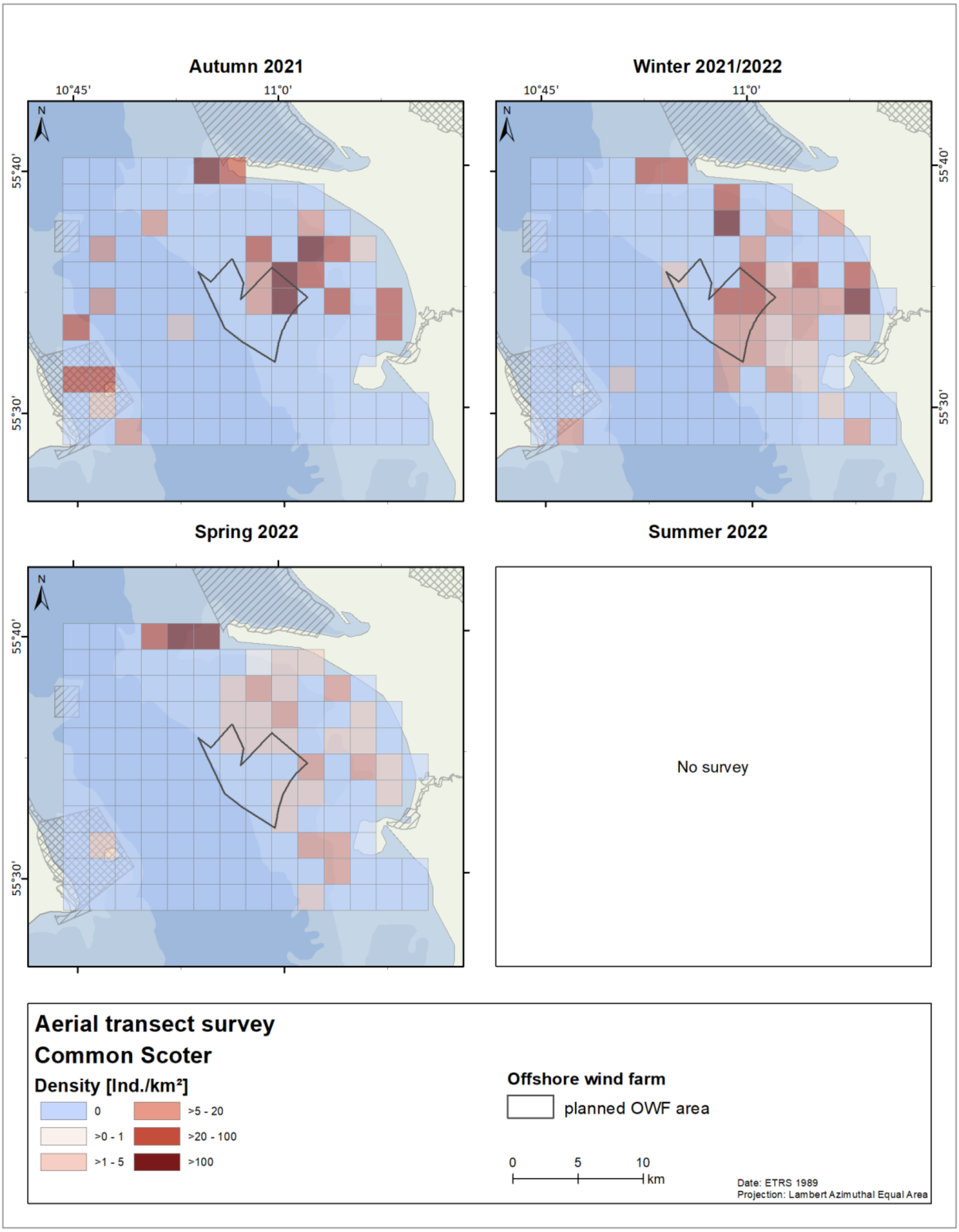

Figure 3.16 Seasonal distribution of Common Scoters in the Jammerland area between autumn 2021 and summer 2022.

The distribution of Common Scoter was spatially concentrated towards the (north)eastern part of the study area, extending also within the proposed wind farm. In autumn 2021 and winter 2020/2021 a few high-density grid cells occurred in the shallow waters to the southwest of the area. Grid cells with > 100 ind./km² were not rare but the lowest densities (< 5 ind./km²) were only seen in summer 2021 (Figure 3.15 and Figure 3.16). For all distribution maps see appendix A.1.12.

3.2.6 Velvet Scoter

Velvet Scoter – *Melanitta fusca*	**DK: Fløjlsand**
Biogeographic population: *M .f. fusca,* Western Siberia & Northern Europe/NW Europe	
Breeding range: W Siberia and N Europe	
Wintering / core non-breeding range: Baltic, W Europe	
Population size:220,000 - 410,000	
1% value: 4,000	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 1 IUCN Red List Category: Vulnerable
Trend: INC?	Trend quality: Reasonable
Key food: molluscs, crustaceans	

Density and distribution of Velvet Scoters in the Jammerland area

Previous surveys undertaken in October and November 2014 by BioConsult SH found a density of 2.65 ind./km² in November but only one individual in October (BAER ET AL. 2015).

A total of 543 Velvet Scoters were recorded in the Band A during the current 22 surveys in the Jammerland area. The highest density of 2.20 ind./km² corresponds to a flight in January 2022 (Table 3.8, Figure 3.17). Densities during the other surveys ranged between 0 and 1.37 ind./km².

Table 3.8 Numbers of observed Velvet Scoters during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	4	0.07	31
12.10.2020	57.0	4	0.07	31
14.11.2020	58.1	22	0.38	168
29.11.2020	52.4	36	0.69	304
13.12.2020	56.9	34	0.60	265
09.01.2021	60.5	37	0.61	269
02.02.2021	56.6	0	0	0
14.02.2021	51.7	2	0.04	18
23.03.2021	57.5	63	1.10	485
14.04.2021	56.5	7	0.12	53
27.04.2021	54.1	9	0.17	75

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.05.2021	57.0	56	0.98	432
16.06.2021	55.9	0	0	0
09.07.2021	54.0	0	0	0
11.08.2021	55.6	7	0.13	57
22.09.2021	54.5	7	0.13	57
02.11.2021	55.3	16	0.29	128
06.01.2022	42.8	94	2.20	969
26.02.2022	43.4	11	0.25	112
18.03.2022	56.5	68	1.20	531
20.04.2022	47.3	65	1.37	606
08.05.2022	53.8	1	0.02	8

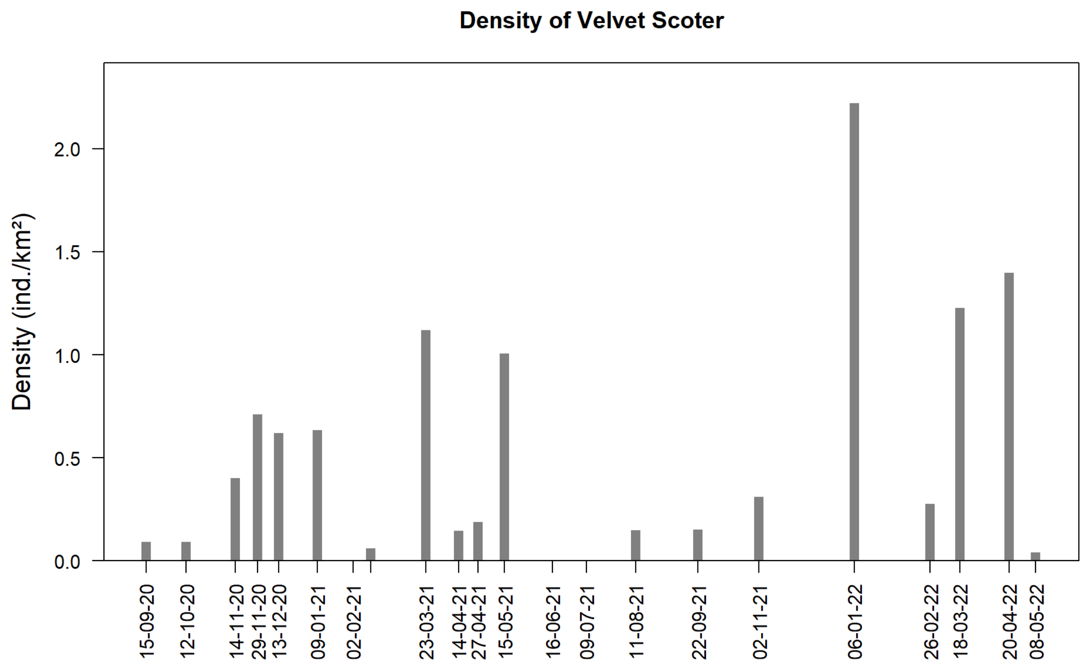

Figure 3.17 Densities of Velvet Scoters during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Velvet Scoters were mainly concentrated in the eastern part of the study area with small densities sometimes reaching the area of the planned OWF. Only in summer 2021 when the densities were overall the lowest, Velvet Scoters were spatially restricted to two grid cells. In spring 2021 and spring 2022 as well as during autumn 2021 and winter 2021/2022, Velvet Scoters also occurred in one grid cell in the southwestern part of the study area (Figure 3.18 and Figure 3.19). For all distribution maps see appendix A.1.13.

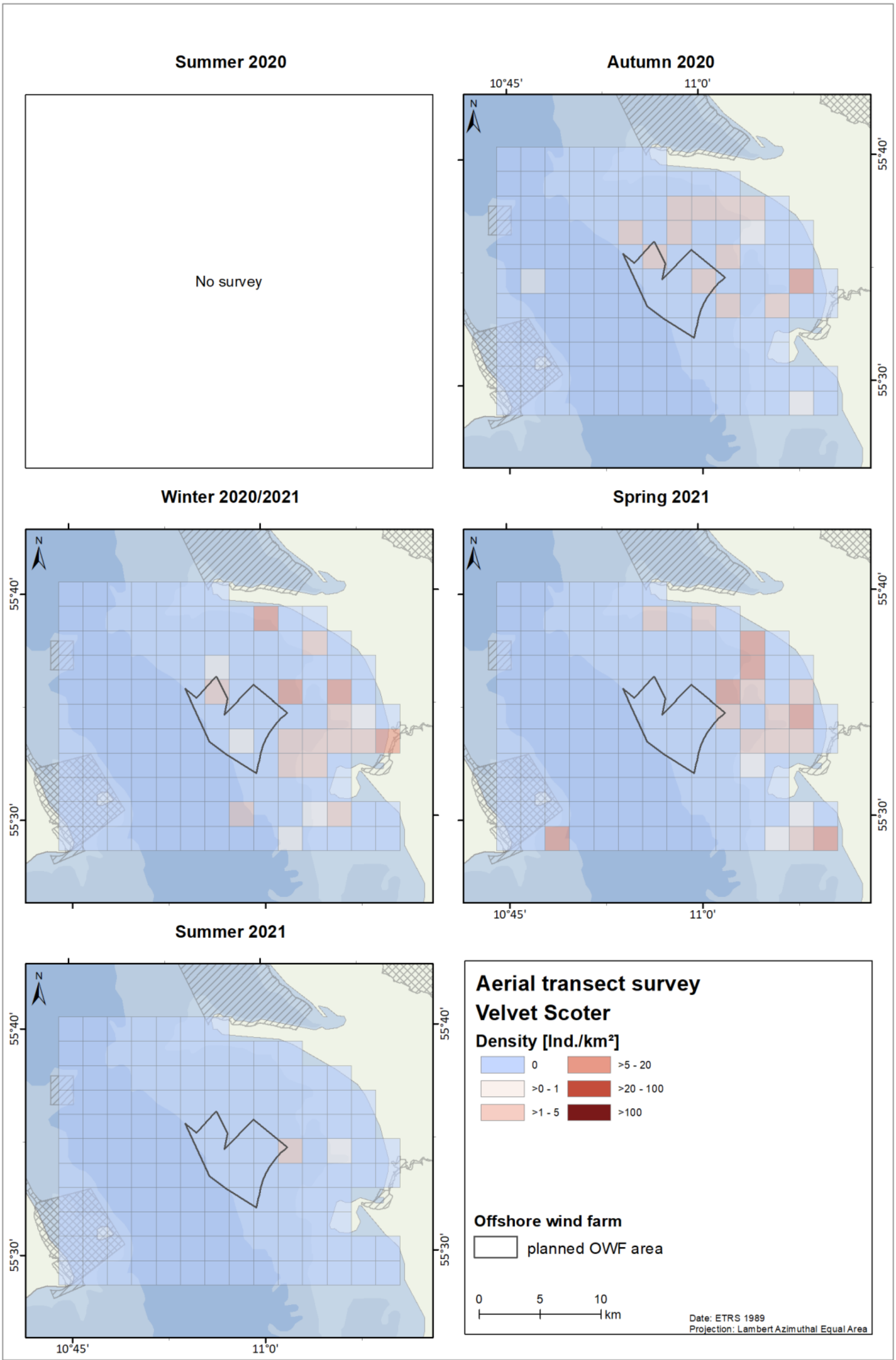

Figure 3.18 *Seasonal distribution of Velvet Scoters in the Jammerland area between summer 2020 and summer 2021.*

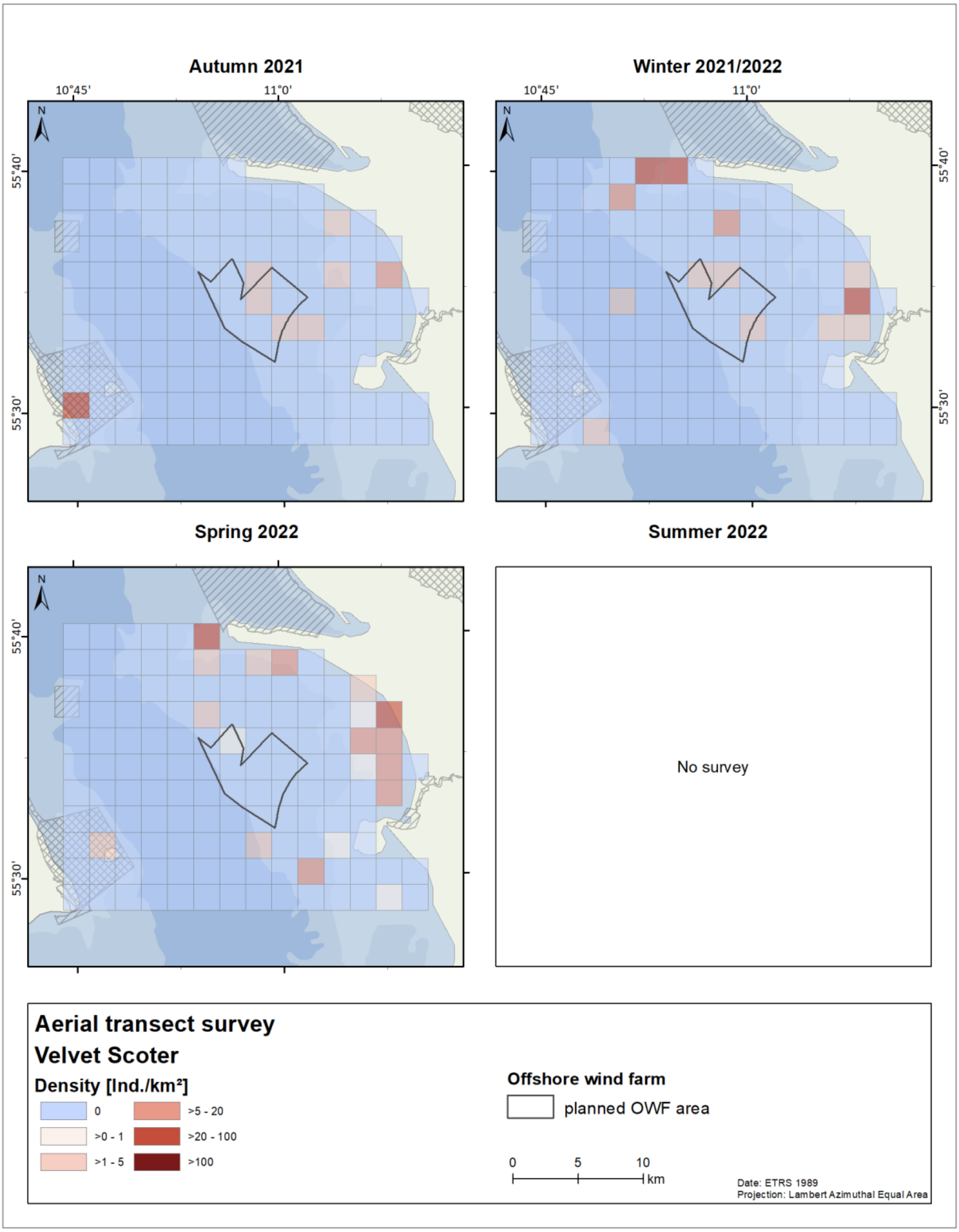

Figure 3.19 Seasonal distribution of Velvet Scoters in the Jammerland area between autumn 2021 and summer 2022.

3.2.7 Red-breasted Merganser

Red-breasted Merganser – *Mergus serrator*	**DK: Toppet Skallesluger**
Biogeographic population: N-W Europe, Central Europe	
Breeding range: N & NW Europe, Iceland, E Greenland	
Wintering / core non-breeding range: N NW & Central Europe, Iceland	
Population size: 100,000 - 160,000	
1% value: 860	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 3 IUCN Red List Category: Near threatened
Trend: STA/DEC?	Trend quality: Reasonable
Key food: fish	

Density and distribution of Red-breasted Mergansers in the Jammerland area

During the 22 surveys in the Jammerland area, a total of 352 Red-breasted Mergansers were recorded in Band A. The highest density was found during a flight in March 2021 with 3.60 ind./km² (Table 3.9, Figure 3.20). Densities during the other surveys were considerably lower, ranging between 0 and 0.48 ind./km².

Table 3.9 Numbers of observed Red-breasted Mergansers during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	0	0.00	0
12.10.2020	57.0	0	0.00	0
14.11.2020	58.1	2	0.03	15
29.11.2020	52.4	12	0.23	101
13.12.2020	56.9	2	0.04	15
09.01.2021	60.5	29	0.48	211
02.02.2021	56.6	15	0.27	117
14.02.2021	51.7	24	0.46	205
23.03.2021	57.5	207	3.60	1,588
14.04.2021	56.5	9	0.16	70
27.04.2021	54.1	4	0.07	33
15.05.2021	57.0	0	0.00	0

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
16.06.2021	55.9	0	0.00	0
09.07.2021	54.0	0	0.00	0
11.08.2021	55.6	0	0.00	0
22.09.2021	54.5	5	0.09	40
02.11.2021	55.3	0	0.00	0
06.01.2022	42.8	17	0.40	175
26.02.2022	43.4	16	0.37	163
18.03.2022	56.5	5	0.09	39
20.04.2022	47.3	5	0.11	47
08.05.2022	53.8	0	0.00	0

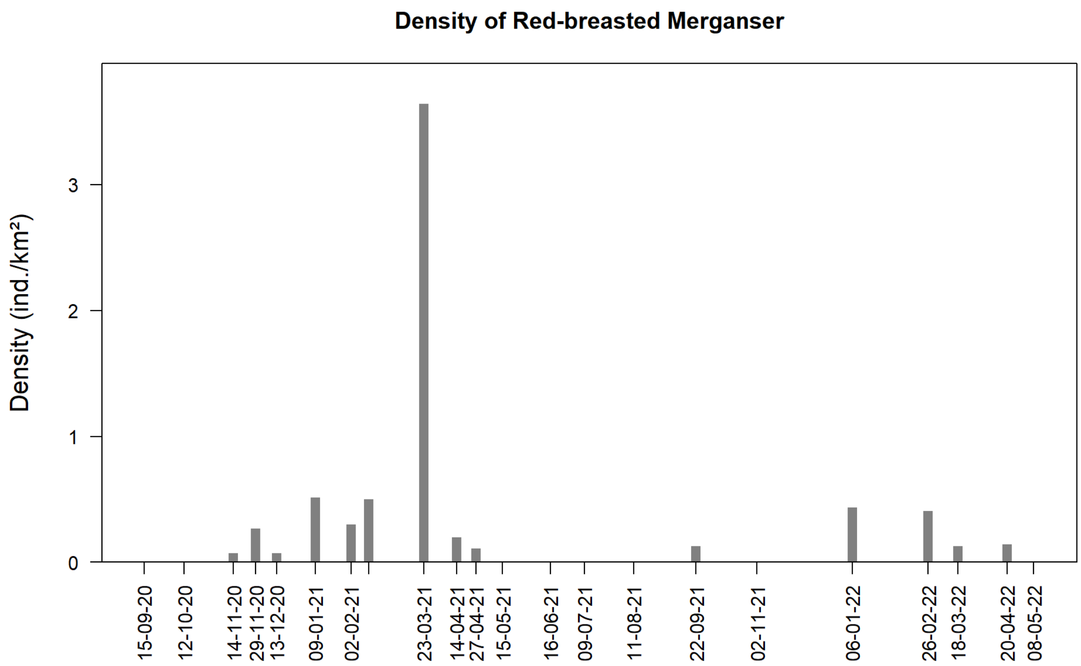

Figure 3.20 Densities of Red-breasted Mergansers during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Red-breasted Mergansers were scattered throughout the study area, but sightings were limited to the shallower parts of the study area, both to the east and southwest of the area. No individuals were recorded neither in the channel with deep water nor within the limits of the planned OWF (Figure 3.21 and Figure 3.22). During the winter seasons, the highest densities were found in the northeastern part of the area, while during winter and spring (of both years), some individuals were also recorded the southwestern part. No birds were recorded during summer. For all distribution maps see appendix A.1.15.

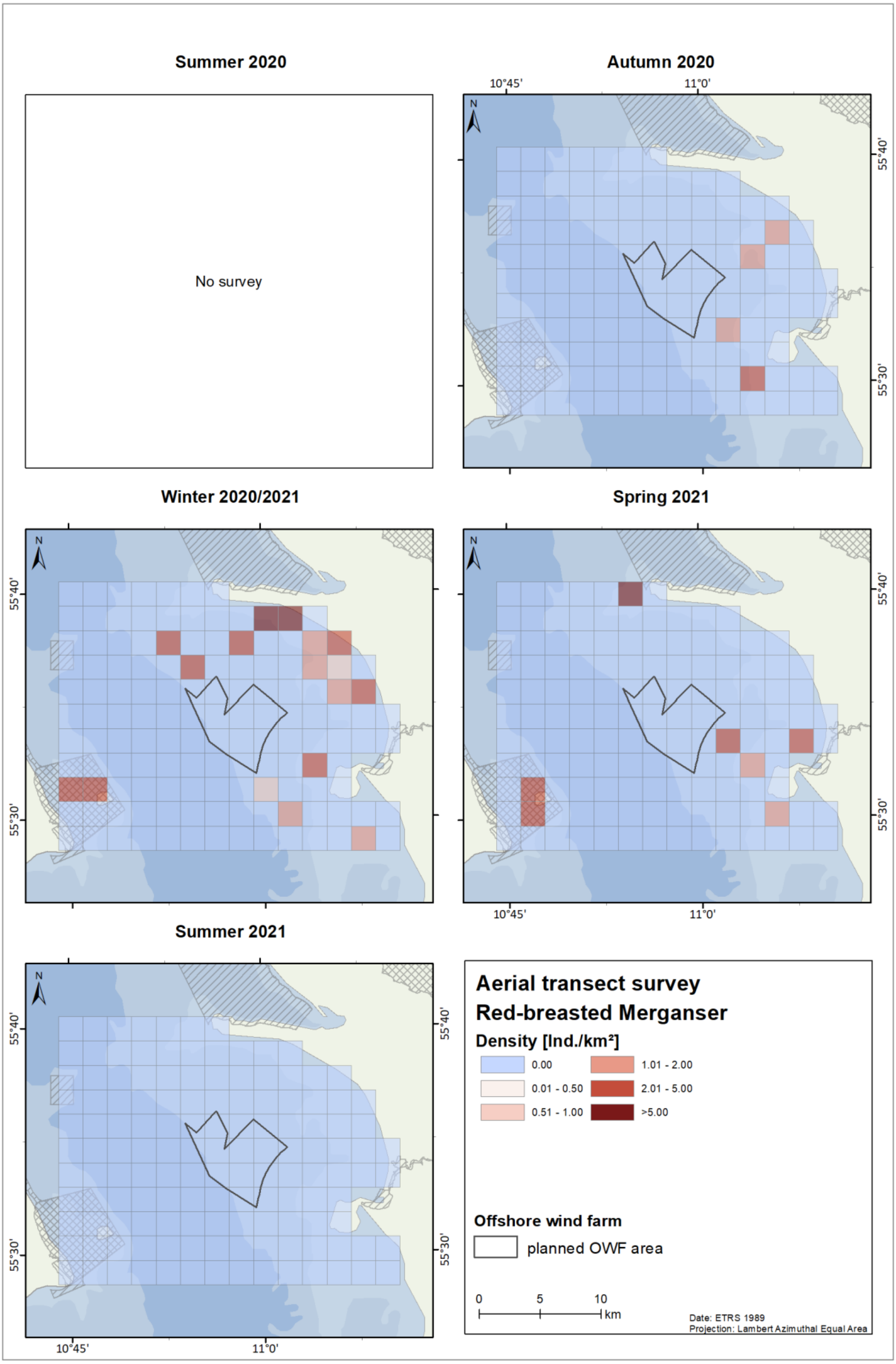

Figure 3.21 Seasonal distribution of Red-breasted Mergansers in the Jammerland area between summer 2020 and summer 2021.

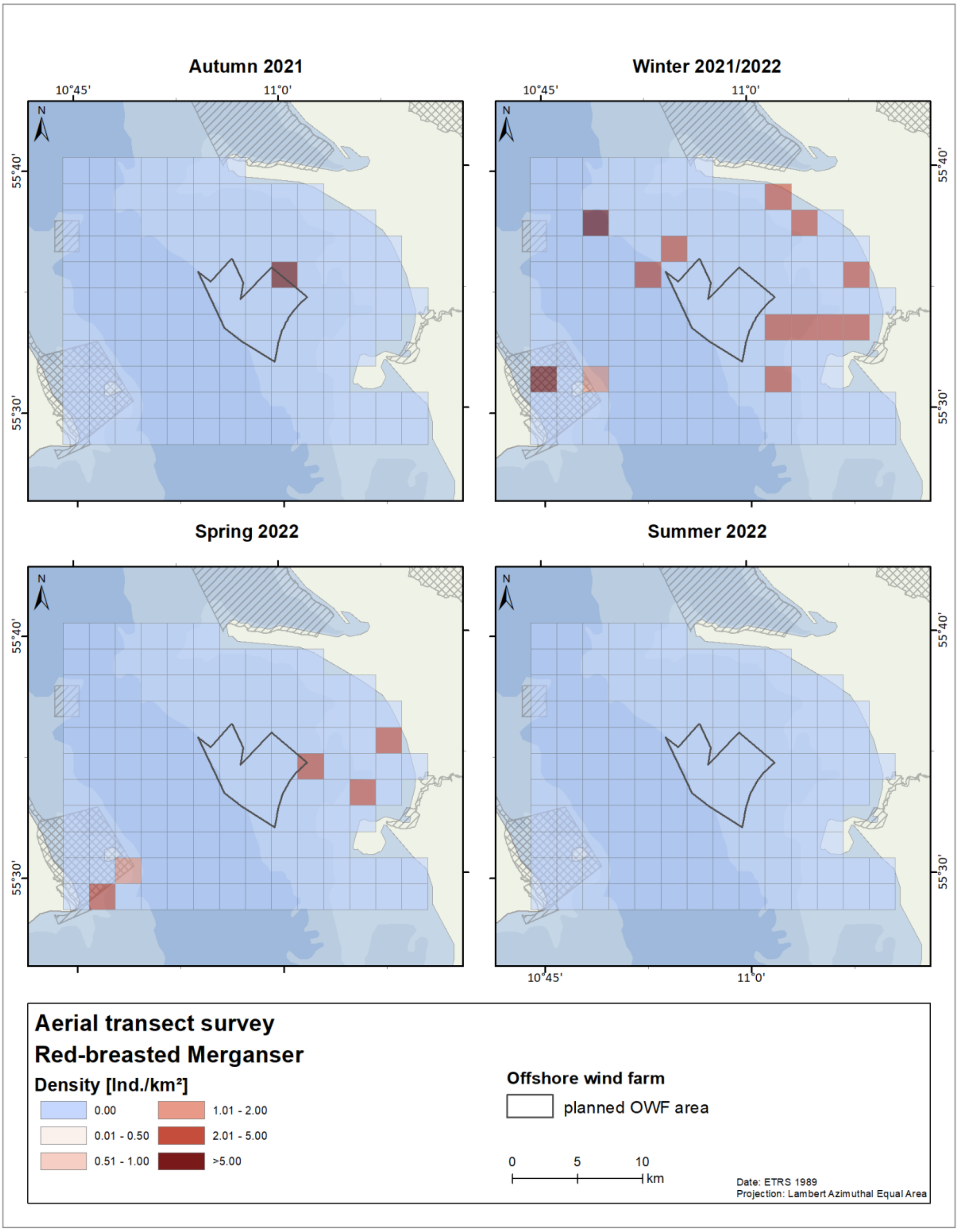

Figure 3.22 Seasonal distribution of Red-breasted Mergansers in the Jammerland area between autumn 2021 and summer 2022.

3.2.8 Black-headed Gull

Black-headed Gull – *Chroicocephalus ridibundus*	**DK: Hættemåge**
Biogeographic population: W Europe/W Europe, W Mediterranean, West Africa	
Breeding range: N & W Europe, S Greenland	
Non-breeding range: S & W Europe	
Population size: 2,500,000 – 3,400,000	
1% value: 31,000	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: Non-SPEC[E] IUCN Red List Category: Least concern
Trend: DEC	Trend quality: Good
Key food: various different food sources	

Density and distribution of Black-headed Gulls in the Jammerland area

A total of 116 Black-headed Gulls were recorded in the Band A during all 22 survey flights. The highest density was found in a flight in October 2020 with 1.23 ind./km² (Table 3.11, Figure 3.23). Densities during the other surveys ranged between 0.0 and 0.35 ind./km².

Table 3.10 Numbers of observed Black-headed Gulls during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	5	0.09	38
12.10.2020	57.0	70	1.23	542
14.11.2020	58.1	0	0.00	0
29.11.2020	52.4	0	0.00	0
13.12.2020	56.9	0	0.00	0
09.01.2021	60.5	4	0.07	29
02.02.2021	56.6	0	0.00	0
14.02.2021	51.7	0	0.00	0
23.03.2021	57.5	2	0.03	15
14.04.2021	56.5	0	0.00	0
27.04.2021	54.1	0	0.00	0
15.05.2021	57.0	0	0.00	0
16.06.2021	55.9	0	0.00	0

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
09.07.2021	54.0	5	0.09	41
11.08.2021	55.6	0	0.00	0
22.09.2021	54.5	0	0.00	0
02.11.2021	55.3	7	0.13	56
06.01.2022	42.8	2	0.05	21
26.02.2022	43.4	0	0.00	0
18.03.2022	56.5	20	0.35	156
20.04.2022	47.3	1	0.02	9
08.05.2022	53.8	0	0.00	0

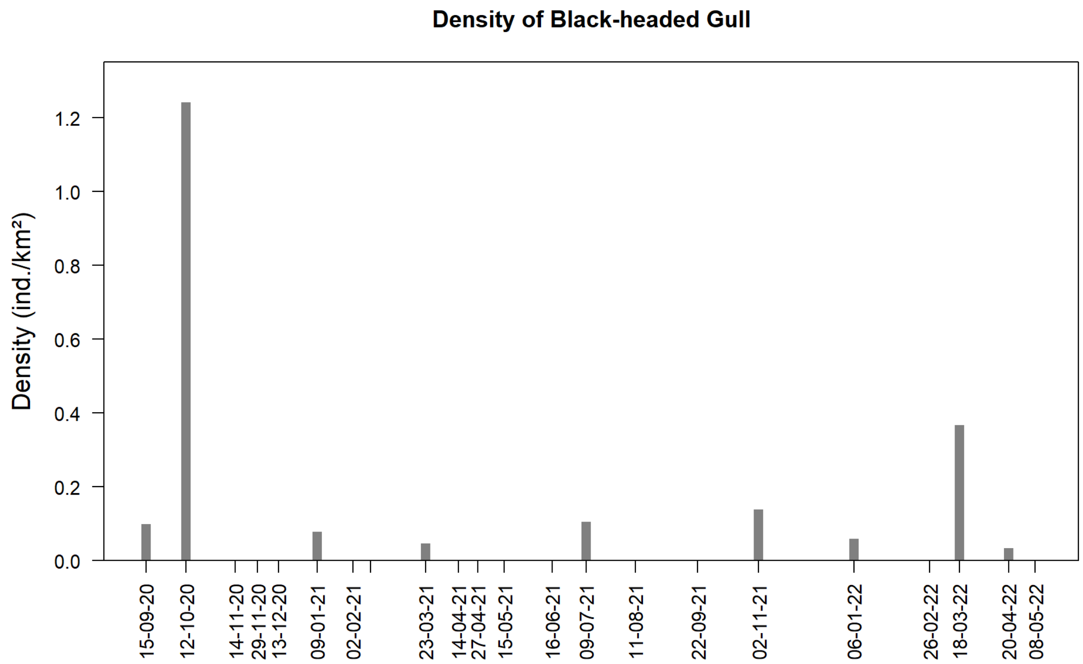

Figure 3.23 Densities of Black-headed Gulls during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Black-headed Gulls were sporadically found and at few grid cells. Their distribution did not show any recognizable pattern. (Figure 3.24 and Figure 3.25). For all distribution maps see appendix A.1.17.

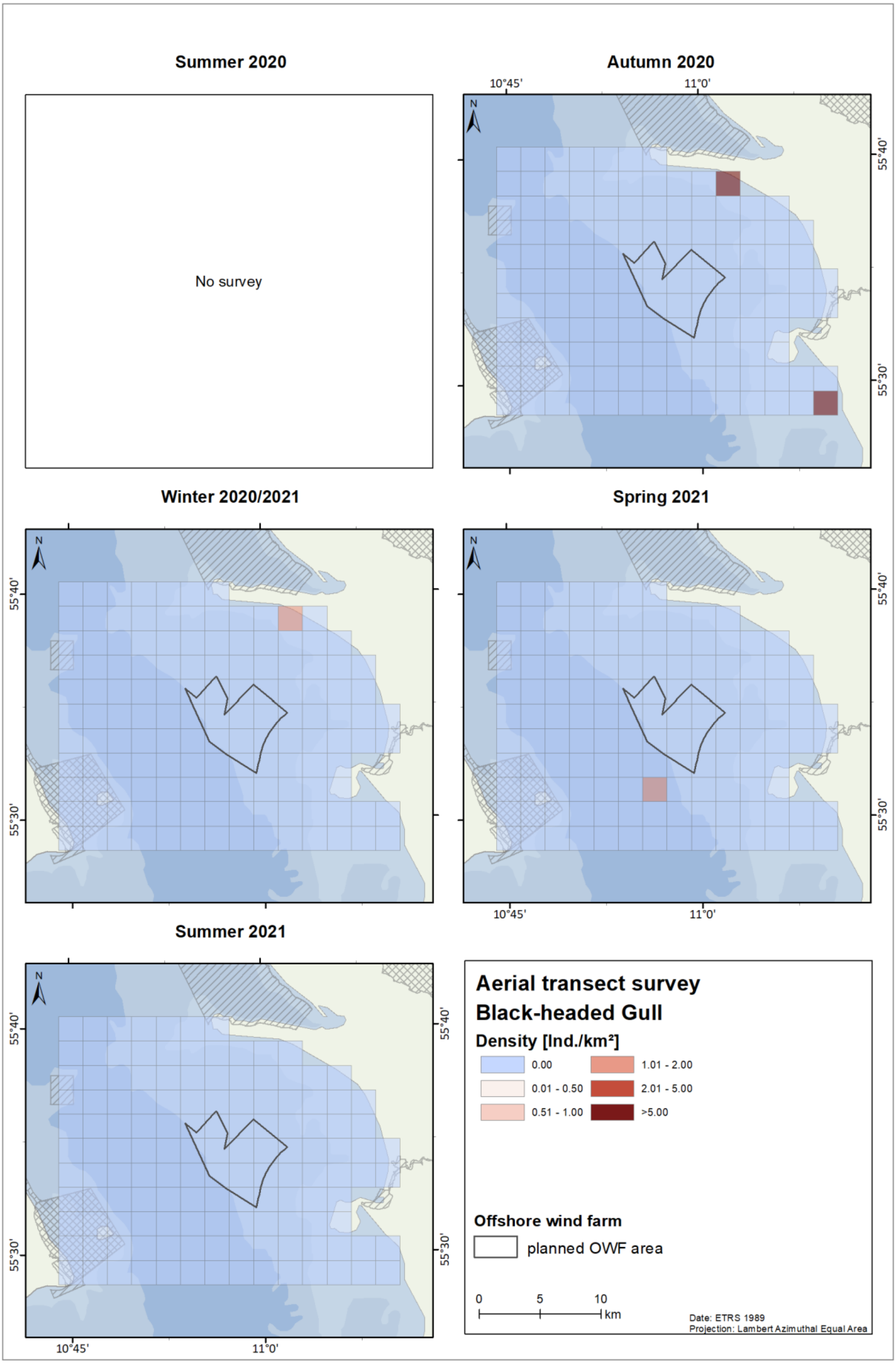

Figure 3.24 Seasonal distribution of Black-headed Gulls in the Jammerland area between summer 2020 and summer 2021.

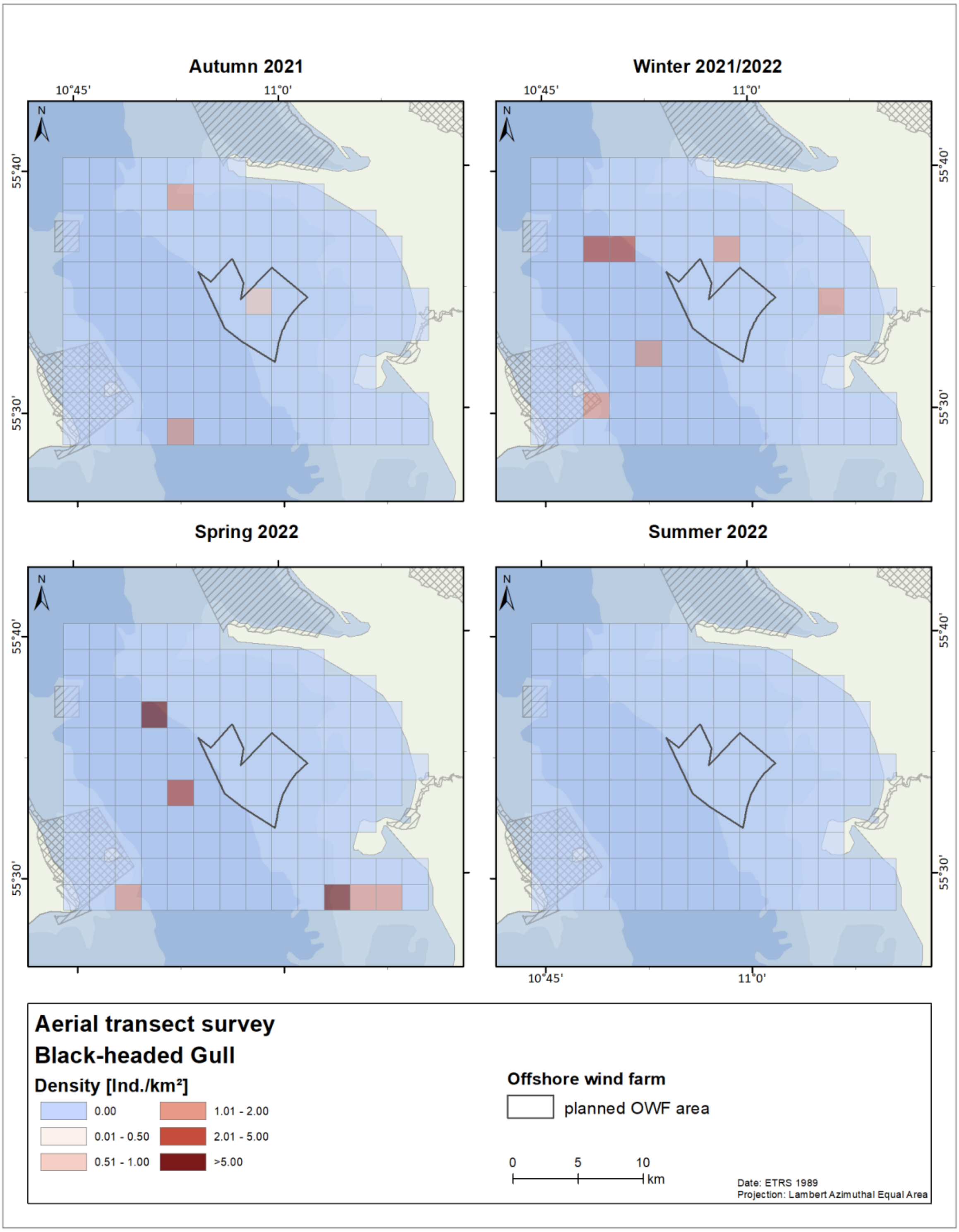

Figure 3.25 Seasonal distribution of Black-headed Gulls in the Jammerland area between autumn 2021 and summer 2022.

3.2.9 Herring Gull

Herring Gull – ***Larus argentatus***	**DK: Sølvmåge**
Biogeographic population: *argentatus*, 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: 14,400	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 2 IUCN Red List Category: Least concern
Trend: DEC	Trend quality: Reasonable
Key food: various different foodsources	

Density and distribution of Herring Gulls in the Jammerland area

Previous surveys undertaken in October and November 2014 by BioConsult SH found a maximum density of 1.32 ind./km².

A total of 582 Herring Gulls were recorded in the Band A during all 22 survey flights. The highest density was found in a flight in September 2020 with 2.91 ind./km² (Table 3.11, Figure 3.26). Densities during the other surveys ranged between 0.02 and 1.08 ind./km².

Table 3.11 Numbers of observed Herring Gulls during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	167	2.91	1,284
12.10.2020	57.0	8	0.14	62
14.11.2020	58.1	63	1.08	478
29.11.2020	52.4	32	0.61	269
13.12.2020	56.9	9	0.16	70
09.01.2021	60.5	5	0.08	36
02.02.2021	56.6	40	0.71	312
14.02.2021	51.7	42	0.81	359
23.03.2021	57.5	18	0.31	138
14.04.2021	56.5	6	0.11	47
27.04.2021	54.1	21	0.39	171

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.05.2021	57.0	3	0.05	23
16.06.2021	55.9	1	0.02	8
09.07.2021	54.0	43	0.80	351
11.08.2021	55.6	1	0.02	8
22.09.2021	54.5	6	0.11	49
02.11.2021	55.3	10	0.18	80
06.01.2022	42.8	18	0.42	186
26.02.2022	43.4	26	0.60	264
18.03.2022	56.5	27	0.48	211
20.04.2022	47.3	14	0.30	131
08.05.2022	53.8	22	0.41	180

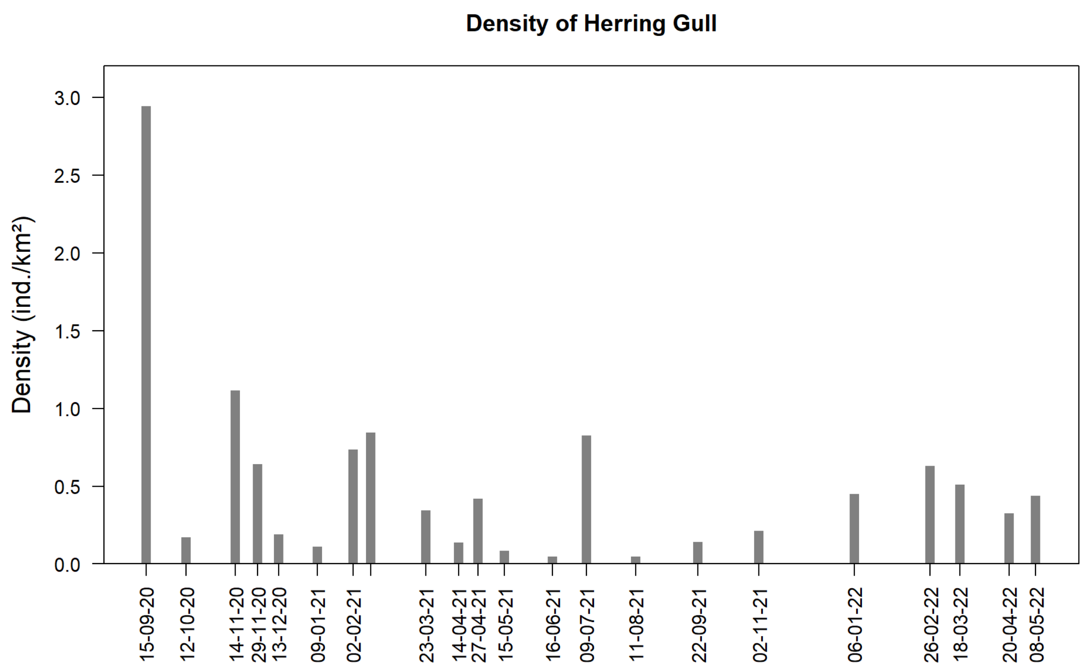

Figure 3.26 Densities of Herring Gulls during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Herring Gulls were widely distributed across the study area, also being found within the area of the planned OWF. The highest densities were often in the southern and eastern parts of the study area (Figure 3.27 and Figure 3.28). Locally high densities, might be related to fishing activities. For all distribution maps see appendix A.1.18.

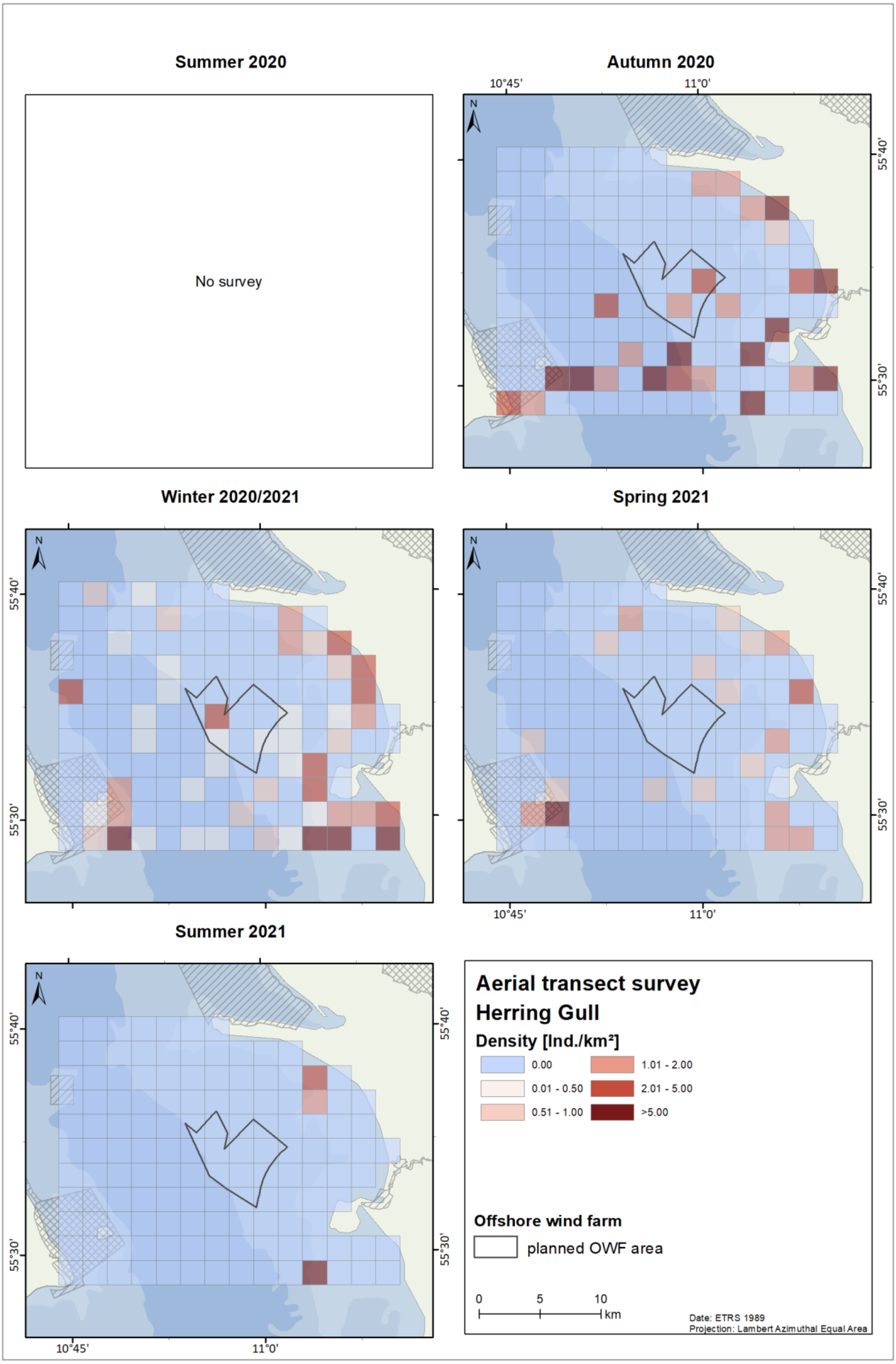

Figure 3.27 Seasonal distribution of Herring Gulls in the Jammerland area between summer 2020 and summer 2021.

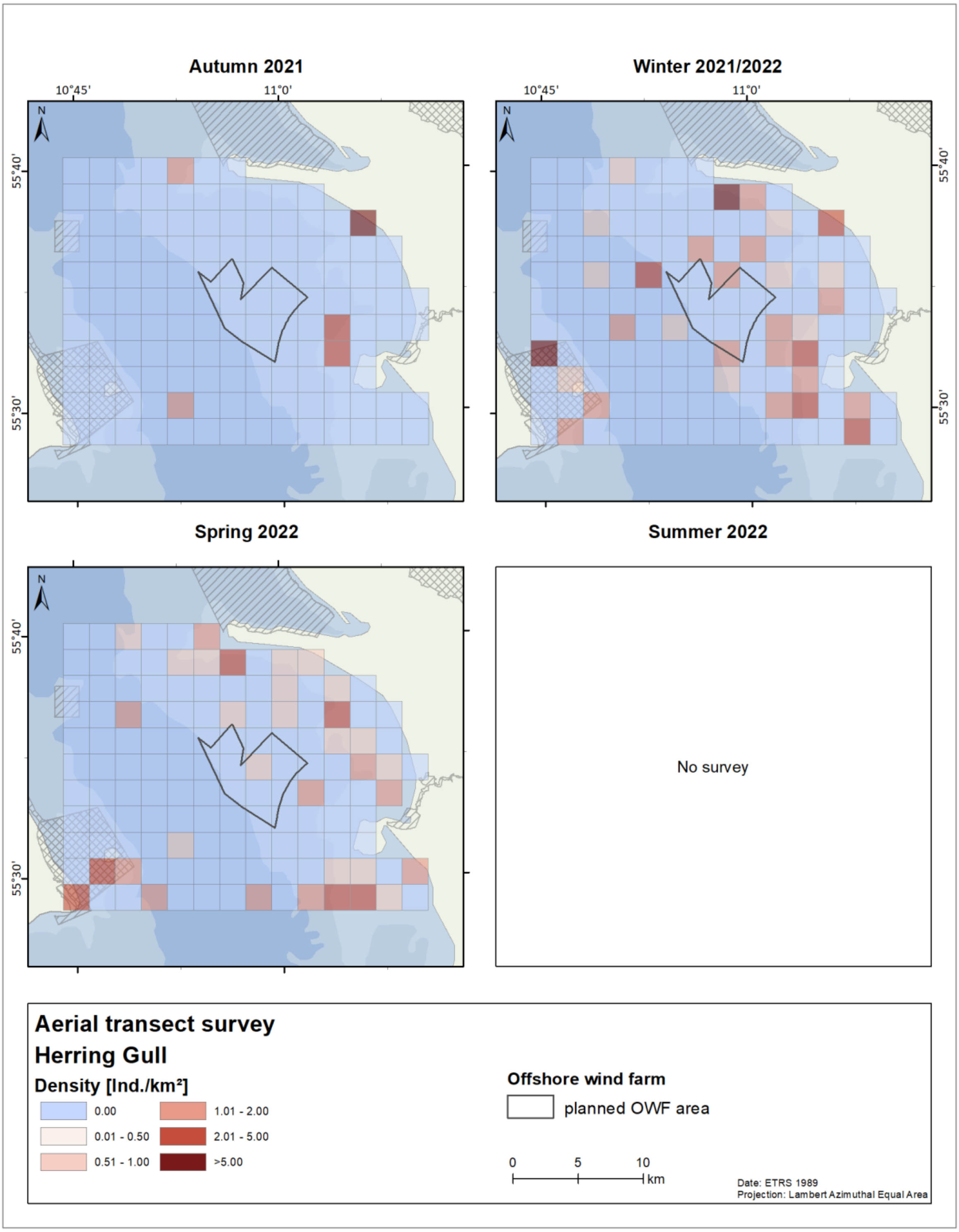

Figure 3.28 Seasonal distribution of Herring Gulls in the Jammerland area between autumn 2021 and summer 2022.

3.2.10 Common Gull

Common Gull – *Larus canus*	DK: Stormmåge
Biogeographic population: NW & C Europe/Atlantic coast & Mediterranean	
Breeding range: Iceland, Ireland, UK, eastwards to White Sea	
Wintering / core non-breeding range: Europe to N Africa	
Population size: 1,400,000 - 2,000,000	
1% value: 16,400	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: Non-SPEC^{E} IUCN Red List Category: Least Concern
Trend: DEC?	Trend quality: Reasonable
Key food: opportunistic	

Density and distribution of Common Gulls in the Jammerland area

A total of 378 Common Gulls were found in the Band A during the current 22 aerial surveys in the Jammerland area. Most of the birds (337 individuals, 89%) were detected in the first flight in September 2020 which corresponded to a density of 5.88 ind./km² (Figure 3.29). Densities during the other surveys were considerably lower, ranging between 0 and 0.14 ind./km² (Table 3.12). Possibly, the high density during this survey is associated with fishing activities, as high densities were also recorded for Herring Gulls, both in the southern part of the survey area (Figure 3.30).

Table 3.12 Numbers of observed Common Gulls during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km^2. Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
15.09.2020	57.4	337	5.88	2,591
12.10.2020	57.0	1	0.02	8
14.11.2020	58.2	1	0.02	8
29.11.2020	52.4	1	0.02	8
13.12.2020	56.9	0	0	0
09.01.2021	60.6	0	0	0
02.02.2021	56.6	0	0	0
14.02.2021	51.7	7	0.14	60
23.03.2021	57.5	5	0.09	38

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
14.04.2021	56.6	0	0	0
27.04.2021	54.1	0	0	0
15.05.2021	57.0	1	0.02	8
16.06.2021	55.9	2	0.04	16
09.07.2021	54.0	3	0.06	24
11.08.2021	55.6	1	0.02	8
22.09.2021	54.5	2	0.04	16
02.11.2021	55.3	4	0.07	32
06.01.2022	42.8	1	0.02	10
26.02.2022	43.4	0	0	0
18.03.2022	56.5	3	0.05	23
20.04.2022	47.3	3	0.06	28
08.05.2022	53.8	6	0.11	49

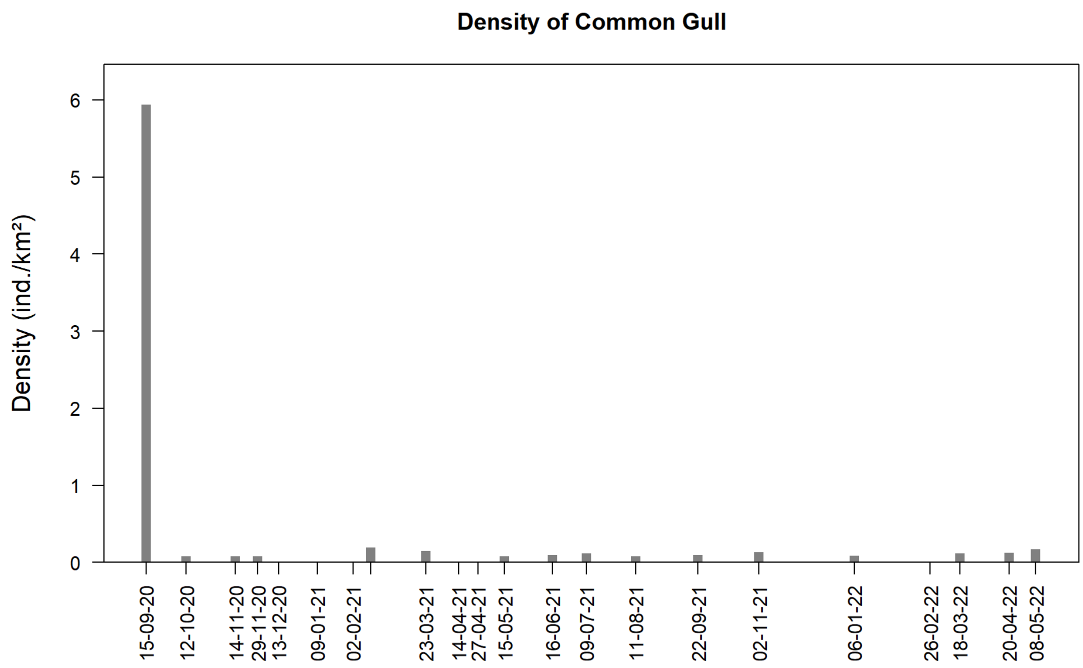

Figure 3.29 Densities of Common Gulls during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Except for the high densities observed in autumn 2020 (due to the high numbers of Common Gulls in the first flight), the distribution of Common Gulls was otherwise patchy without focal areas (Figure 3.30 and Figure 3.31). Nonetheless, occasionally, Common Gulls were observed in the deeper waters of the study area and also within the limits of the planned area. For all distribution maps see appendix A.1.19.

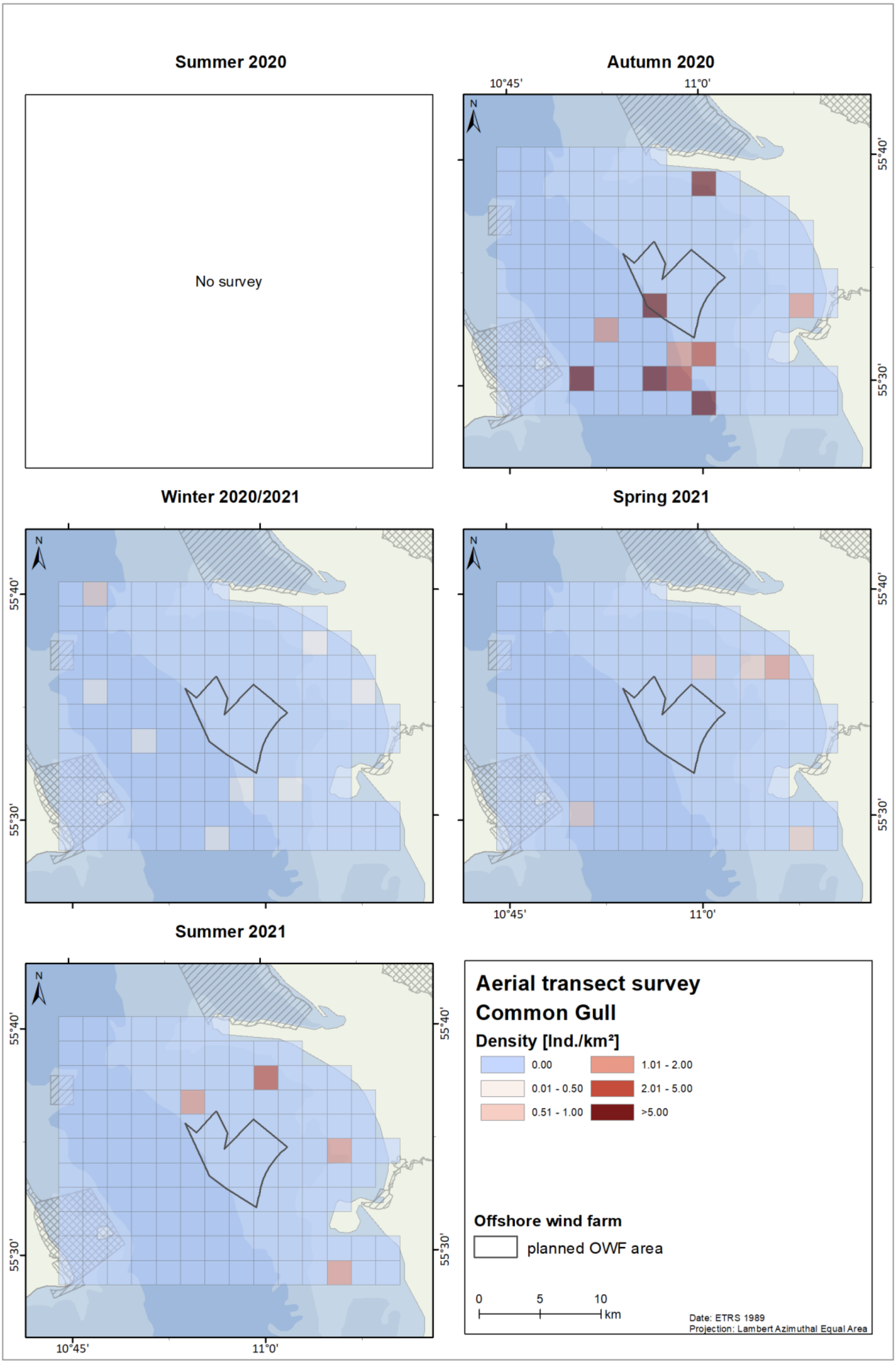

Figure 3.30 Seasonal distribution of Common Gulls in the Jammerland area between summer 2020 and summer 2021.

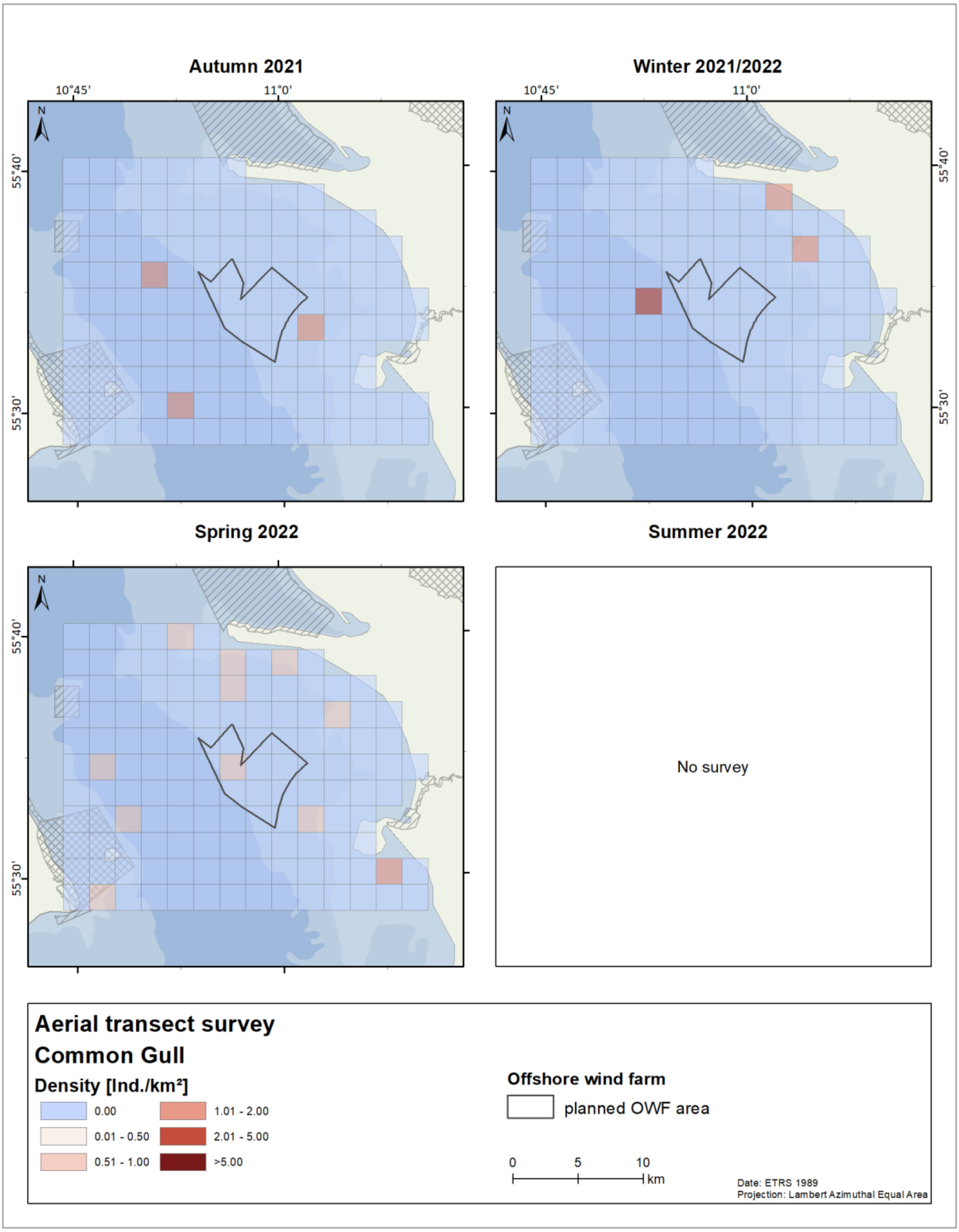

Figure 3.31 Seasonal distribution of Common Gulls in the Jammerland area between autumn 2021 and summer 2022.

3.2.11 Common Guillemot

Common Guillemot – *Uria aalge*	**DK: Lomvie**
Biogeographic population: Baltic Sea*	
Breeding range: Baltic Sea	
Non-breeding range: Baltic Sea	
Population size: 77,000 – 100,000	
1% value: 880	
Conservation status:	EU Birds Directive, Annex I: not listed EU SPEC Category: SPEC 3 IUCN Red List Category: Least Concern
Trend: INC	Trend quality: Good
Key food: 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. More recent data provided by Wetlands International suggest a larger population in the Baltic Sea, possible up to 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).

Density and distribution of Common Guillemots in the Jammerland area

Within the band A, 424 Common Guillemots were recorded during all 22 survey flights. The highest densities were detected in both flights in February 2021 with 1.84 ind./km² and 1.77 ind./km² (Figure 3.32 and Table 3.13). Densities during the other surveys ranged between 0 and 1.31 ind./km².

Table 3.13 Numbers of observed Common Guillemots during 22 aerial surveys. 'Effort' represents the coverage of the study area in one- or two-sided valid conditions during the particular survey. 'N birds' the actual number of birds counted within Band A transects, 'Density' the number of birds per km². Total estimate represents the total number of birds estimated for the study area calculated on the basis of the densities.

Survey	Effort (km²)	N birds	Density [ind./km²]	Total estimate
15.09.2020	57.4	39	0.68	300
12.10.2020	57.0	0	0.00	0
14.11.2020	58.2	8	0.14	61
29.11.2020	52.4	0	0.00	0
13.12.2020	56.9	10	0.18	77
09.01.2021	60.6	4	0.07	29
02.02.2021	56.6	100	1.77	779
14.02.2021	51.7	95	1.84	811

Survey	Effort (km^2)	N birds	Density [ind./km^2]	Total estimate
23.03.2021	57.5	1	0.02	8
14.04.2021	56.6	5	0.09	39
27.04.2021	54.1	0	0	0
15.05.2021	57.0	0	0	0
16.06.2021	55.9	0	0	0
09.07.2021	54.0	1	0.02	8
11.08.2021	55.6	5	0.09	40
22.09.2021	54.5	19	0.35	154
02.11.2021	55.3	37	0.67	295
06.01.2022	42.8	56	1.31	577
26.02.2022	43.4	44	1.01	448
18.03.2022	56.5	0	0	0
20.04.2022	47.3	0	0	0
08.05.2022	53.8	0	0	0

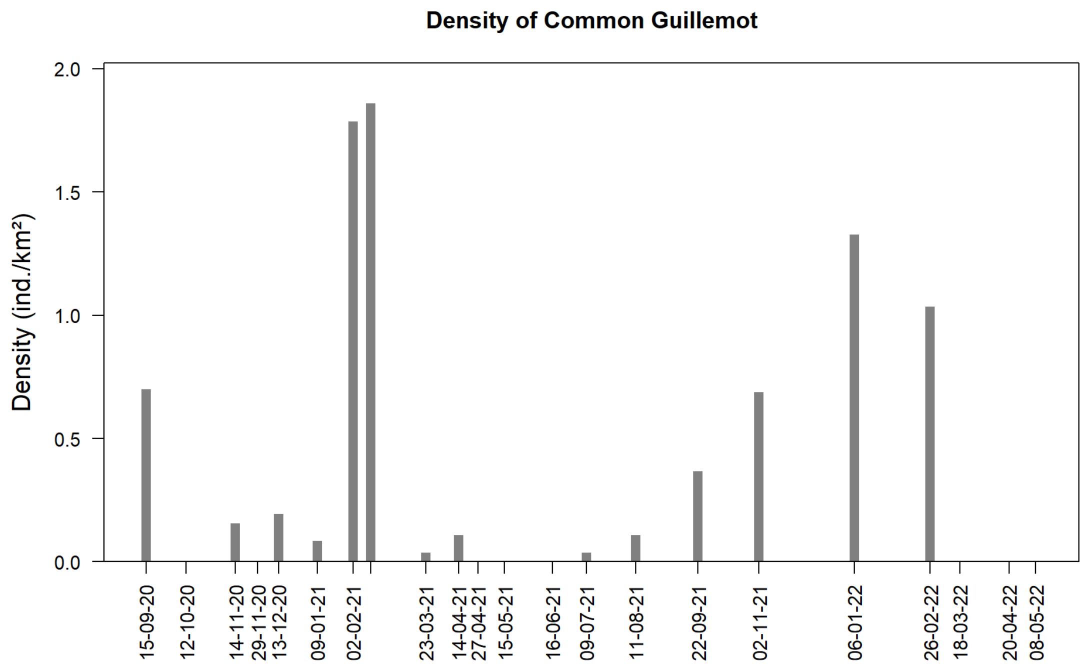

Figure 3.32 Densities of Common Guillemots during all 22 aerial surveys between September 2020 and May 2022 in the Jammerland study area.

Common Guillemots were widely distributed across the study area, especially during winter. The highest densities were mainly found in some distance from the coast, and individuals were also recorded inside the planned OWF (Figure 3.33 and Figure 3.34). No individuals occurred in the summers and in spring 2022. For all distribution maps see appendix A.1.23.

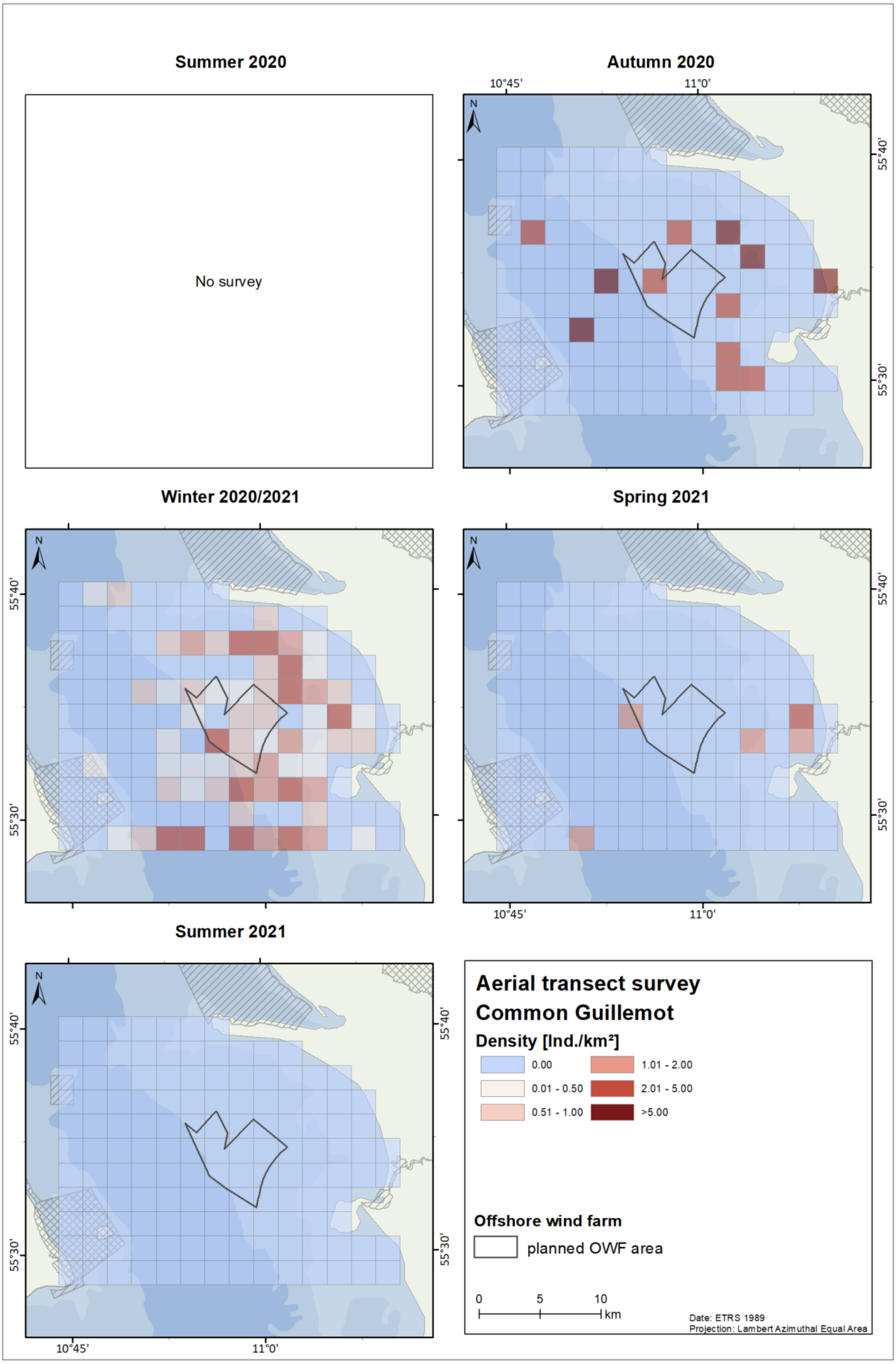

Figure 3.33 Seasonal distribution of Common Guillemots in the Jammerland area between summer 2020 and summer 2021.

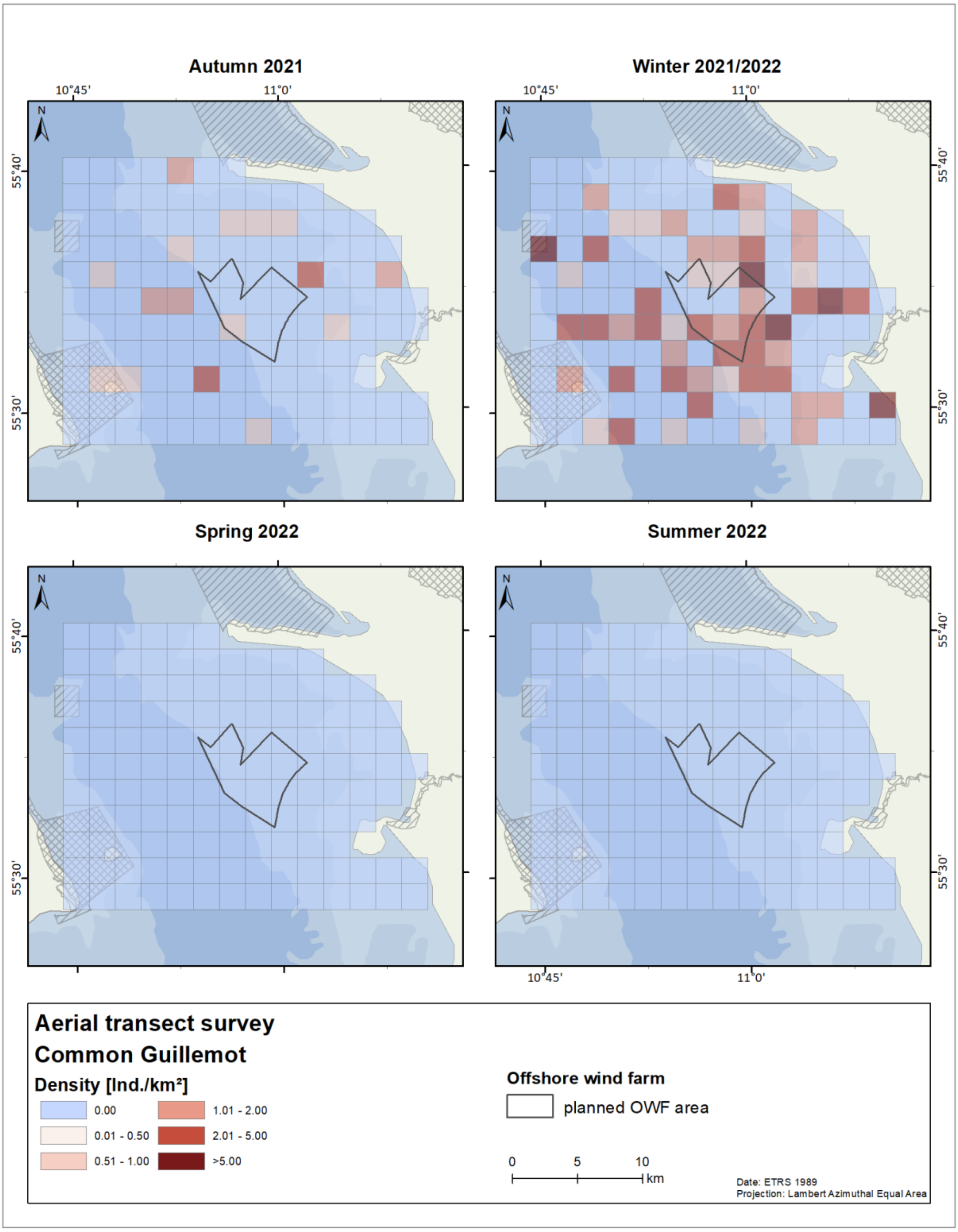

Figure 3.34 Seasonal distribution of Common Guillemots in the Jammerland area between autumn 2021 and summer 2022.

3.3 Abundance and distribution of marine mammals

A total of 39 Harbour Porpoises, 15 Harbour Seals and 1 unidentified pinniped (Grey/Harbour Seal) were recorded in the Jammerland area during the 22 surveys within the survey period under valid conditions. No Grey Seals were detected.

The highest sighting rate per 100 km was found during the survey in November 2021 with 4.6 ind./100 km. Across all flights, on average, about one individual was seen per 100 km. The distribution of Harbour Porpoises was patchy without focal areas (see appendix A.1.26), but there was a slight tendency for Harbour Porpoises to be more often found within the deep water channel.

In comparison, in October 2014, 7 Harbour Porpoise sightings with a total of 12 individuals were recorded during a survey of this former period, which equals 4 individuals/100 km transect length and is thus very similar to the value of November 2021 (Baer et al. 2015). During the survey in November 2014, only one individual was recorded. All sightings occurred either on the edge or within the channel of deeper water crossing the study area.

Up to 3 individuals of Harbour Seals were observed during a single flight, but mostly just one or two individuals. The distribution of the Harbour Seals was patchy but seemed to occur in more shallow waters. Nonetheless, also for this species neither densities nor grid density maps are provided. For the distribution maps see appendix A.1.26 and A.1.27.

Table 3.14 Marine mammal observations during 22 aerial survey flights in the Jammerland area (all bands included). Listed are all individuals recorded by main observers under valid conditions. The third column shows the probabilities of Harbour Porpoise presence in the upper water column (0-2 m) depending on the month of observation according to Teilmann et al (2013). The fifth column is the corrected number of Harbour Porpoises after Teilmann et al (2013) correction.

Survey	Effort (km^2)	Correction factor (Teilmann 2013)	Harbour Porpoise (n, all bands)	Harbour Porpoise (n) corrected	Harbour Porpoise (n corrected/100 km)	Harbour Seal (n)	Unidentified pinniped (n)
15.09.2020	38.4	0.45	3	6.7	2.07	1	1
12.10.2020	23.4	0.453	0	0.0	0.00	0	0
14.11.2020	29.4	0.463	0	0.0	0.00	0	0
29.11.2020	4.7	0.463	0	0.0	0.00	0	0
13.12.2020	42.5	0.499	0	0.0	0.00	0	0
09.01.2021	34.3	0.492	0	0.0	0.00	0	0
02.02.2021	14.4	0.425	0	0.0	0.00	0	0
14.02.2021	39.3	0.425	1	2.4	0.71	0	0
23.03.2021	35.9	0.525	0	0.0	0.00	1	0
14.04.2021	31.4	0.615	0	0.0	0.00	0	0
27.04.2021	49.6	0.615	3	4.9	1.17	0	0
15.05.2021	57.0	0.573	3	5.2	1.09	2	0
16.06.2021	28.2	0.553	2	3.6	1.53	1	0
09.07.2021	54.0	0.57	8	14.0	3.09	1	0
11.08.2021	47.4	0.517	0	0.0	0.00	0	0

Survey	Effort (km^2)	Correction factor (Teilmann 2013)	Harbour Porpoise (n, all bands)	Harbour Porpoise (n) corrected	Harbour Porpoise (n corrected/100 km)	Harbour Seal (n)	Unidentified pinniped (n)
22.09.2021	41.3	0.45	2	4.4	1.28	2	0
02.11.2021	44.9	0.463	8	17.3	4.57	1	0
06.01.2022	42.8	0.492	0	0.0	0.00	0	0
26.02.2022	43.4	0.425	0	0.0	0.00	1	0
18.03.2022	56.5	0.525	5	9.5	2.01	1	0
20.04.2022	42.9	0.615	2	3.3	0.90	1	0
08.05.2022	53.8	0.573	2	3.5	0.77	3	0
Total	**529.9**		**39**	**74.8**		**15**	**1**

4 DISCUSSION

4.1 Critique of methods

Data was collected during 22 visual aerial surveys from September 2020 to May 2022. 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. Thus, 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.

Several challenges during visual aerial surveys exist: due to the short observation time, the identification of dark or small species such as Razorbills, Guillemots, and Common and Arctic Terns can be difficult. Also, the identification rate might differ somewhat between observers (observer bias). Visual aerial surveys might also cause some sensitive species to flush, due to the low flight height of 76m (Zydelis et al. 2019). These factors could all affect species numbers recorded during the surveys to some extent and need to be considered when interpreting the results.

4.2 Species abundance and distribution

The results of the visual aerial surveys from September 2020 to May 2022 in the Jammerland study area were largely in line with expectations. Water depth in the study area varied, with shallow waters in the Eastern part and South-Western part, and a strait with deeper water (the Great Belt) crossing from the North-West to the South. The study area reached all the way to the coast, especially covering the coastline of the Jammerland Bay. This was also reflected in the species range and distribution.

In the Baltic Sea, **Red-throated Divers** are found as winter visitors and migrants (Mendel et al. 2008). During the aerial surveys in this study, low to medium densities (up to 0.32 ind./km²) of Red-throated Divers were found within the study area. The highest densities were found during winter and during spring. Previous surveys undertaken in October and November 2014 by BioConsult SH found densities between 0.1 and 2.2 ind./km² (Baer et al. 2015). Also Petersen & Nielsen (2011) reported low to medium densities of Red-throated Divers in this area. Similar to the previous survey, divers were predominantly found along the mid and north-eastern sections of the transects. Only few individuals were found in the deeper channel of the Great Belt. Given the rather low densities, the study area does not seem to be of high importance to this species. Nevertheless, as divers react very sensitively to anthropogenic disturbances like OWF, showing displacement distances of up to 10-15 km in some studies (Dierschke et al. 2016; Mendel et al. 2019; Heinänen et al. 2020), some individuals resting within the Jammerland Bay will likely be disturbed by the planned OWF.

The **Great Cormorant** was the third most-abundant species during the study period with densities up to 2,74 ind./km². The closest reported key area for this species is the SW Kattegat (Skov et al.

2011) with > 2000 wintering individuals. In the current study, cormorants were mostly recorded in the shallow parts of the study area, but frequently also far from the shore and within the footprint of the planned OWF. Cormorants are known to be attracted by OWF as they use the structures for resting (DIERSCHKE ET AL. 2016) and thus the species might increase in numbers in the area after the construction of the planned OWF.

Of the sea ducks, **Common Eiders** were the most abundant species during aerial surveys, followed by **Common Scoters**. **Velvet Scoters** occurred only in relatively small numbers. Common Eiders and Common Scoters reached the highest densities during autumn and winter. For Common Eiders, densities of > 100 ind./km² were reached at maximum in the current study, and similar values in the previous study in 2014 (BAER ET AL. 2015). As expected, both species were concentrated mostly in the shallow parts of the study area. However, during some surveys, the distribution also reached into deeper water, including the footprint of the planned OWF. The Great Belt has been described as one of the key wintering areas for both Common Eiders and Common Scoters (SKOV ET AL. 2011). Sea ducks are sensitive to anthropogenic disturbances (DIERSCHKE ET AL. 2016), although species differ somewhat in their response. Common Scoters are one of the most sensitive species towards ship traffic (FLIESSBACH ET AL. 2019). Therefore, sea ducks are expected to be partly displaced from the area of the planned OWF and routes of associated ship traffic.

Red-breasted mergansers were recorded mostly in low numbers within the study area and mainly in shallow waters. Only on one occasion, a larger concentration (> 100) of individuals was found at the northern tip of the Jammerland Bay. According to PETERSEN & NIELSEN (2011), only low densities are expected for the study area, although a few hundred birds are reported to use the SW Kattegat (SKOV ET AL. 2011) as wintering area. Red-breasted mergansers show high escape distances from ships (FLIESSBACH ET AL. 2019) but seem to be weakly attracted to OWFs (DIERSCHKE ET AL. 2016). Due to the low numbers around the planned OWF, however, only a small number of birds might be affected.

Of the gulls, the most common species observed in this study was the **Herring Gull.** Overall, gulls occurred in the area in rather low densities. Most gull species are reported to be weakly attracted to OWFs (DIERSCHKE ET AL. 2016). The distribution of many gull species is to a large extent driven by fishing activities, as they feed on discards, and thus densities can fluctuate strongly depending on the presence of fishing vessels (LEOPOLD ET AL. 2013).

Of the auks, **Common Guillemots** were frequently recorded in the study area during winter, while only small numbers of the other species (Razorbills and Black Guillemots) were seen. Common Guillemots were distributed across the whole study area, with lower numbers close to the coast and higher numbers further offshore. The maximum densities in this study reached about 1.8 ind./km², suggesting that the study area is of some importance for this species. PETERSEN & NIELSEN (2011) reported in contrast, that Guillemots/Razorbills almost exclusively wintered in central Kattegat. There, the modelled density for the study area was very low. Several studies reported Common Guillemots to show avoidance of OWFs, with varying distances (DIERSCHKE ET AL. 2016). Thus, given the current findings, some individuals are expected to be displaced from the area of the planned OWF.

Marine mammals were recorded in relatively small numbers during this study, although this might be due to the low flight height and thus a relatively small surveyed area, which was optimized for counting birds. In total, 39 **Harbour Porpoises** were seen across all bands during the 22 flights. This averages about one individual per 100 km transect distance. As the method was not specifically designed to survey marine mammals but seabirds, no densities were calculated. It is known that the study area, which is part of the Great Belt, can harbour high densities and is an important passage area of these marine mammals (TEILMANN ET AL. 2008; SVEEGAARD ET AL. 2022). From literature, densities previously recorded in the area of the Great Belt, are listed in Table 4.1. While it is difficult to make a comparison of densities due to the limitations of the study, numbers recorded in this study suggest that Habour Porpoises occurred in similar ranges as reported earlier. Especially as numbers observed here may rather be an underestimation (perception and availability bias tend to be larger in aerial surveys; see HAMMOND ET AL. 2021).

Table 4.1 Mean density of Harbour Porpoises (ind./km²) together with confidence interval and coefficient of variation during different surveys in (or including) the Great Belt region since the beginning of the 1990s.

		Density of Harbour Porpoises (ind./km²)		
Survey	**Survey period**	**Mean (confidence interval)**	**Coefficient of variation**	**Reference**
Great Belt	1992	0.147 (0.099 – 0.217)		(HEIDE-JØRGENSEN ET AL. 1993)
SCANS (for area block I')	Jun-Aug 1994	0.644		(HAMMOND ET AL. 2002)
SCANS II (ship)	Jul Aug 2005	0.280	0.36	(HAMMOND ET AL. 2013)
MiniScans (western Baltic, Belt Seas and Kattegat)	Jul 2012	0.786 (0.498 -1.292)	0.235	(VIQUERAT ET AL. 2014)
MiniSCANS II	Jun-Jul 2020	0.05 (0 – 0.16)	1.05	(UNGER ET AL. 2021)

Harbour Seals were also recorded rather regularly during about 50 % of the surveys, but in small numbers. In the past, the area did not seem to be of high importance for this species (ANDERSEN & OLSEN 2010). During the surveys in 2014, three individuals were recorded during one flight and none during the second valid flight (BAER ET AL. 2015).

5 SUMMARY

BioConsult SH was commissioned by European Energy A/S to determine the abundance and spatial distribution of resting seabirds and marine mammals in the area. This report presents the results of 22 observer-based aerial surveys conducted between September 2020 and May 2022 over an area of 441 km² covering the proposed area of the OWF Jammerland located in the Jammerland Bugt.

During the 22 surveys a total of 141,941 birds which belonged to 31 species were recorded during the whole survey period. Within Band A of the transect scheme, 35,686 individuals belonging to 27 species were recorded. Two duck species were the most abundant ones representing almost 90% of the whole number of individuals counted within Band A. These were Common Eider (67%) and Common Scoter (22.1%). Great Cormorants were the third most common species representing just 2.1% of the total number of individuals counted. In total, the 11 most relevant seabird species were described in more detail: **Red-throated Divers** were the only diver species recorded in the area and the species was the least abundant of the 11 selected species. The highest densities of this species (up to 0.32 ind./km²) were found in winter and spring. **Great Cormorants** were found in higher densities at the shallower parts of the study area with the highest densities reaching 2.74 ind./km². **Common Eiders** and **Common Scoters** reached higher densities in autumn and winter with the first species achieving densities of over 100 ind./km². Both species as well as other duck species (**Mallards, Velvet Scoter, Red-breasted Mergansers**) were occurring mainly at the shallower parts of the study area. Of the three gull species worth mentioning for the study area (**the Black-headed Gull, the Herring Gull and the Common Gull**), the most abundant one was the Herring Gull. Yet, densities of all gulls were rather low. **Common Guillemots** were the only frequently reported species of auk recorded in the area. It was well distributed throughout the area but occurred at higher densities further offshore.

Two species of marine mammals were registered rather regularly: the **Harbour Porpoise** and the **Harbour Seal**. For Harbour Porpoises, the study area is one of the important areas where high densities of have been previously registered and the Great Belt is known to be used as passage area.

6 LITERATURE

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A APPENDIX

A.1 Species Distribution Maps

A.1.1 Red-throated Diver

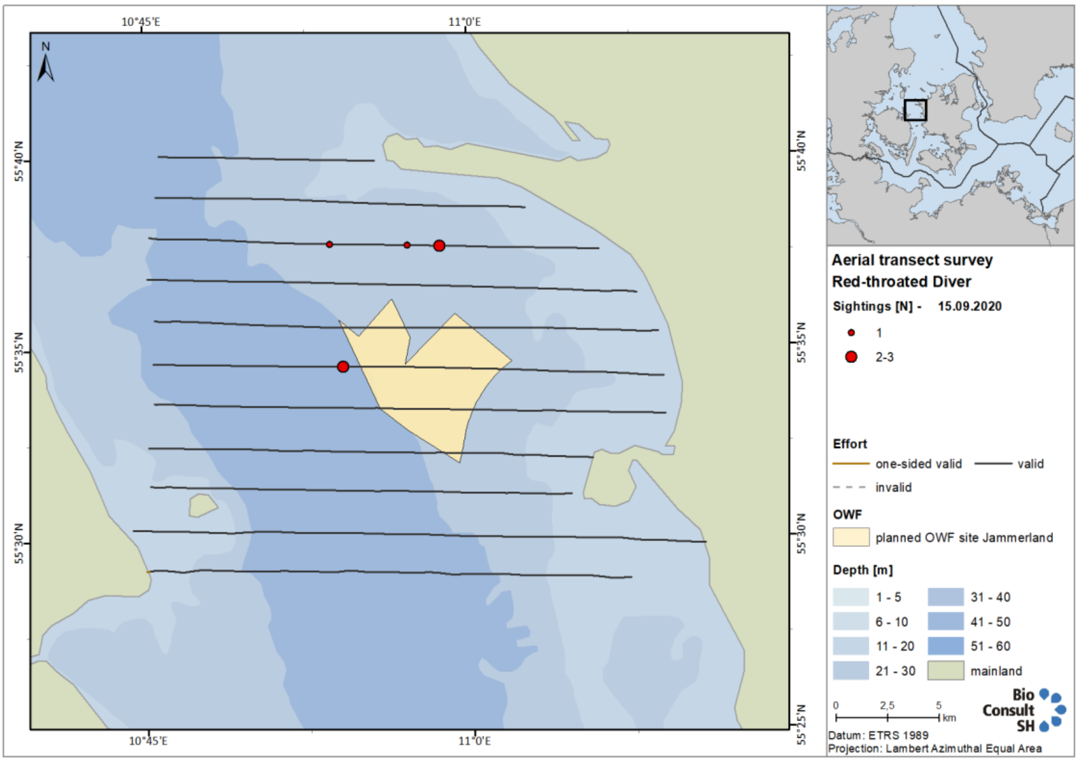


Figure A. 1 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

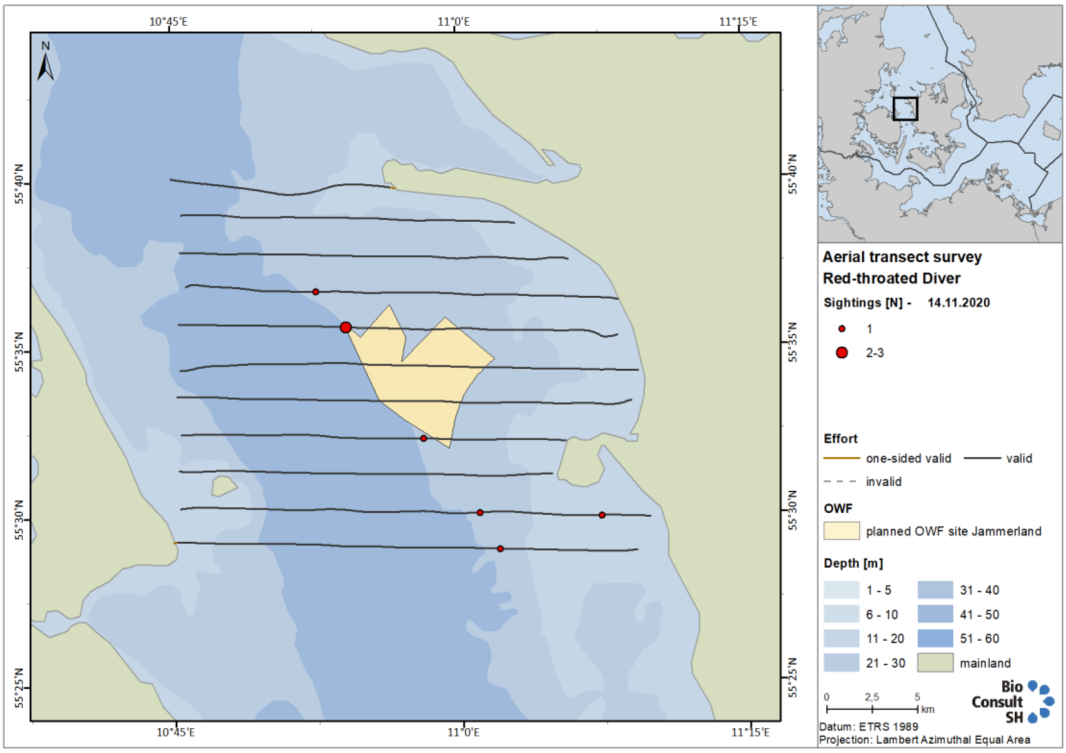


Figure A. 2 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

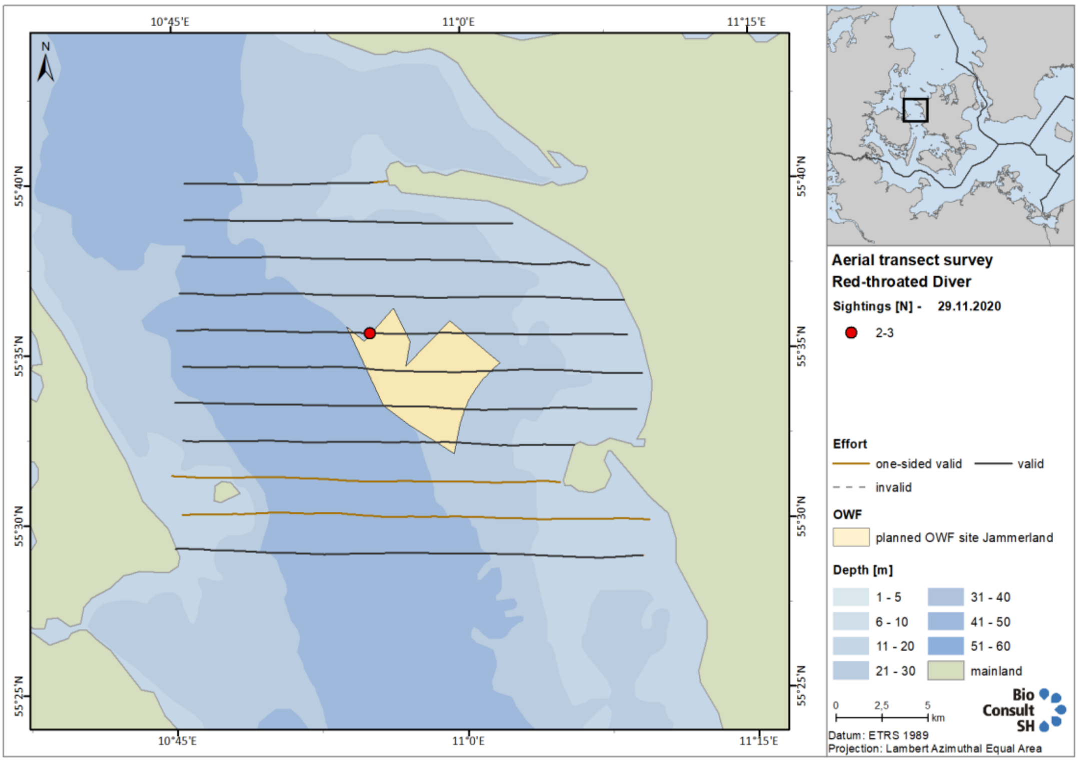


Figure A. 3 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

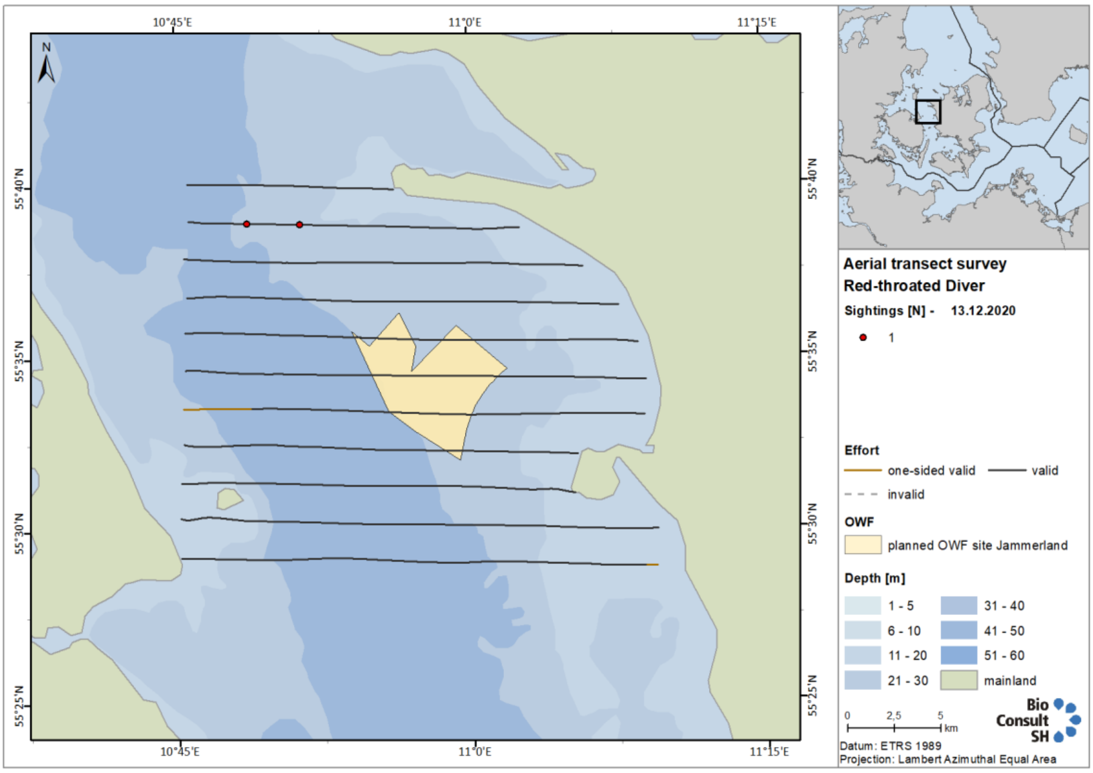


Figure A. 4 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

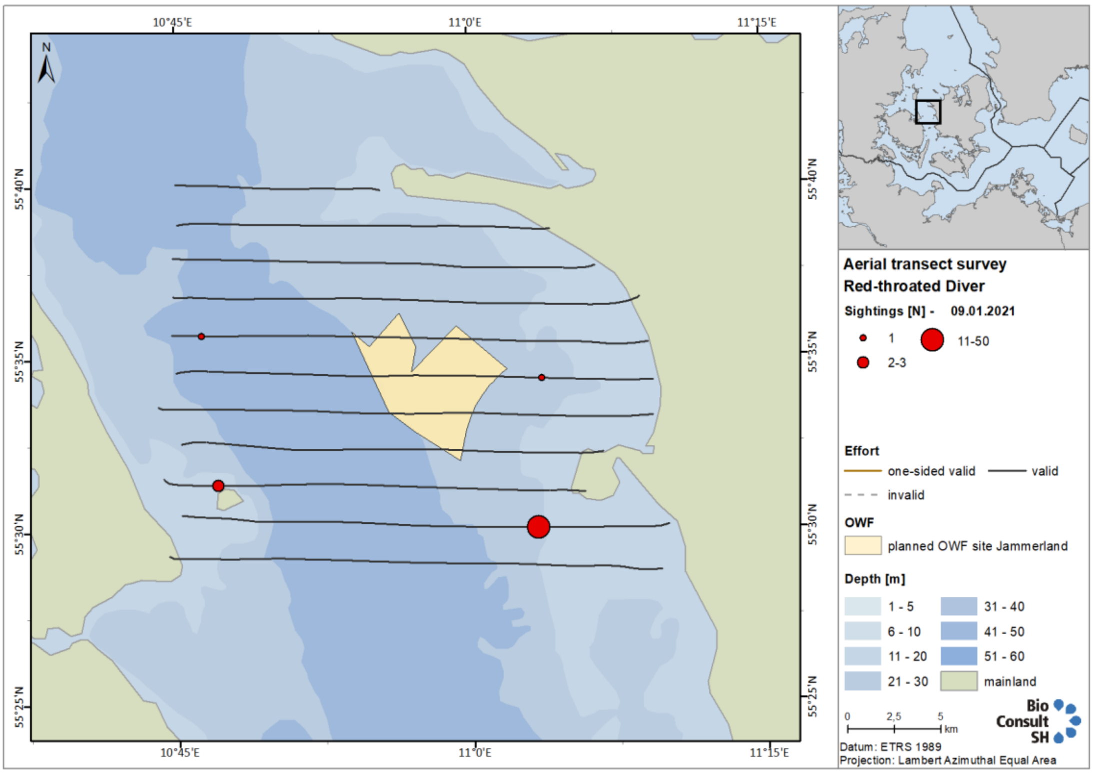


Figure A. 5 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 09th January 2021.

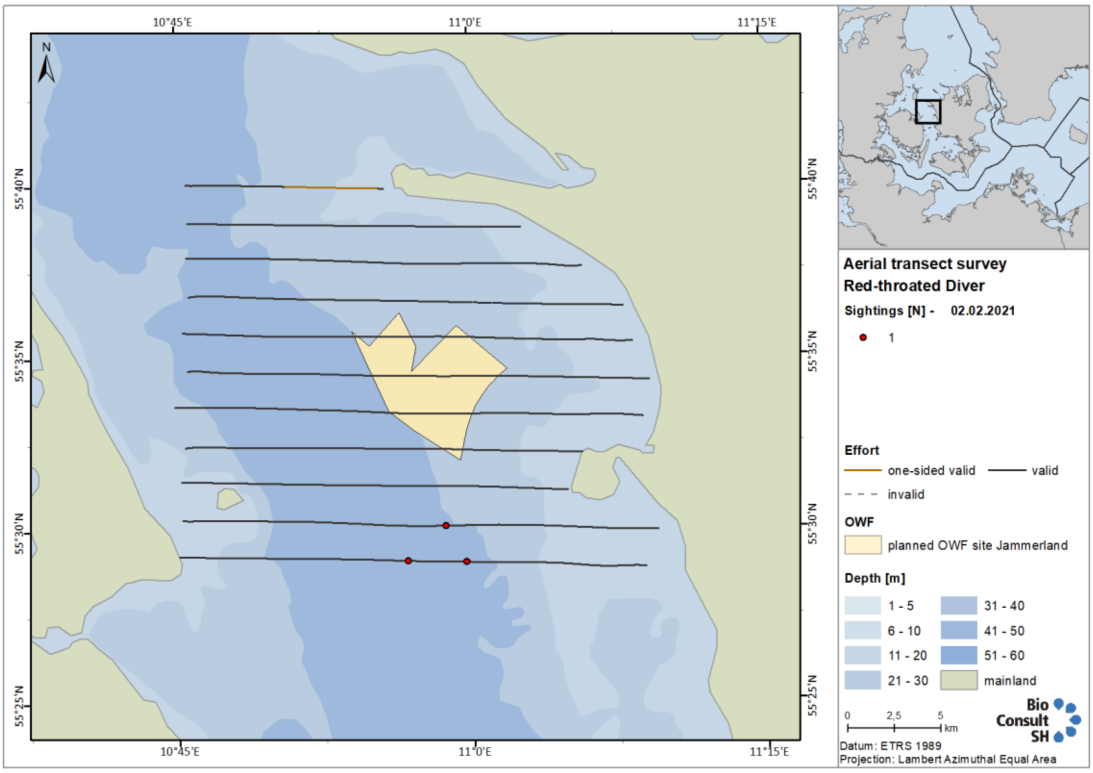


Figure A. 6 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 02nd February 2021.

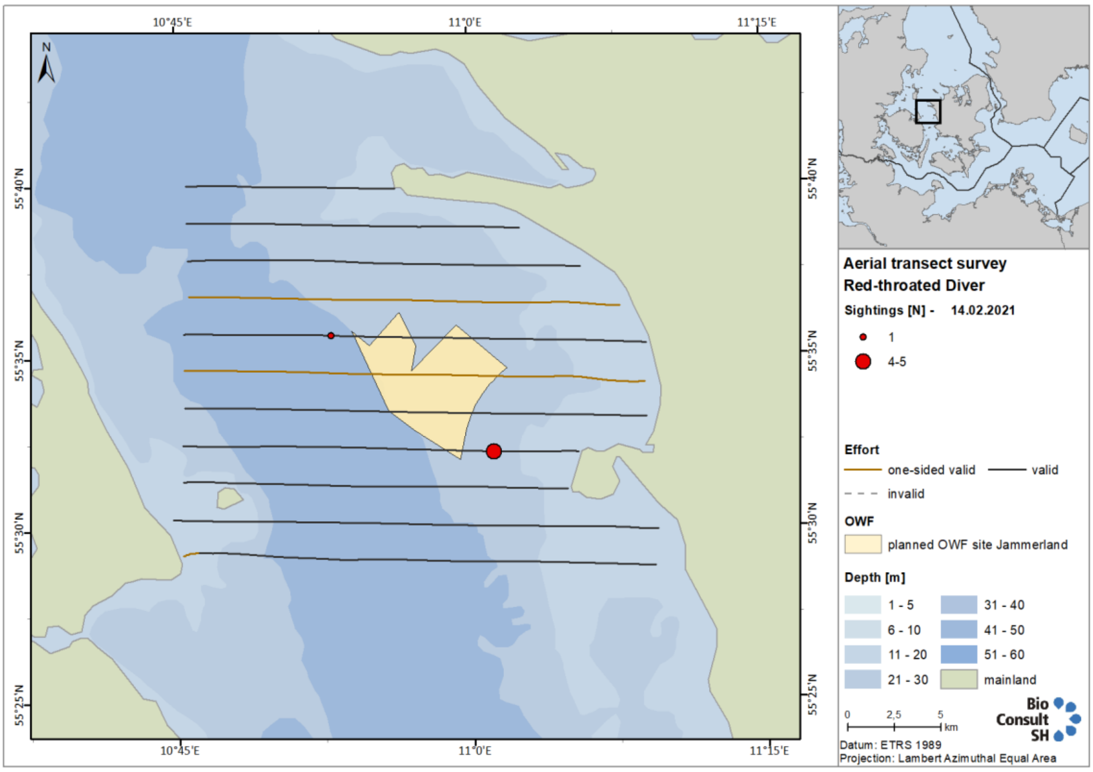


Figure A. 7 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

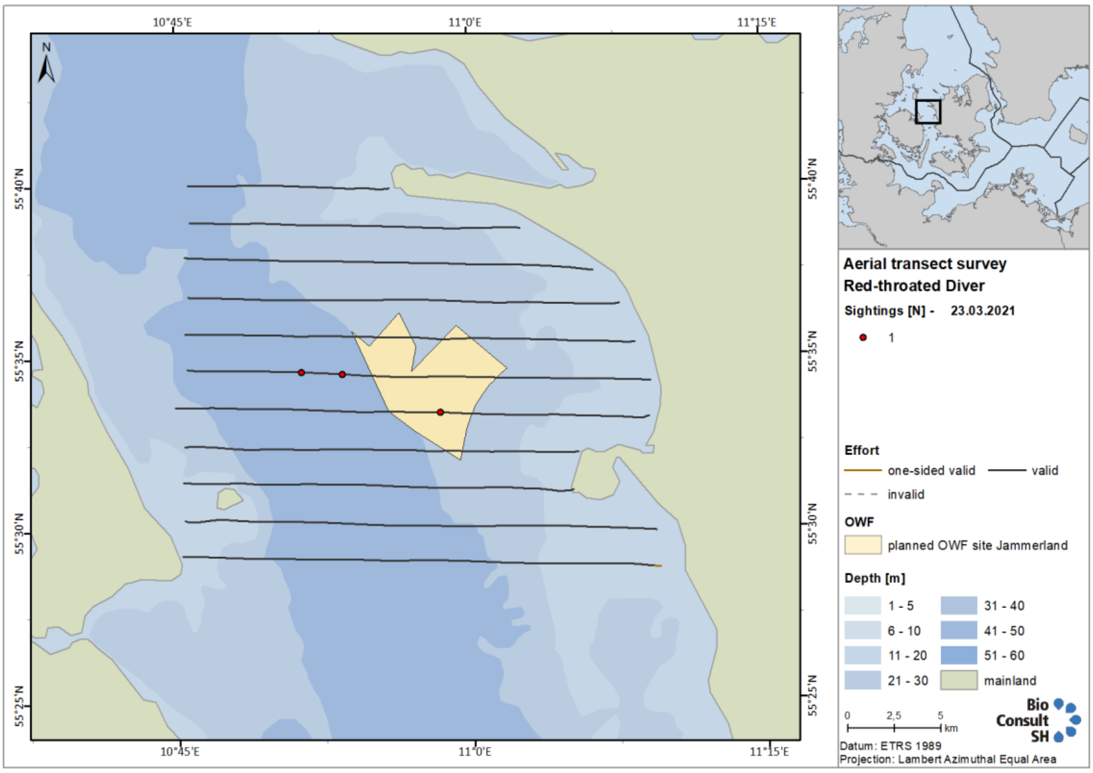


Figure A. 8 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

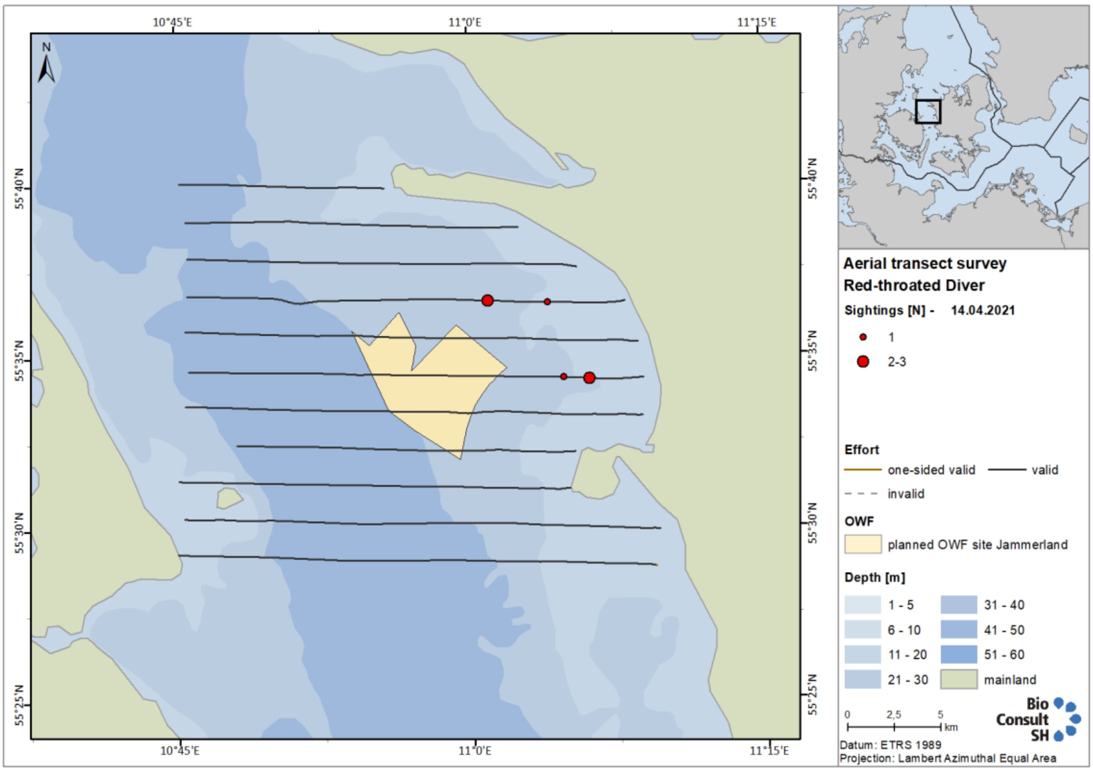


Figure A. 9 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

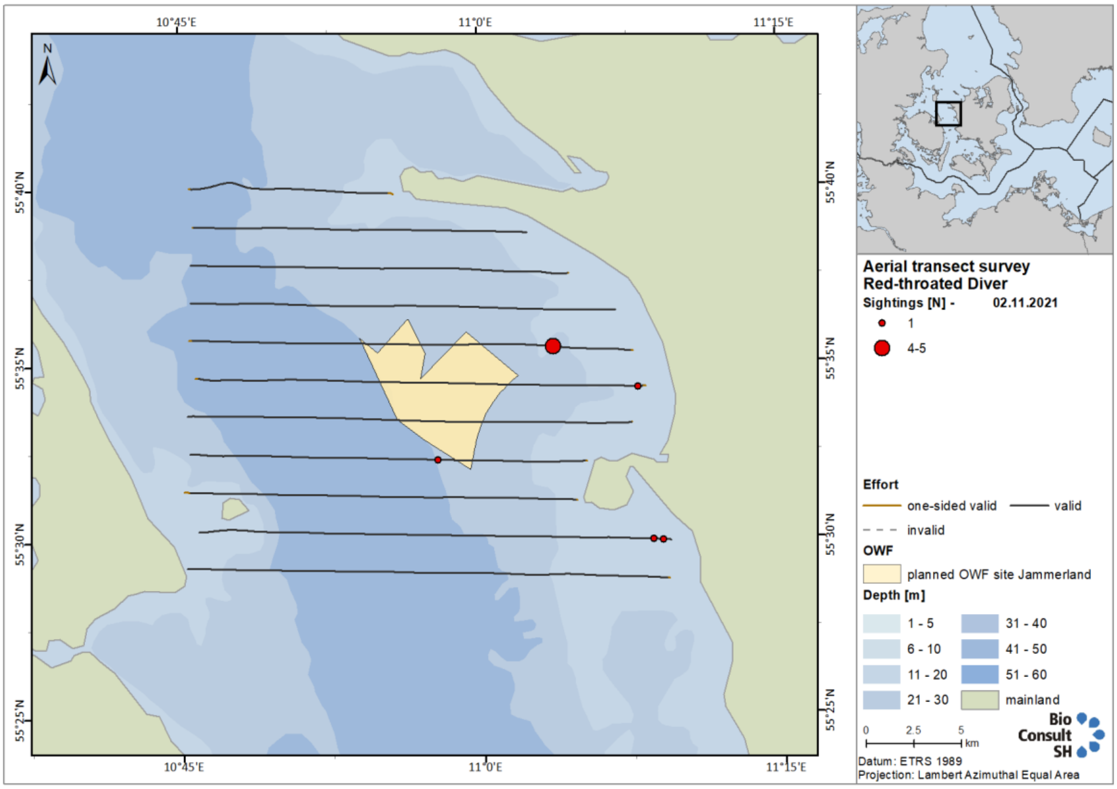


Figure A. 10 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

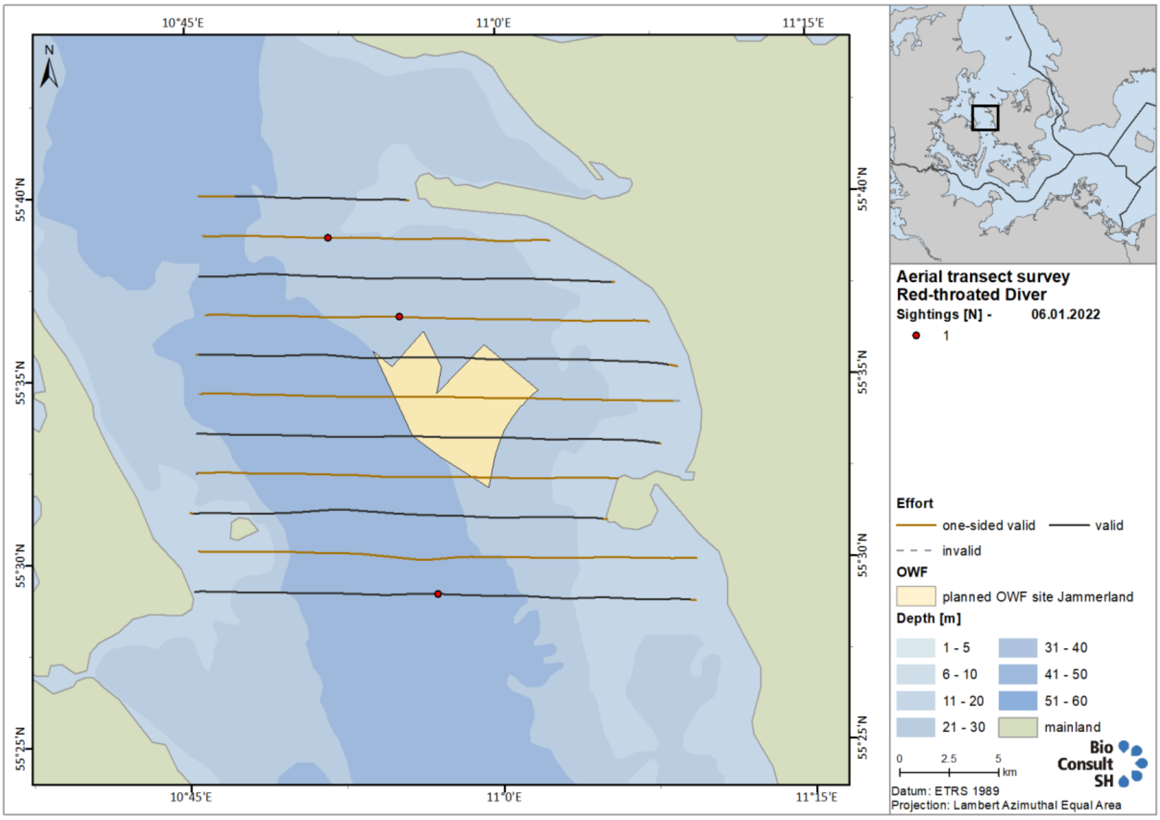


Figure A. 11 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

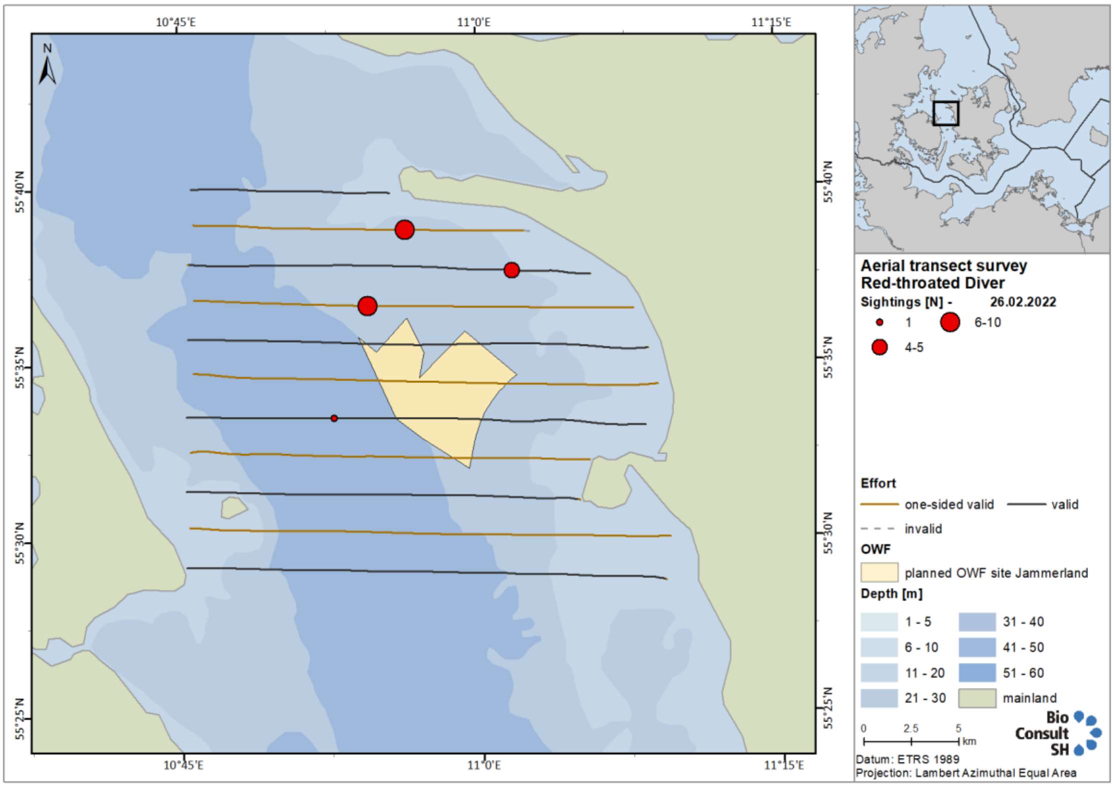


Figure A. 12 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

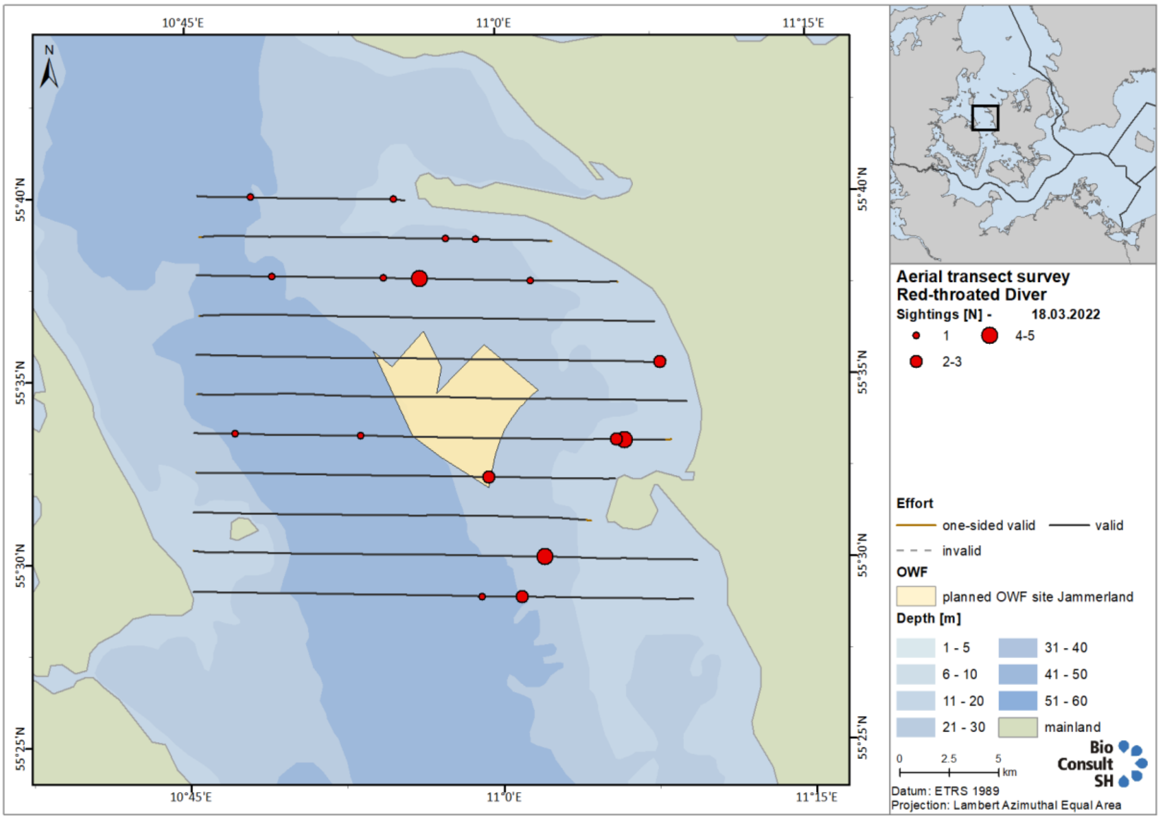


Figure A. 13 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

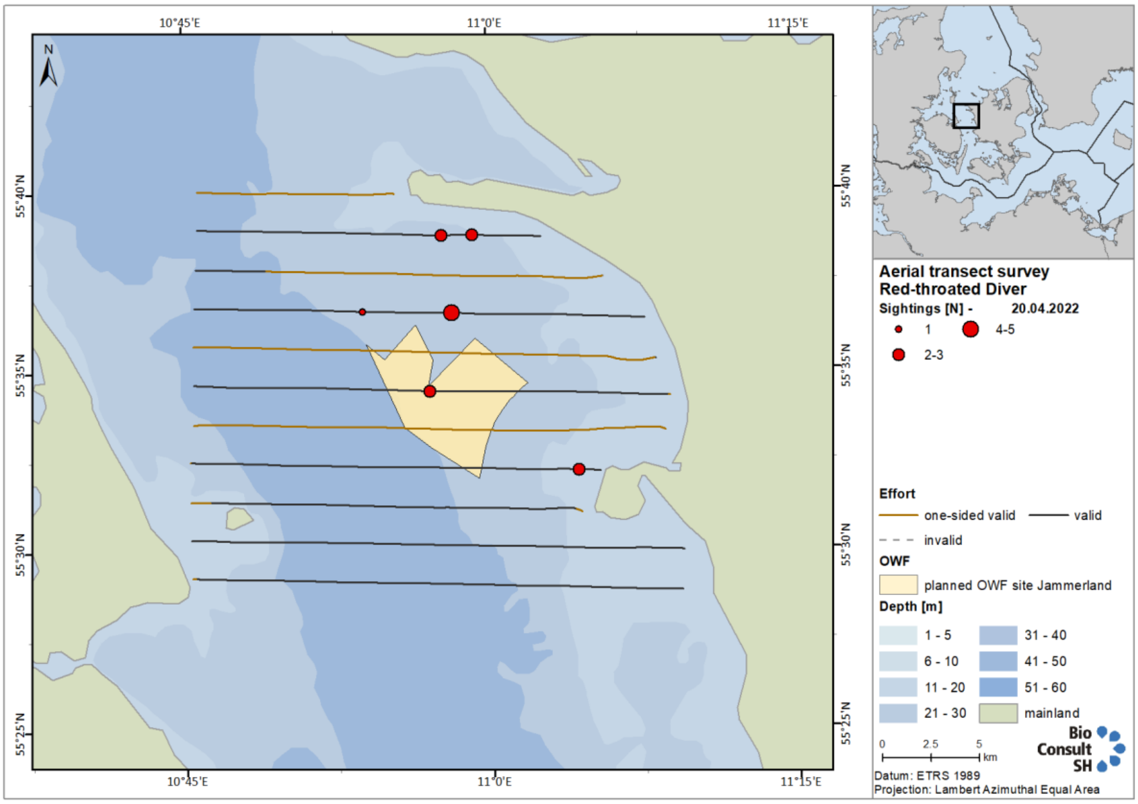


Figure A. 14 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

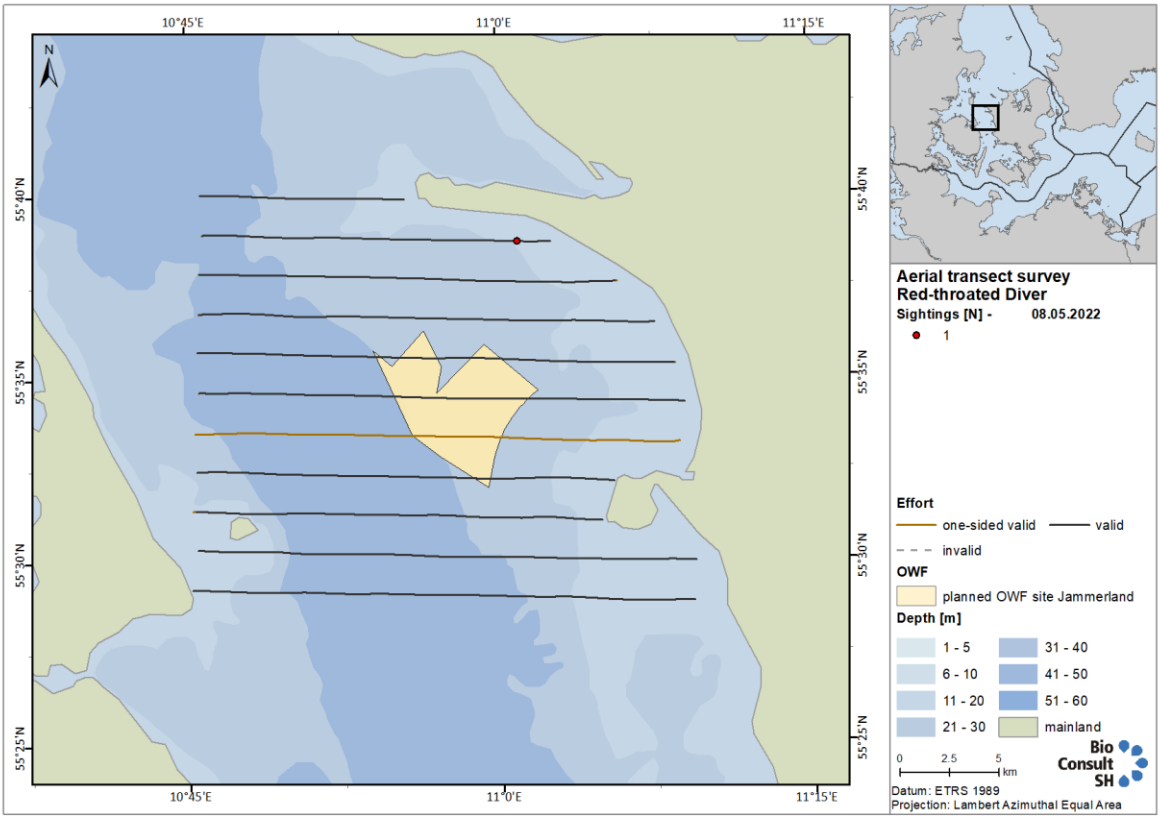


Figure A. 15 Red-throated Diver distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.2 Grebes

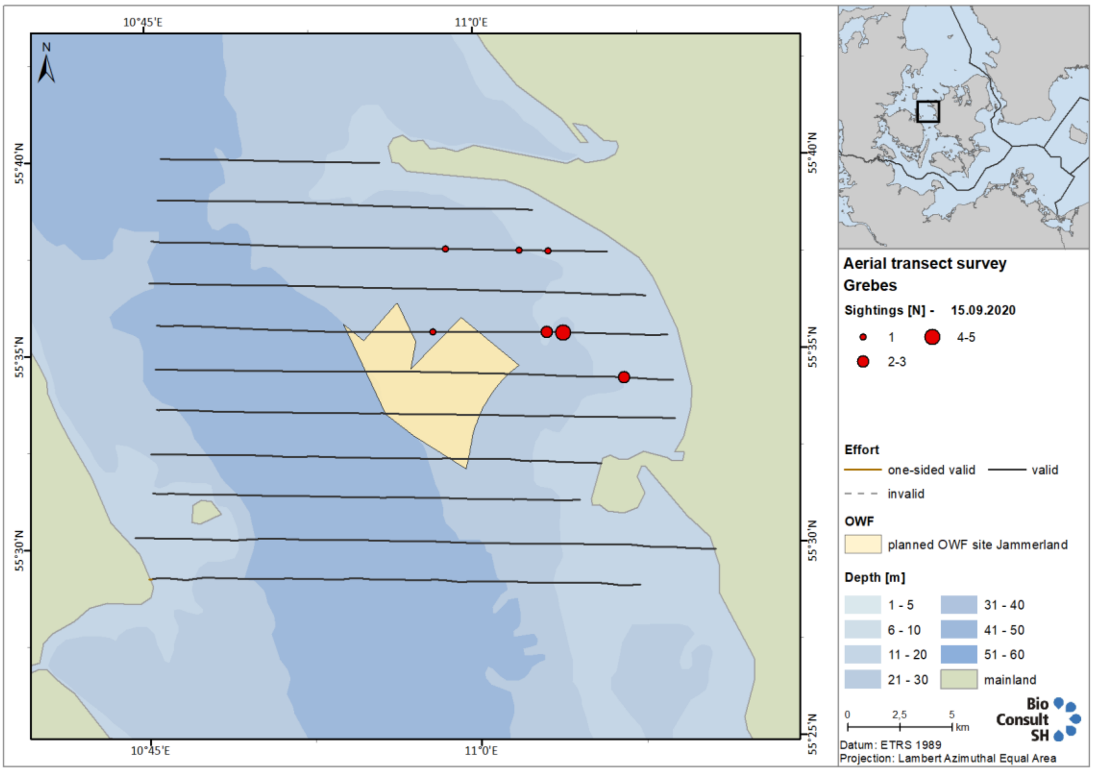


Figure A. 16 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

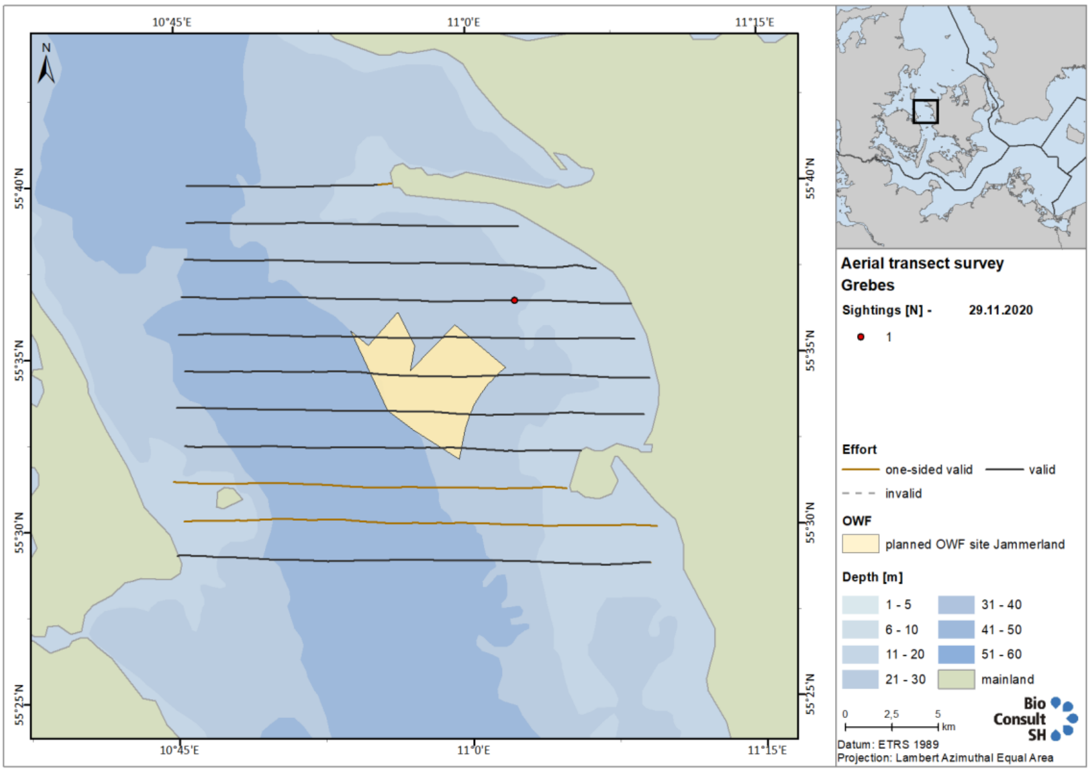


Figure A. 17 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

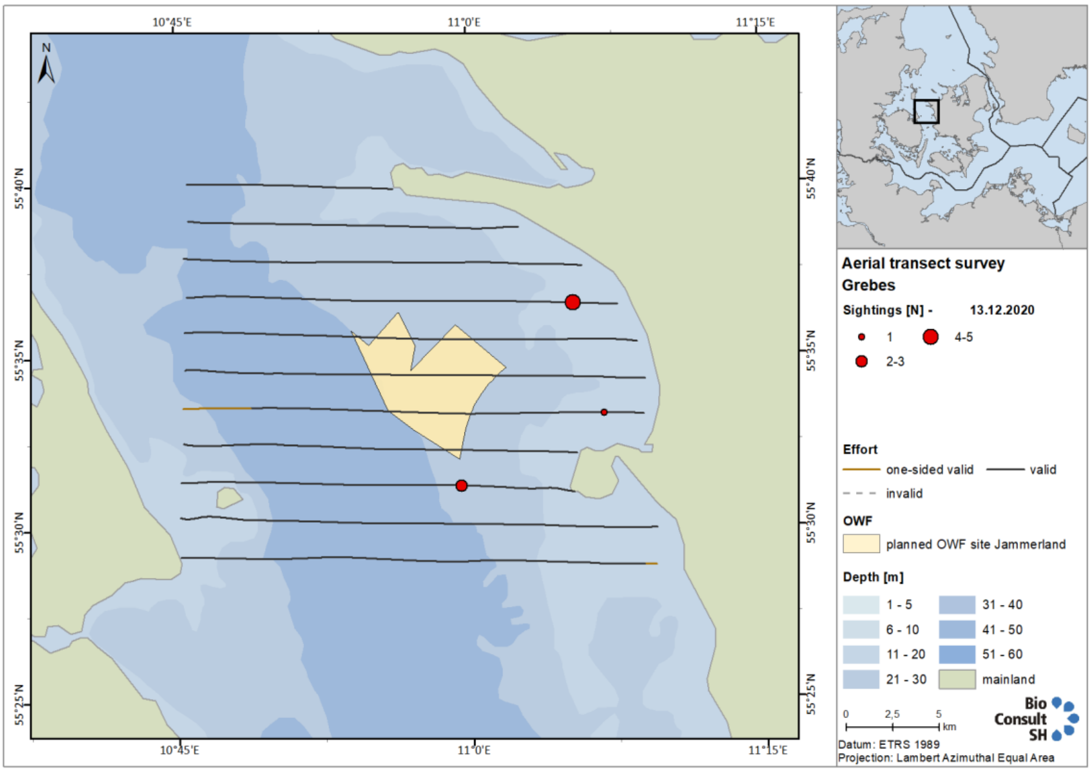
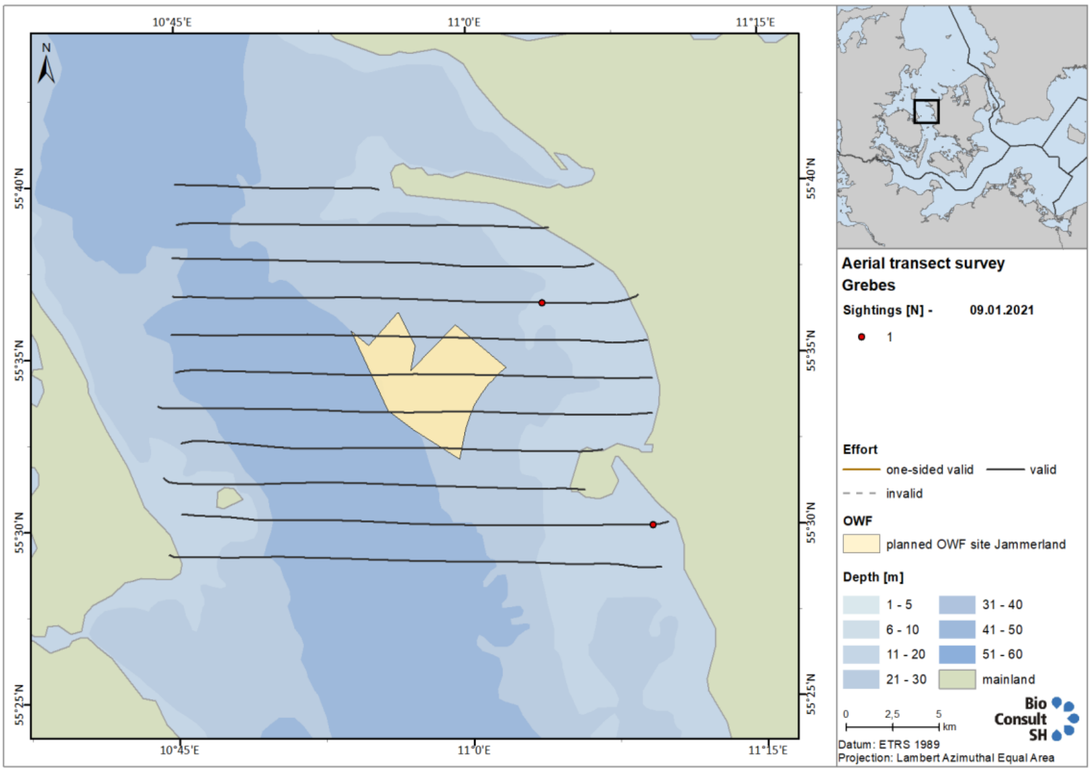


Figure A. 18 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 13th December 2020.



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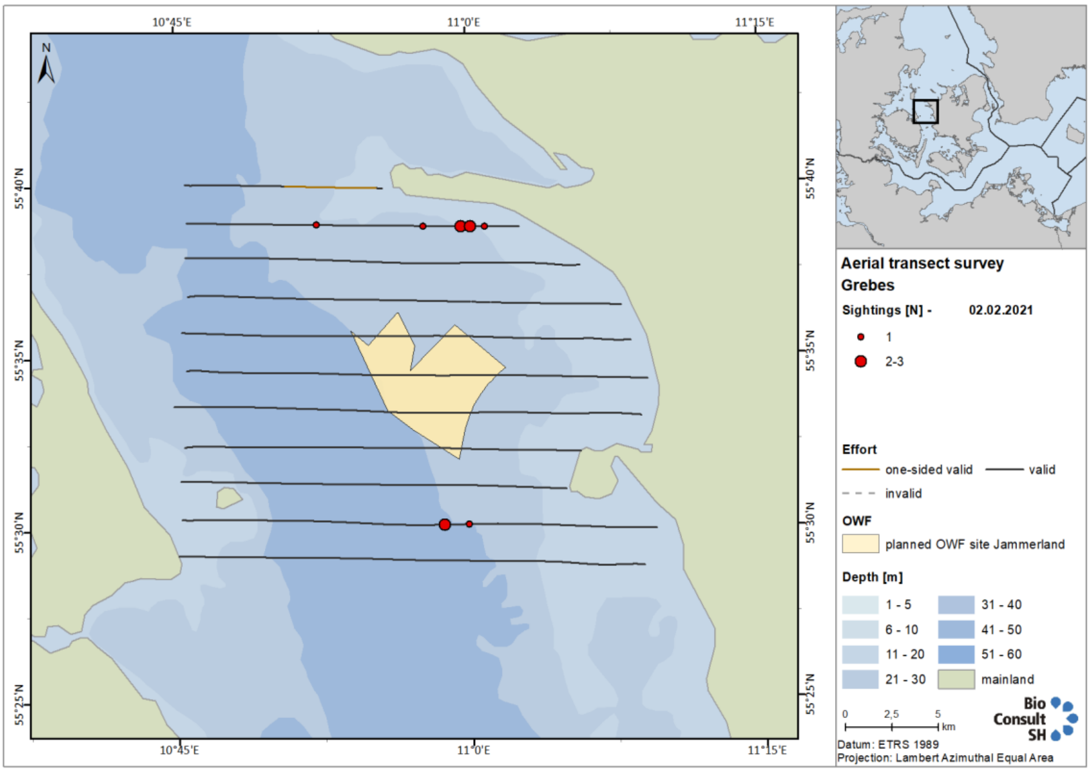

Figure A. 20 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

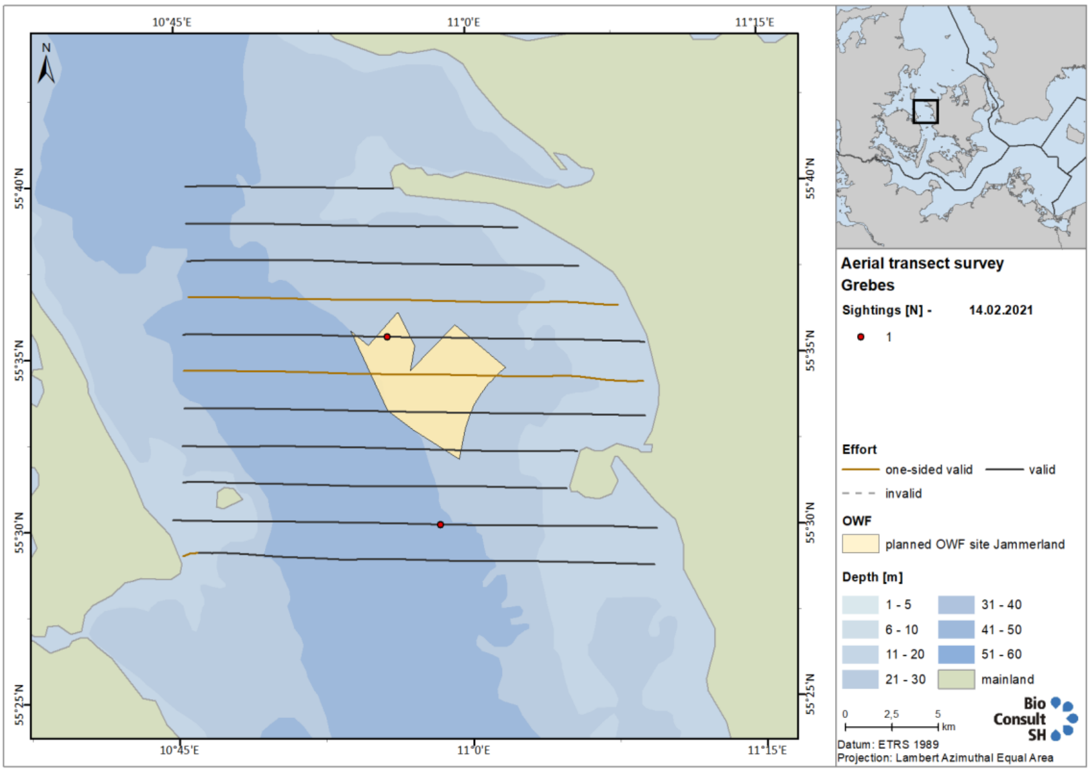

Figure A. 21 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

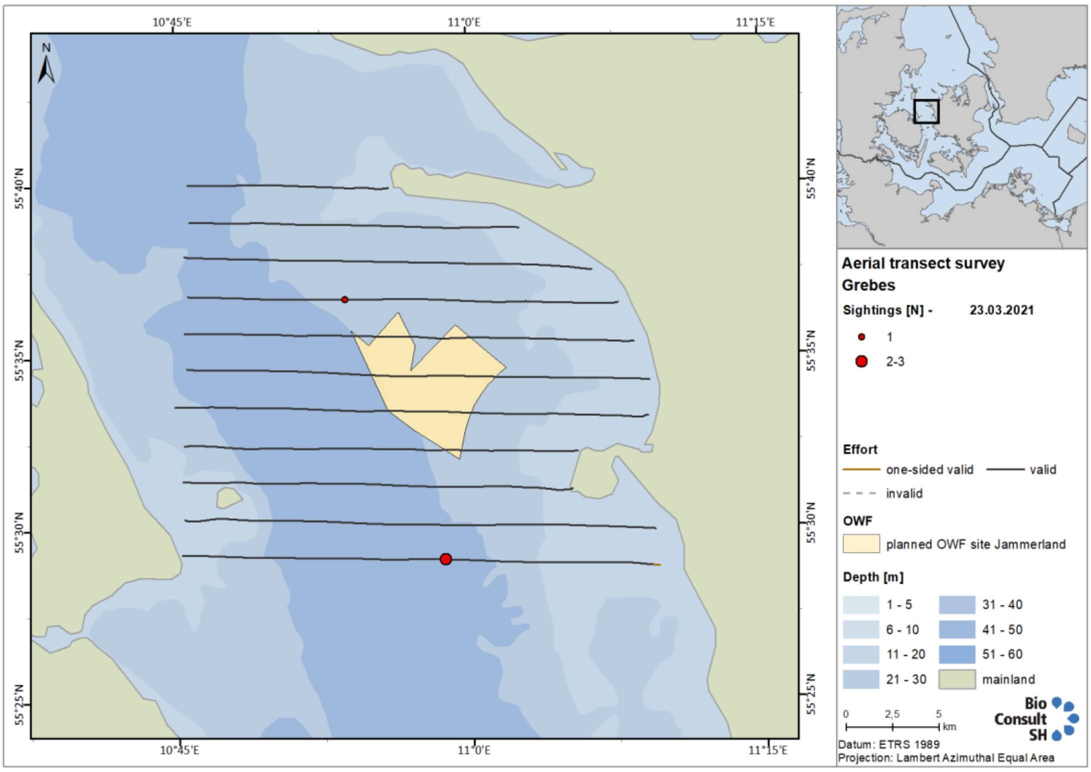

Figure A. 22 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

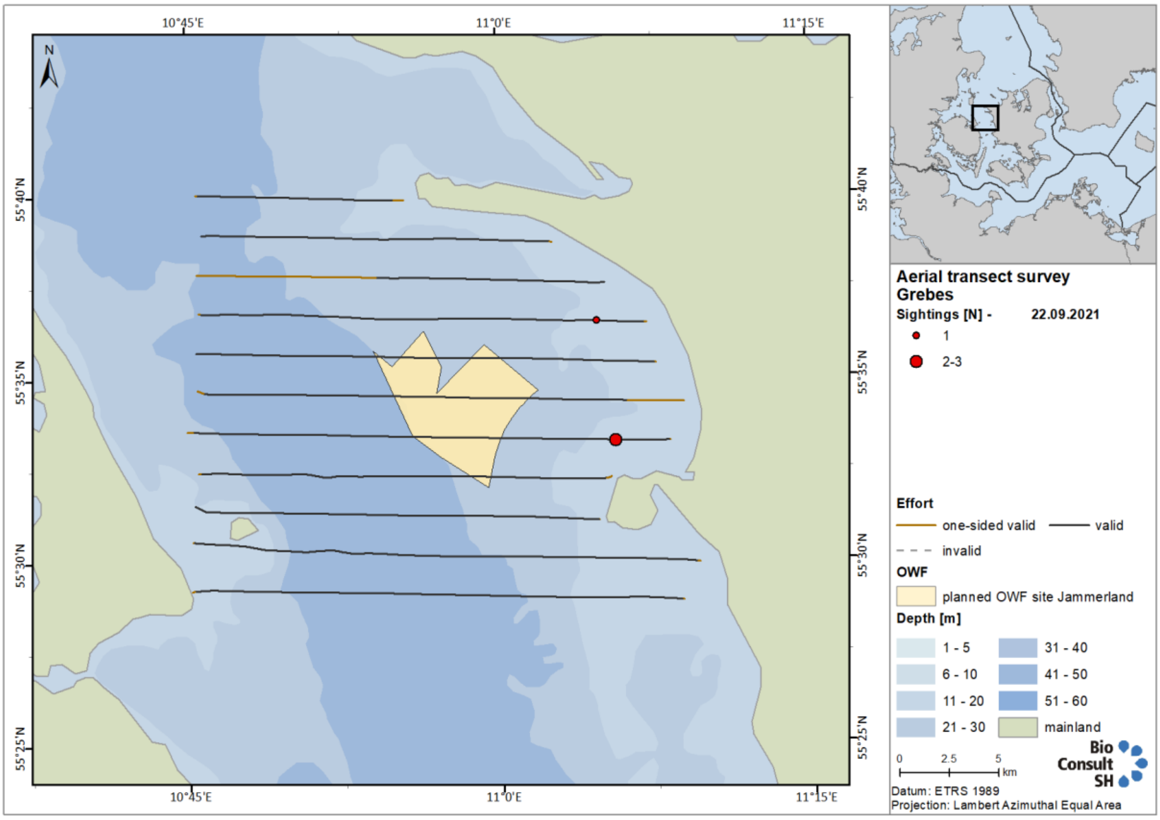

Figure A. 23 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

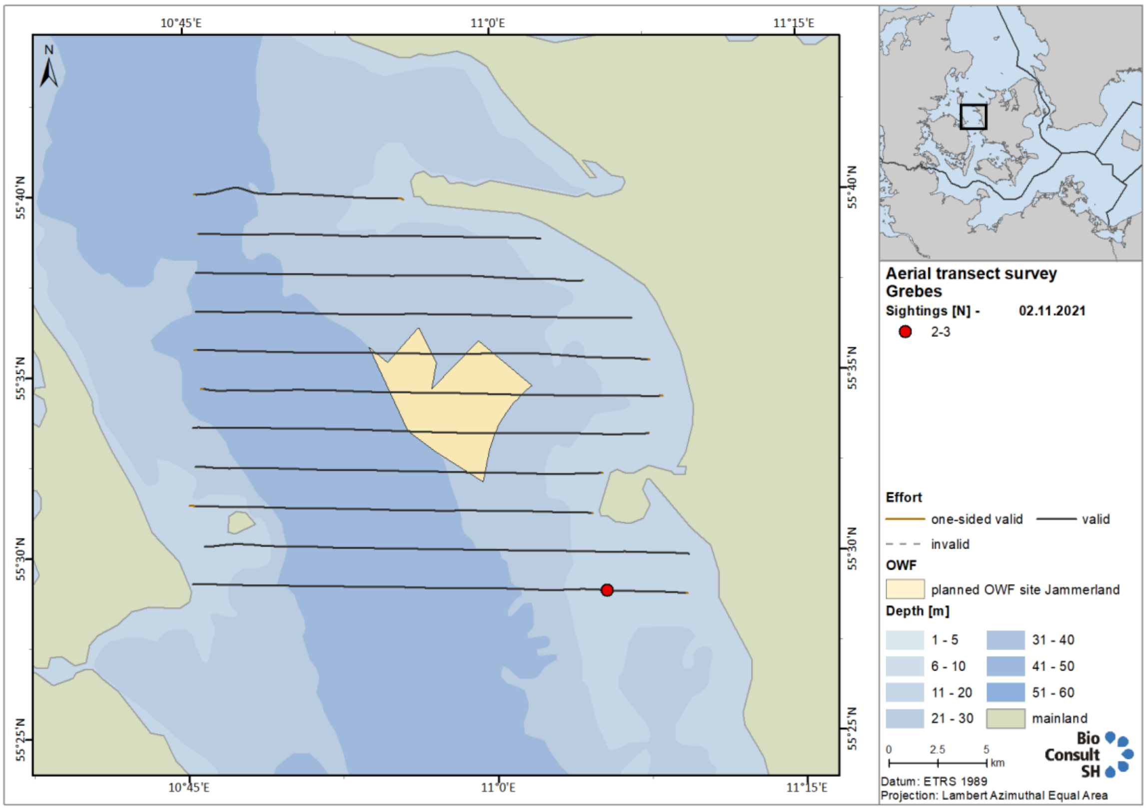

Figure A. 24 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

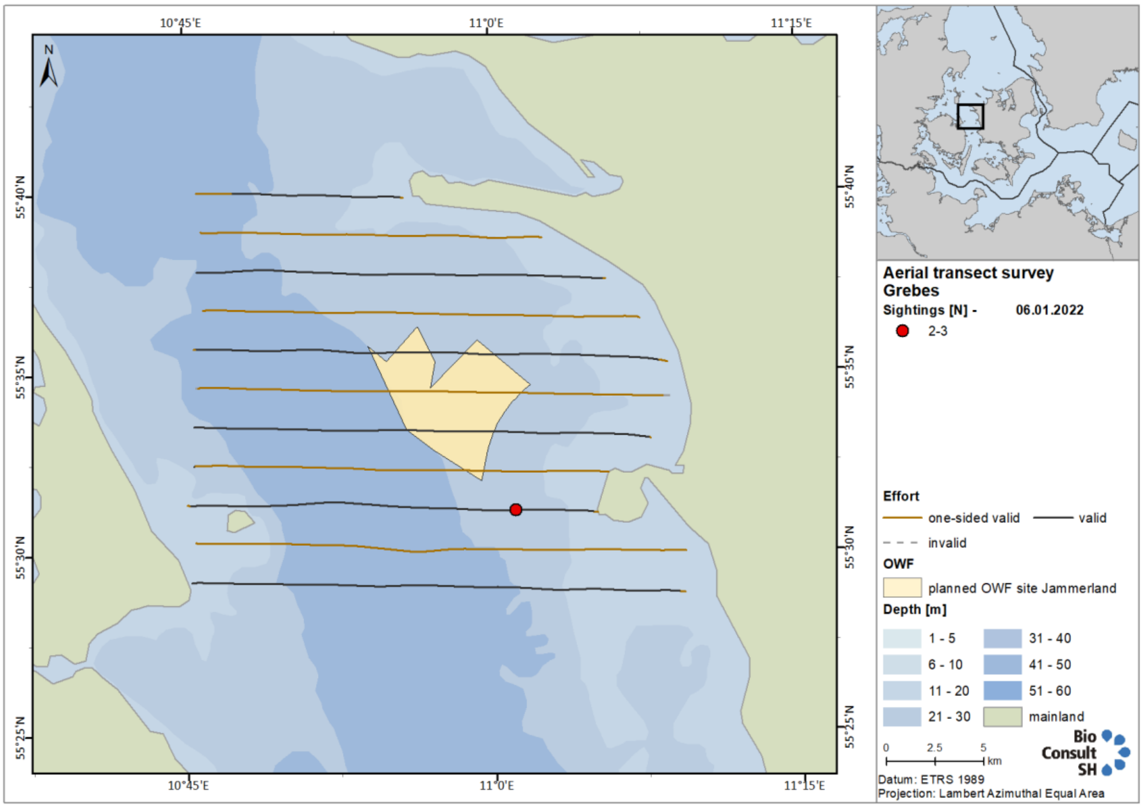

Figure A. 25 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

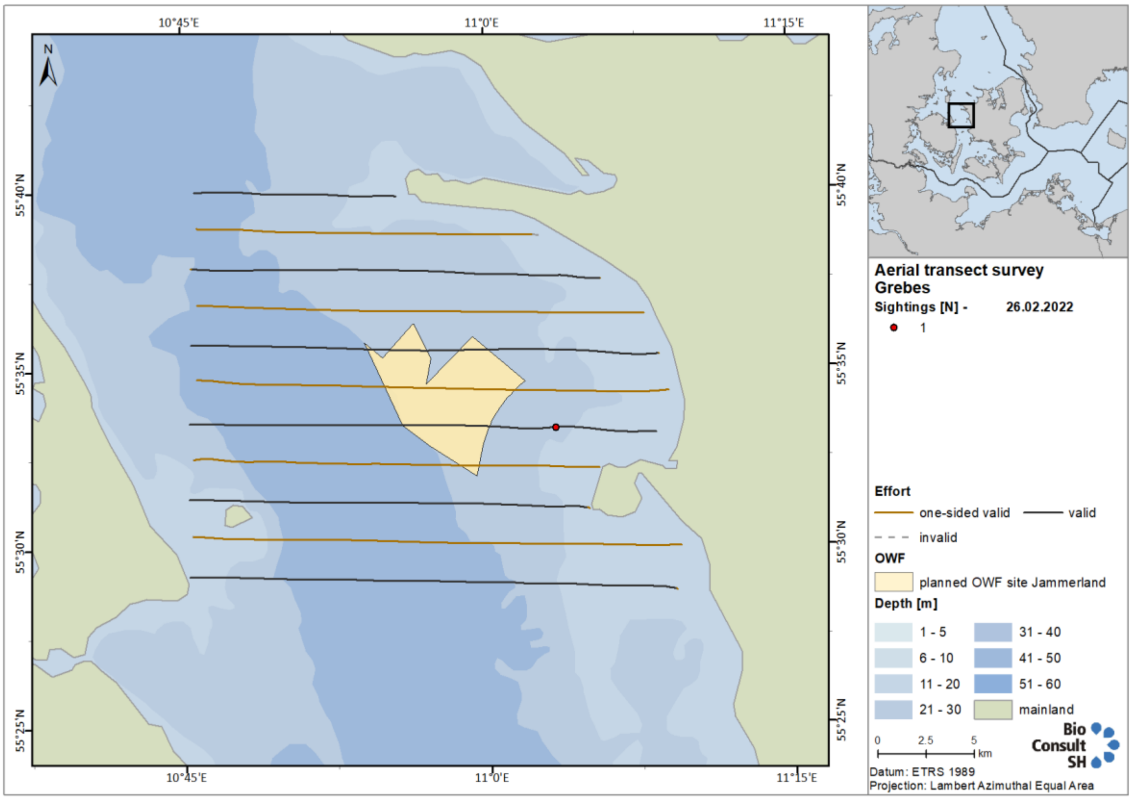

Figure A. 26 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 28th February 2022.

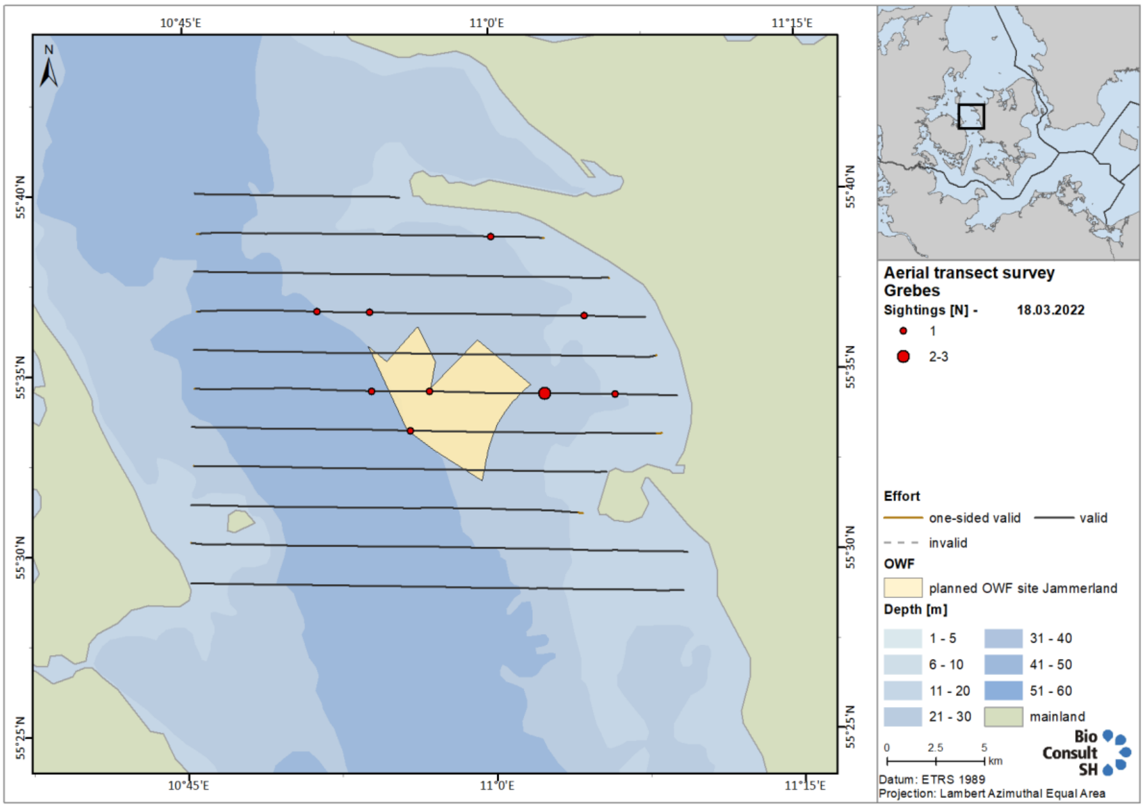

Figure A. 27 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 618th March 2022.

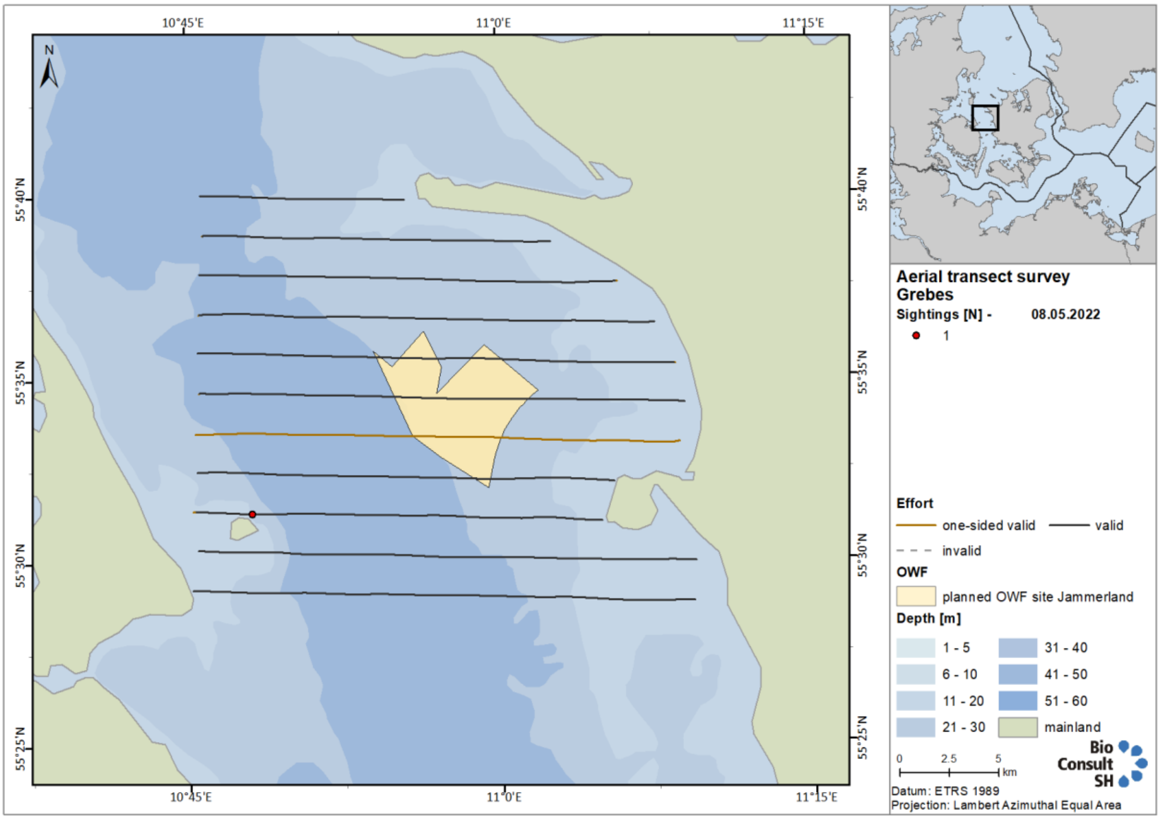

Figure A. 28 Grebes sp. distribution in the Jammerland area during the aerial survey flight on 8th May 20212.

A.1.3 Red-necked Grebe

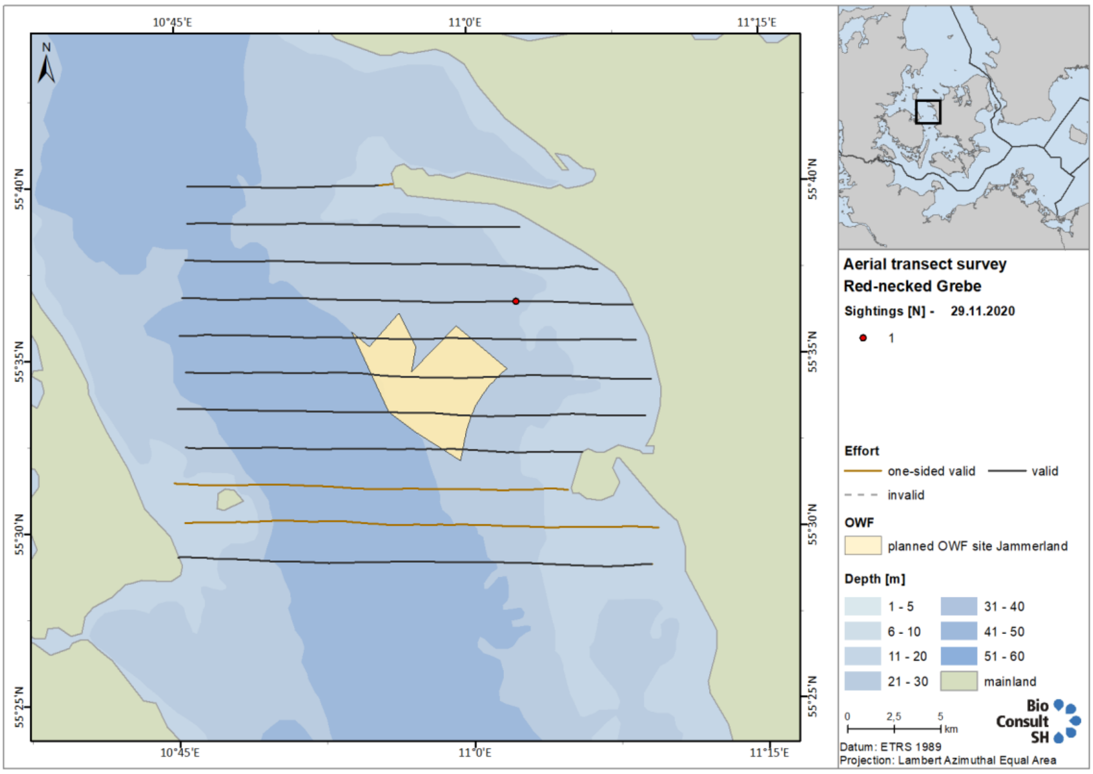

Figure A. 29 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

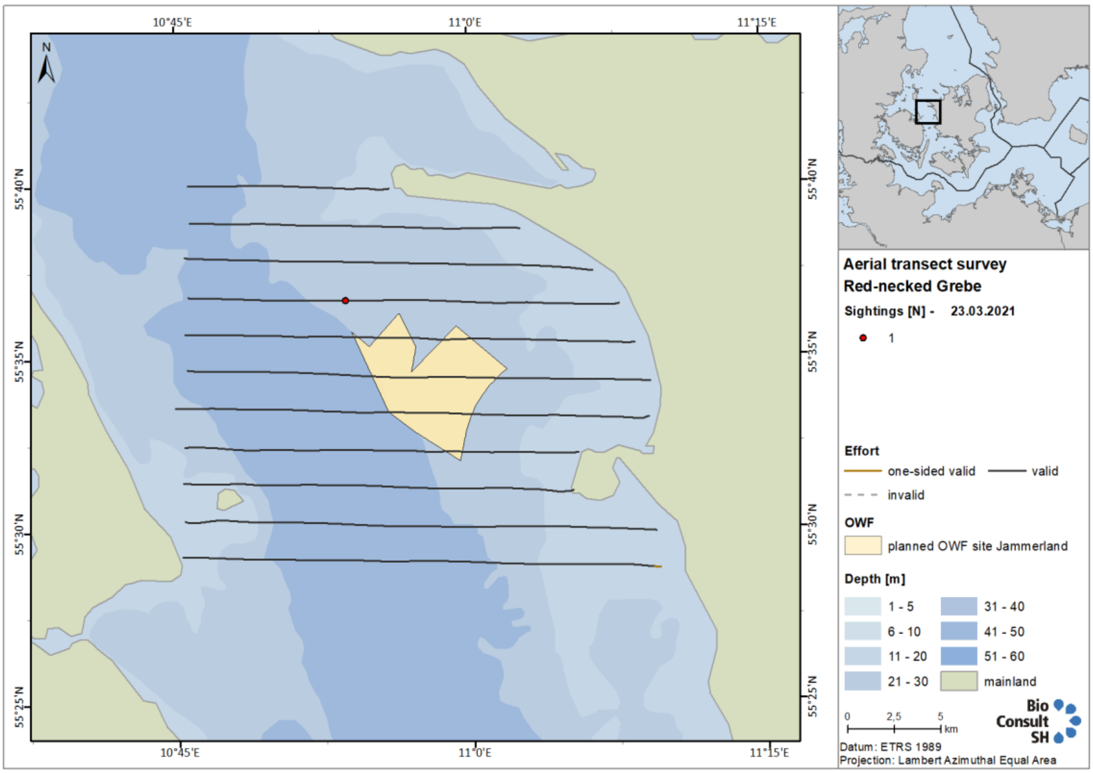

Figure A. 30 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

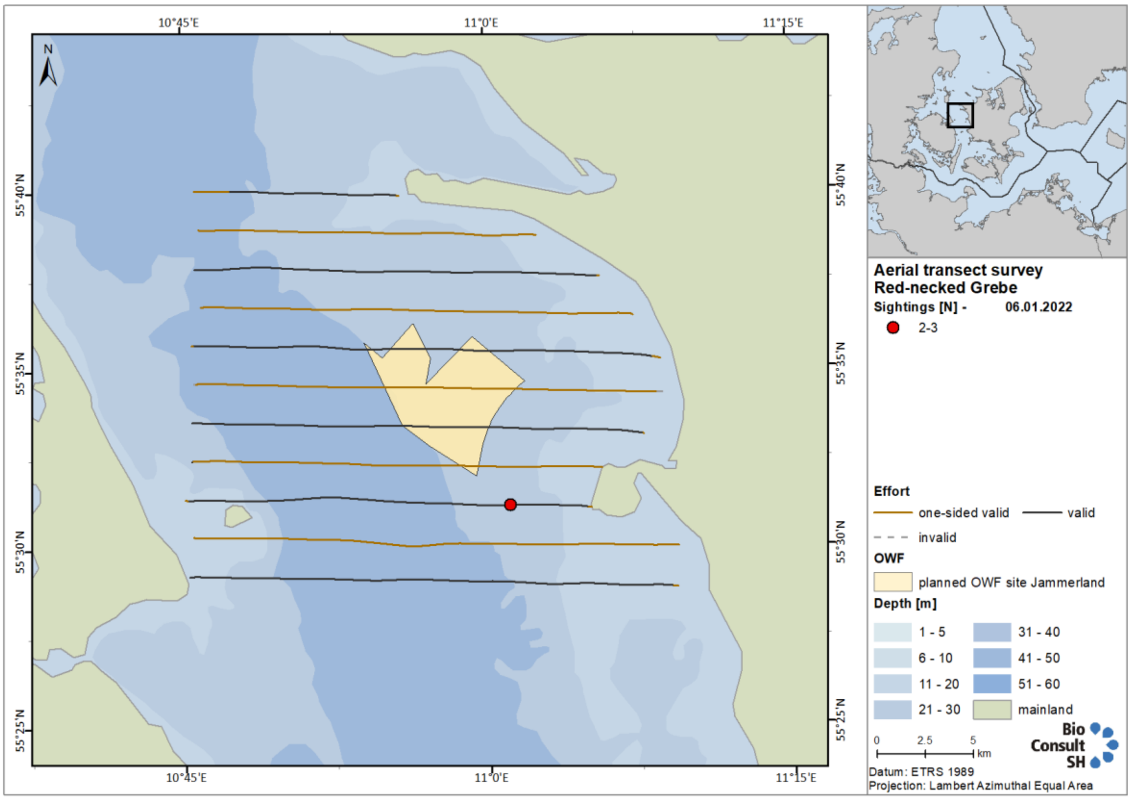

Figure A. 31 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

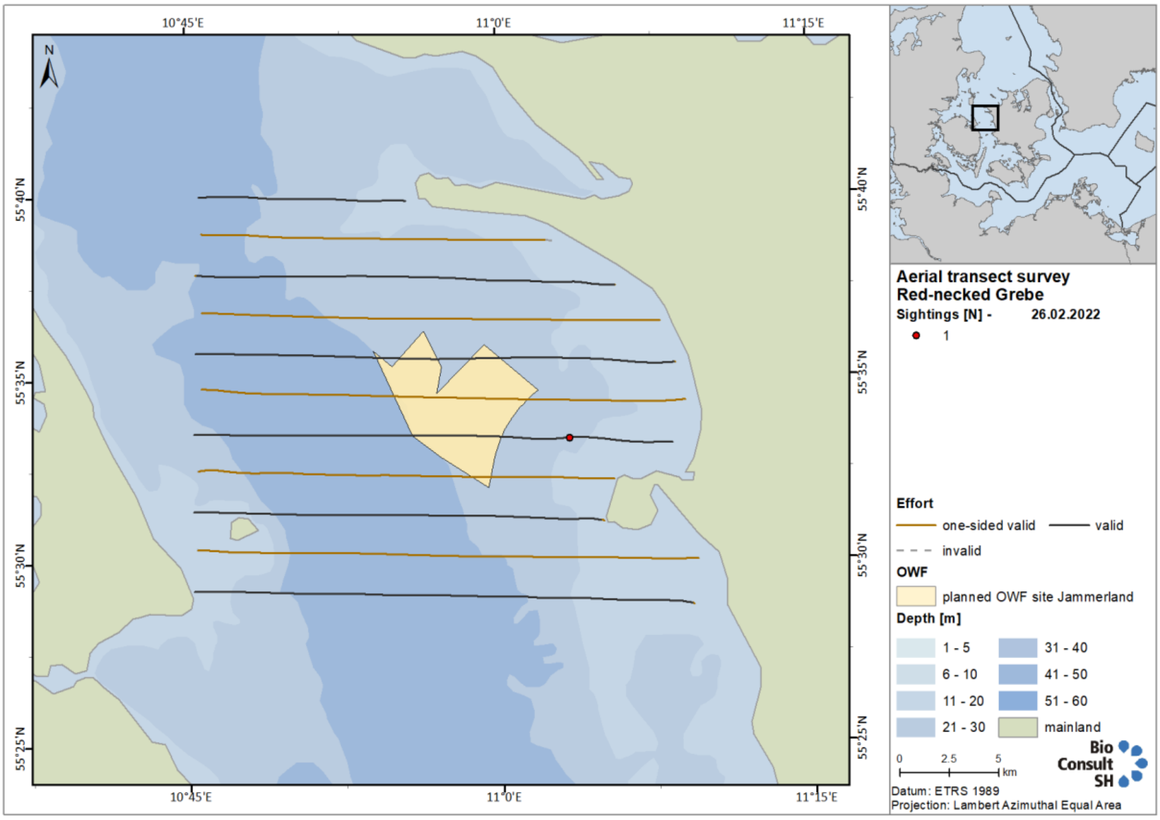

Figure A. 32 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

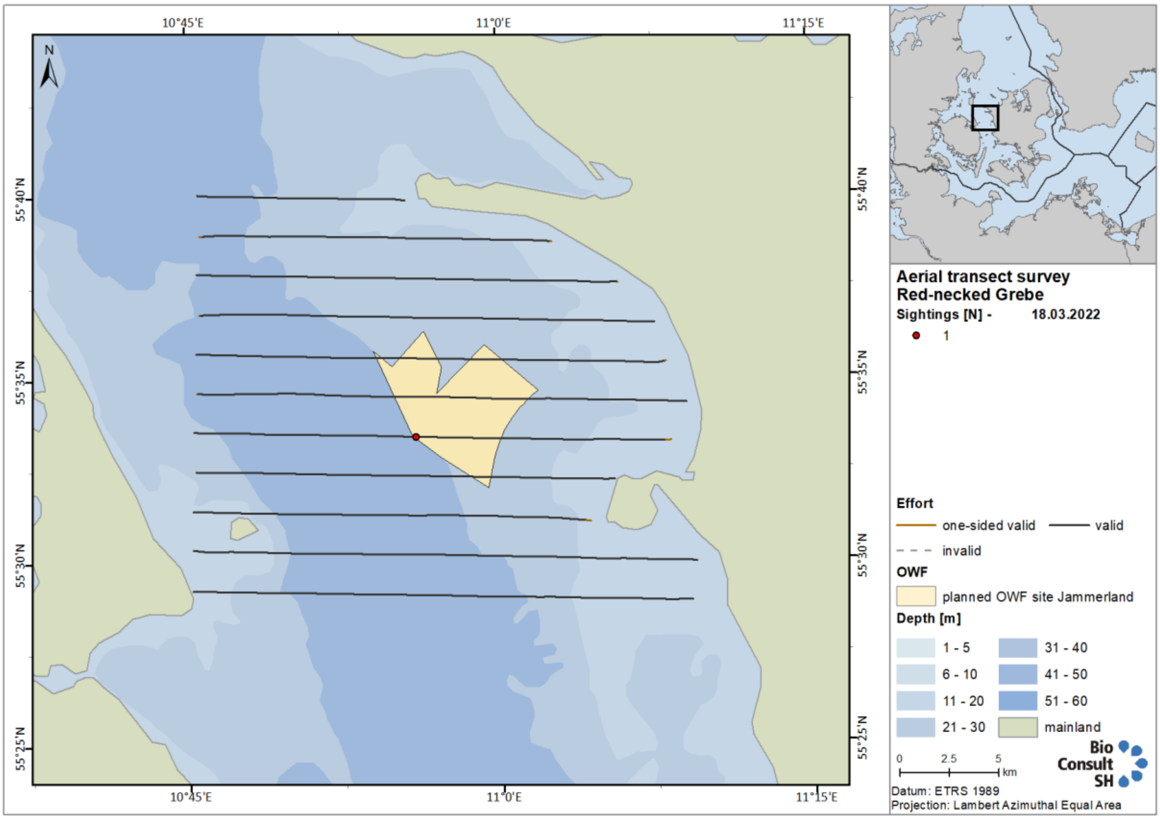

Figure A. 33 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

A.1.4 Northern Gannet

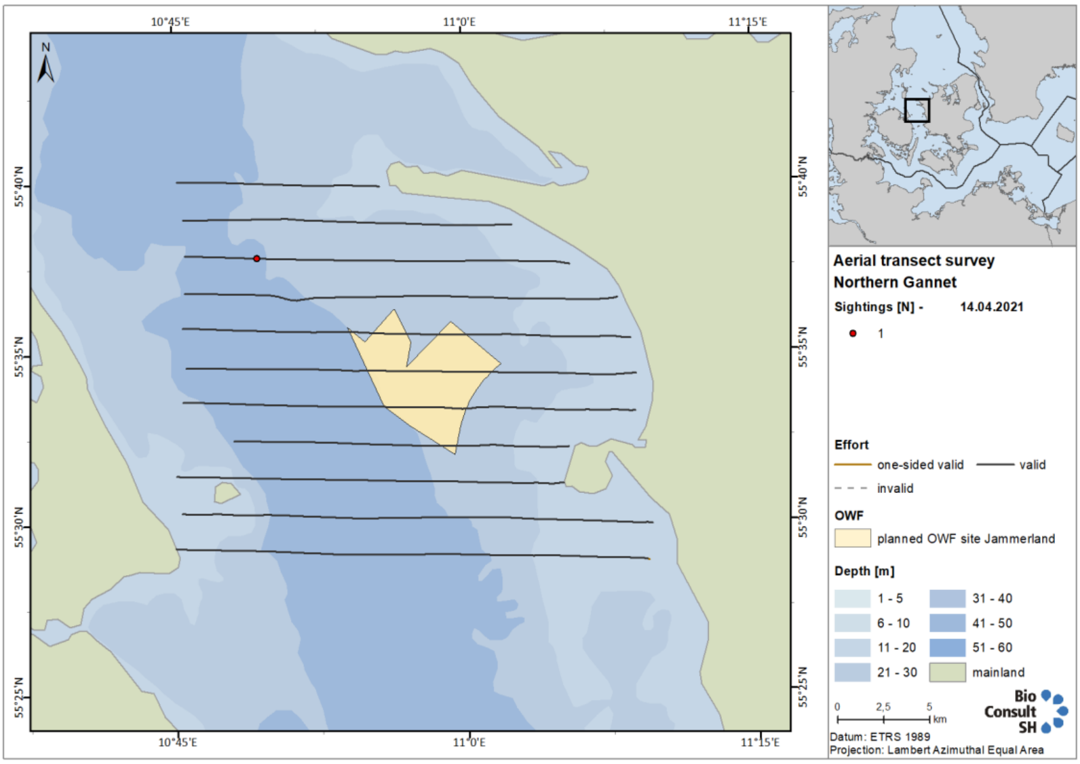

Figure A. 34 Northern Gannet distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

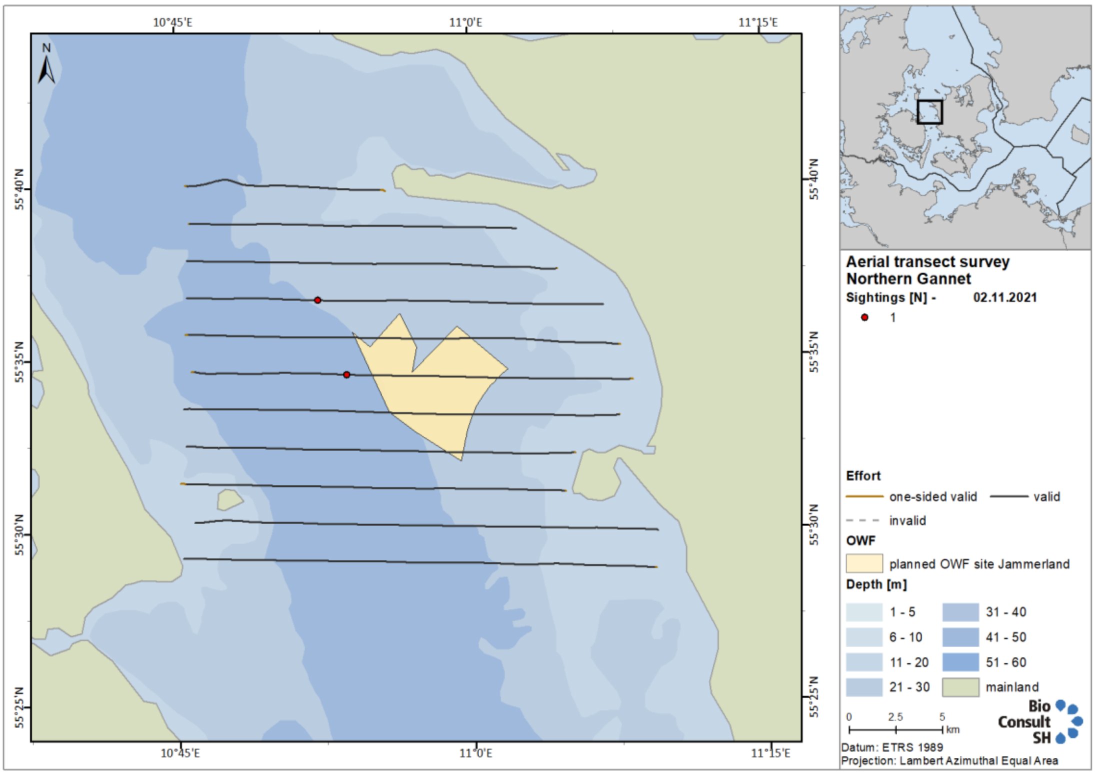

Figure A. 35 Red-necked Grebe distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

A.1.5 Great Cormorant

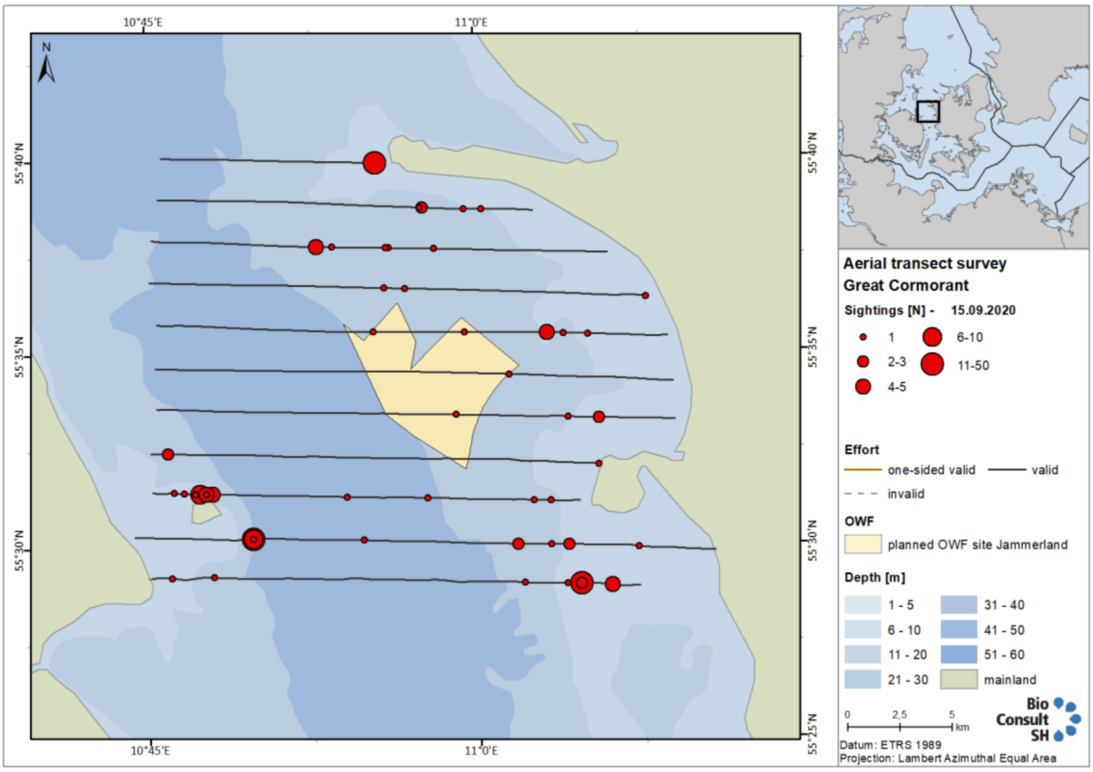

Figure A. 36 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

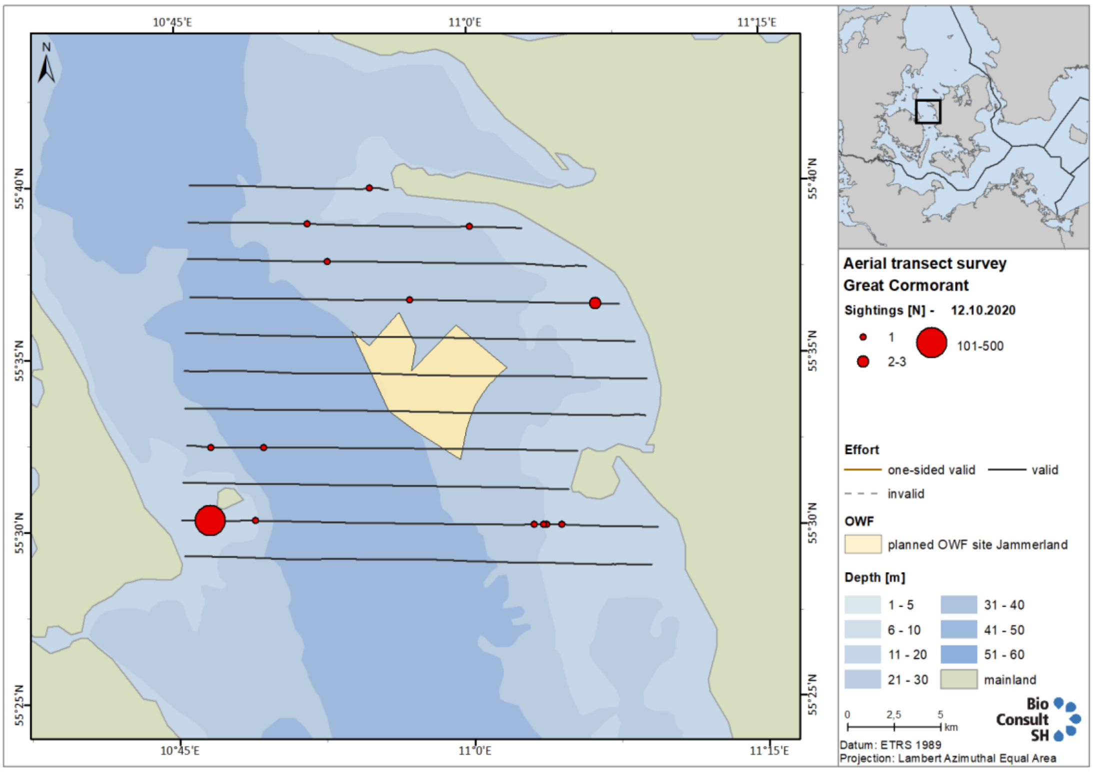

Figure A. 37 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

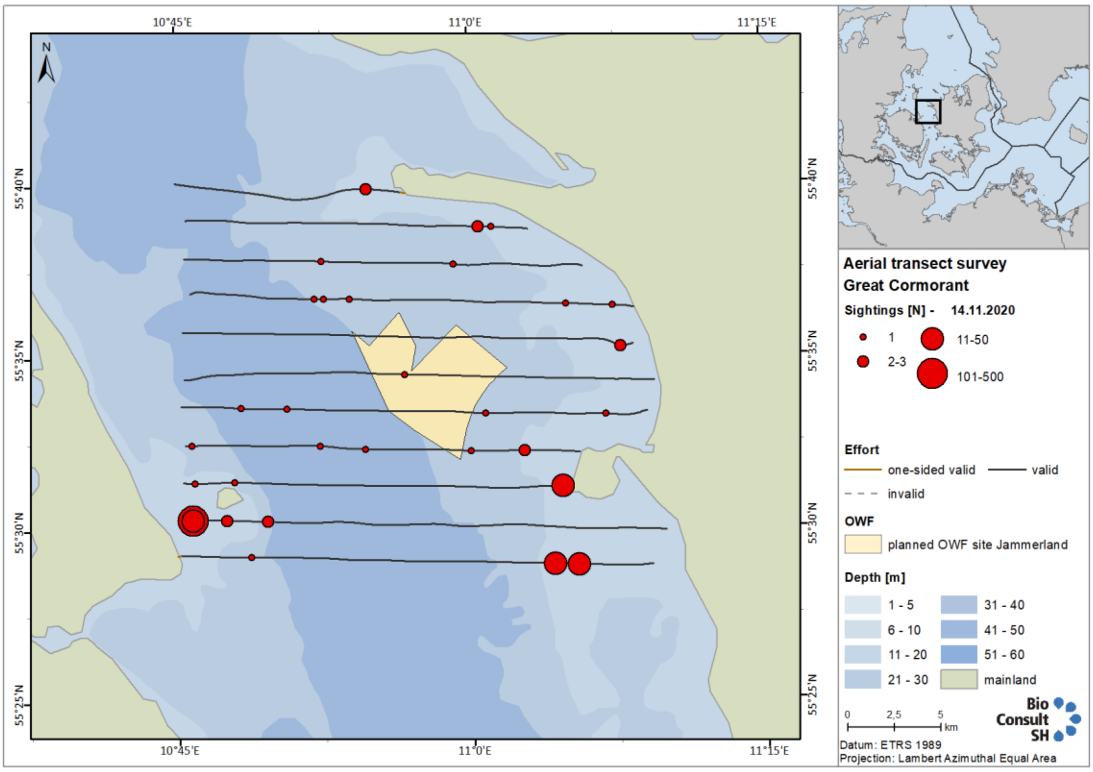

Figure A. 38 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

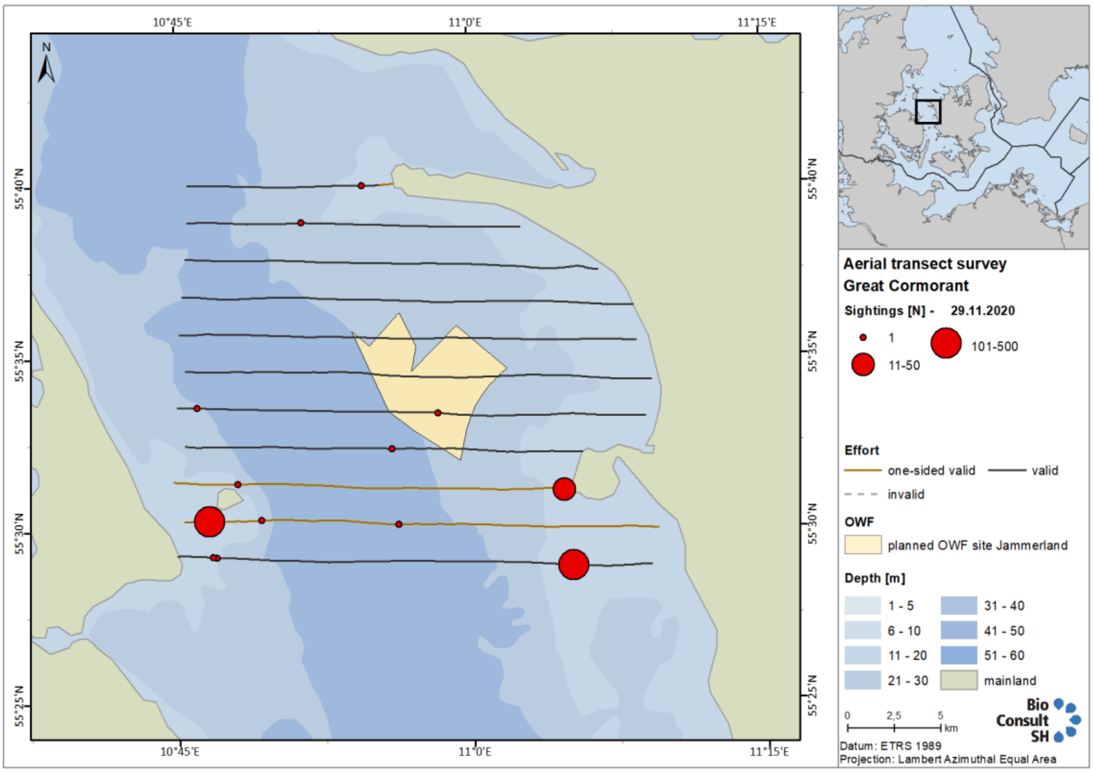

Figure A. 39 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

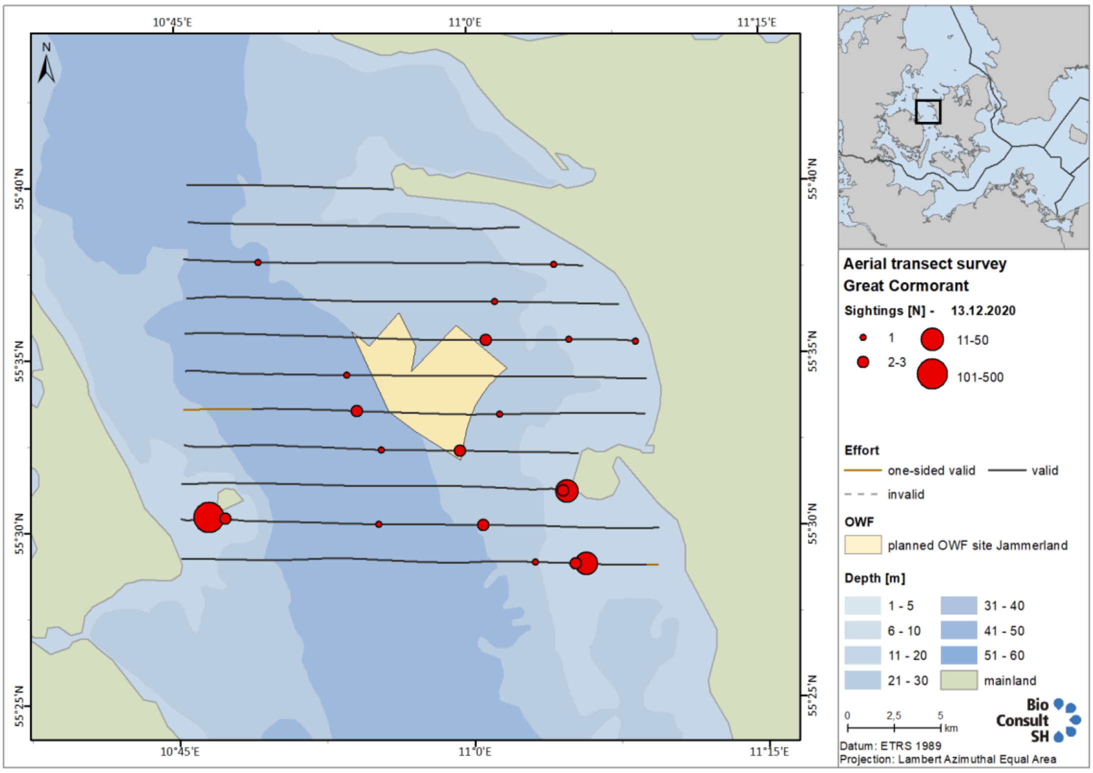

Figure A. 40 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

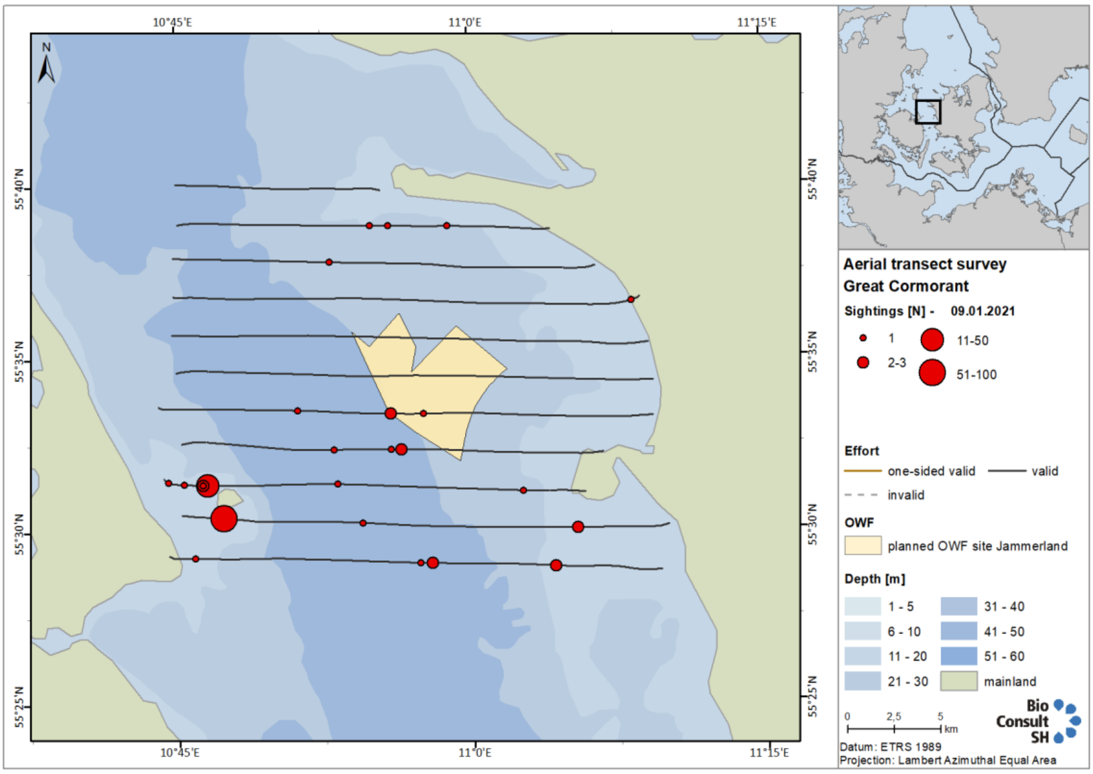

Figure A. 41 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

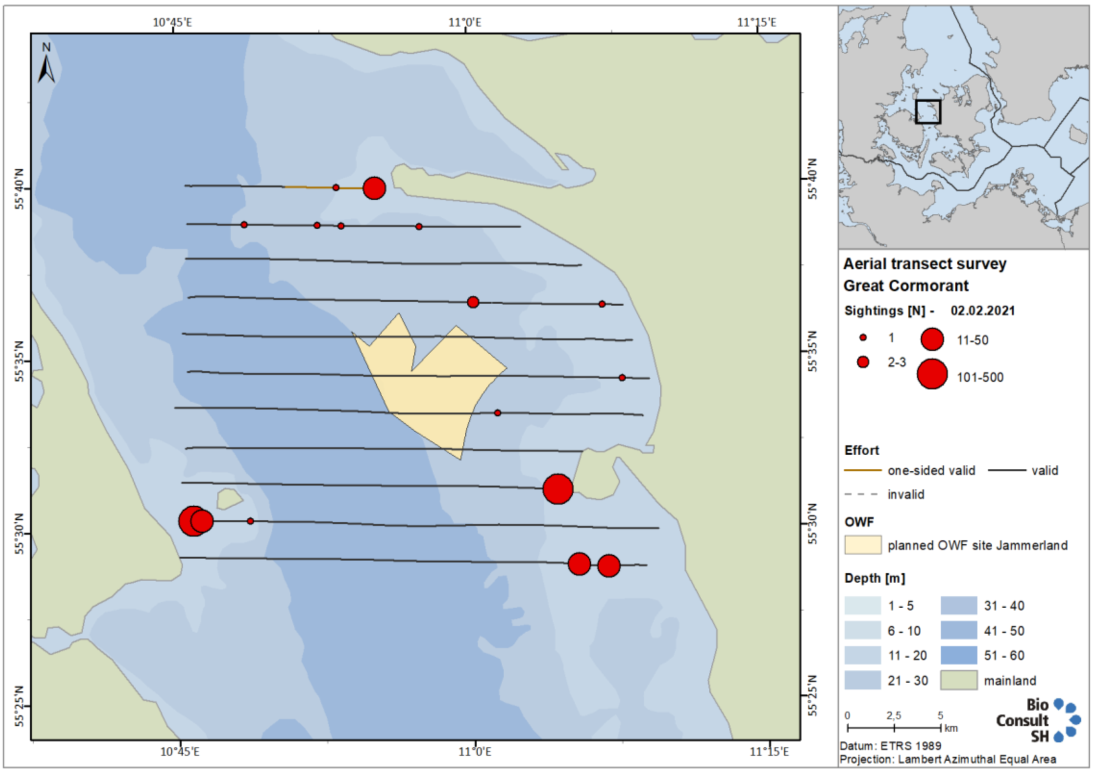

Figure A. 42 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

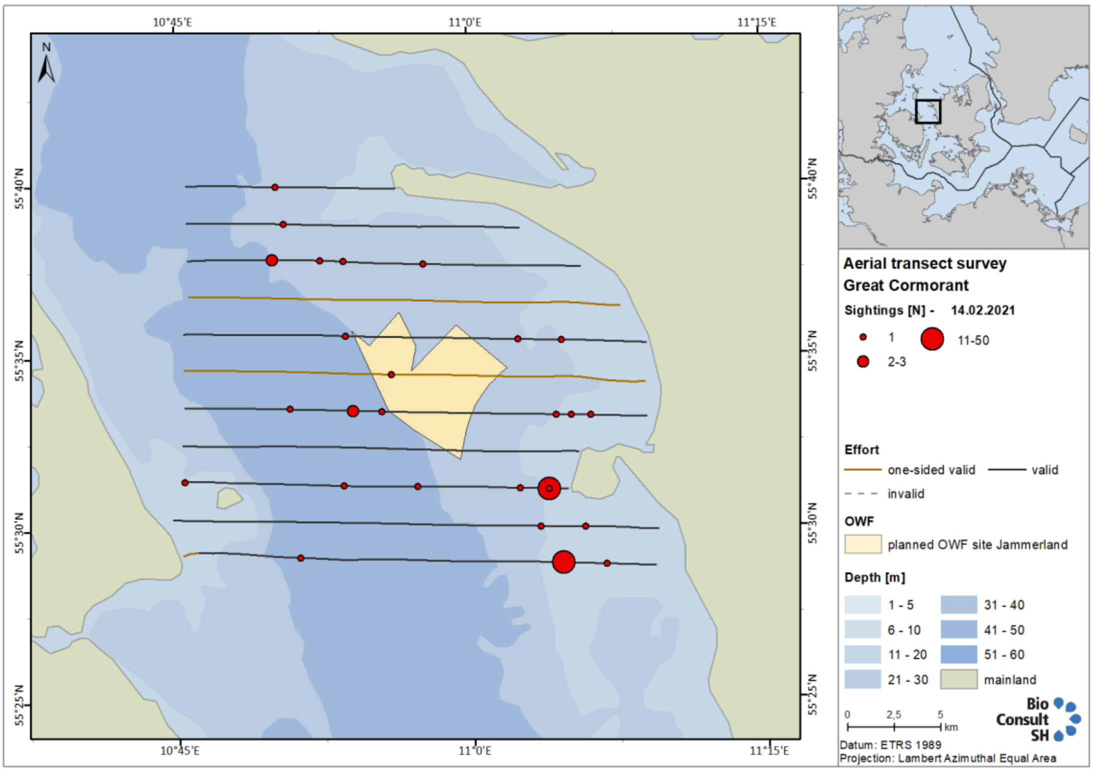

Figure A. 43 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

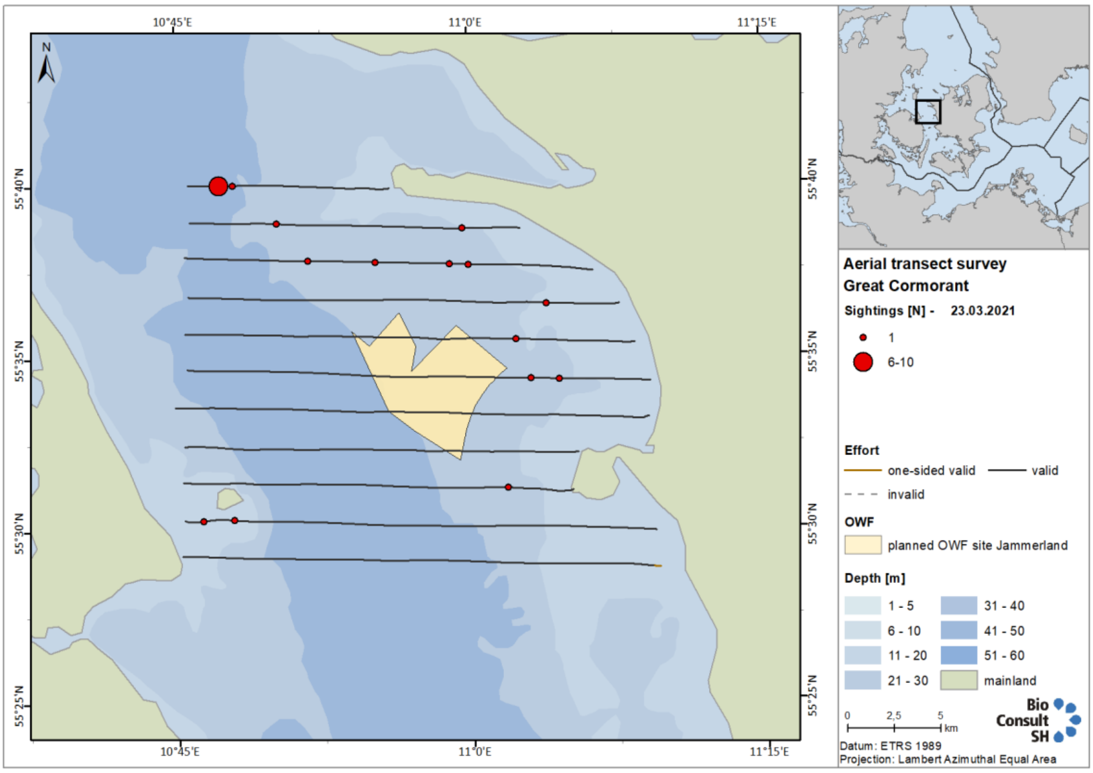

Figure A. 44 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

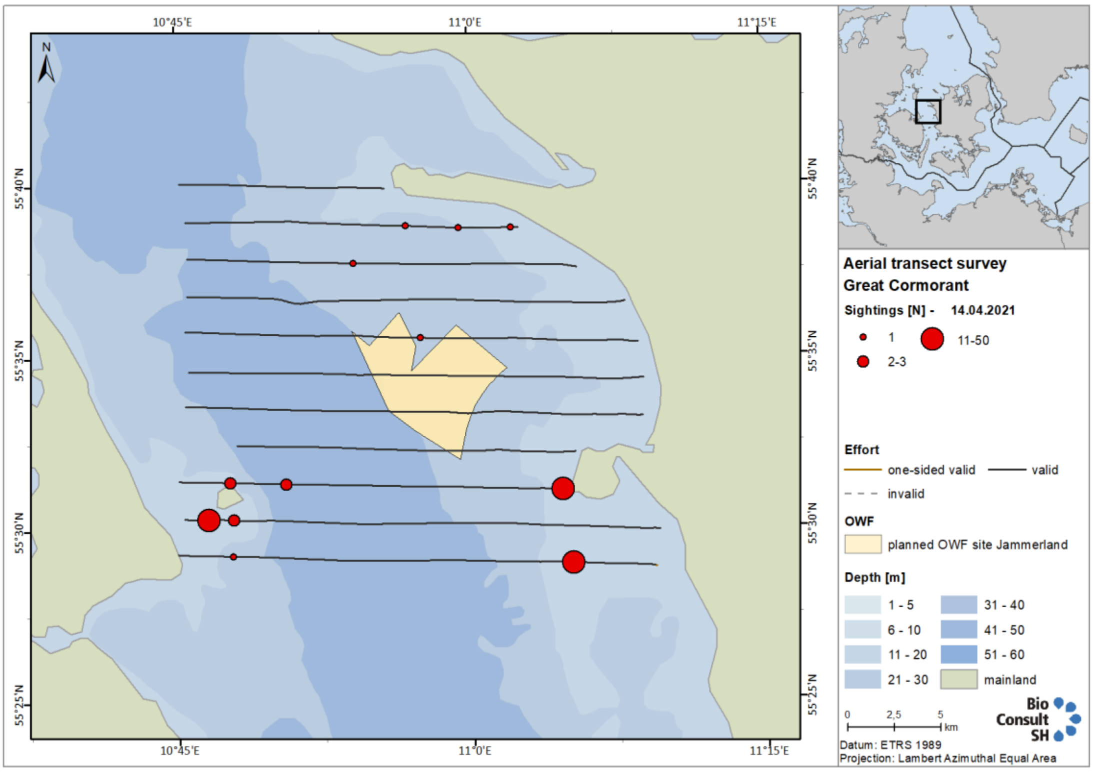

Figure A. 45 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

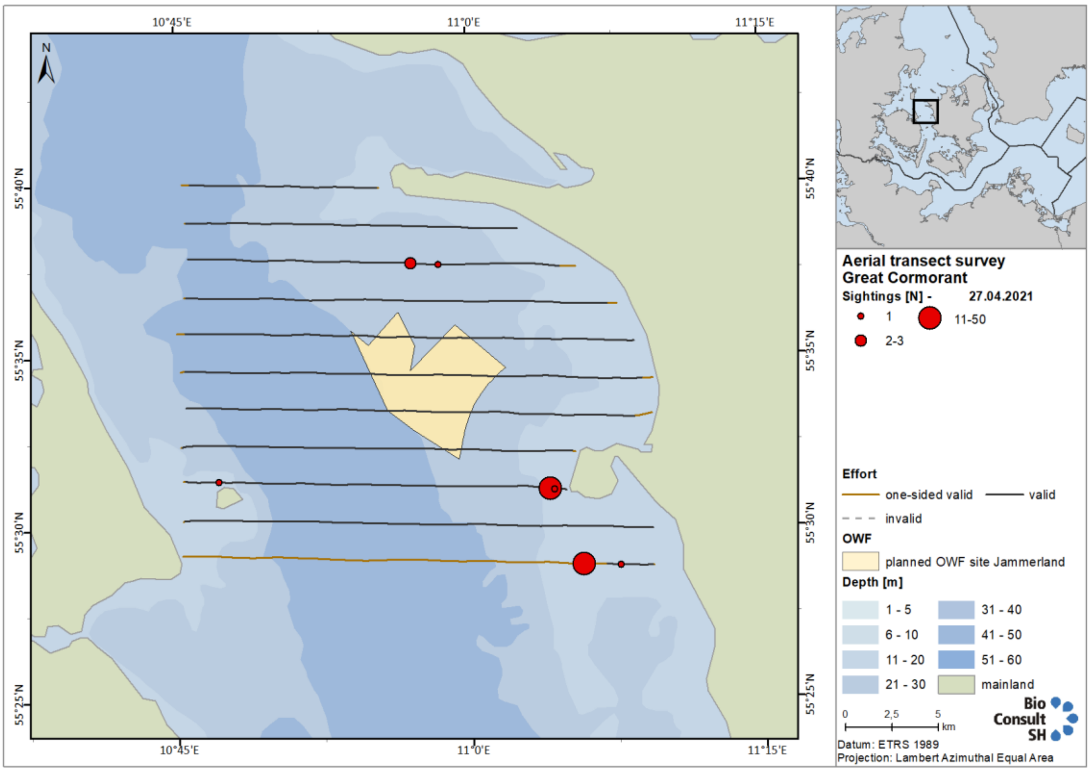

Figure A. 46 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

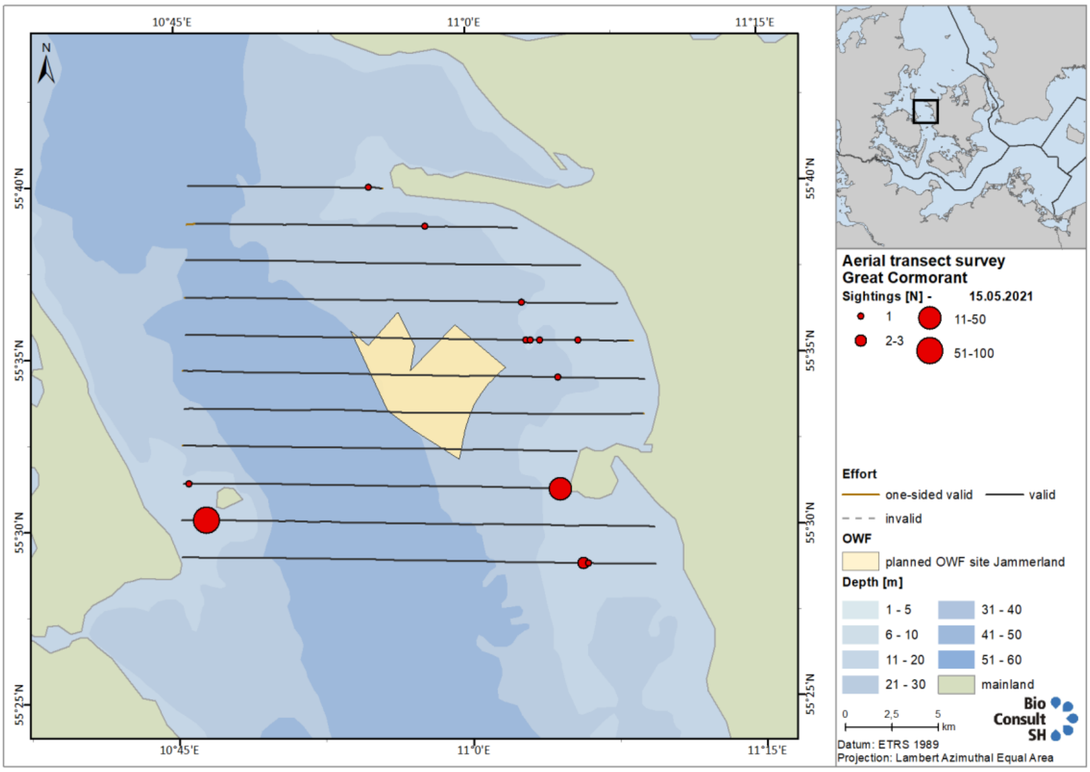

Figure A. 47 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

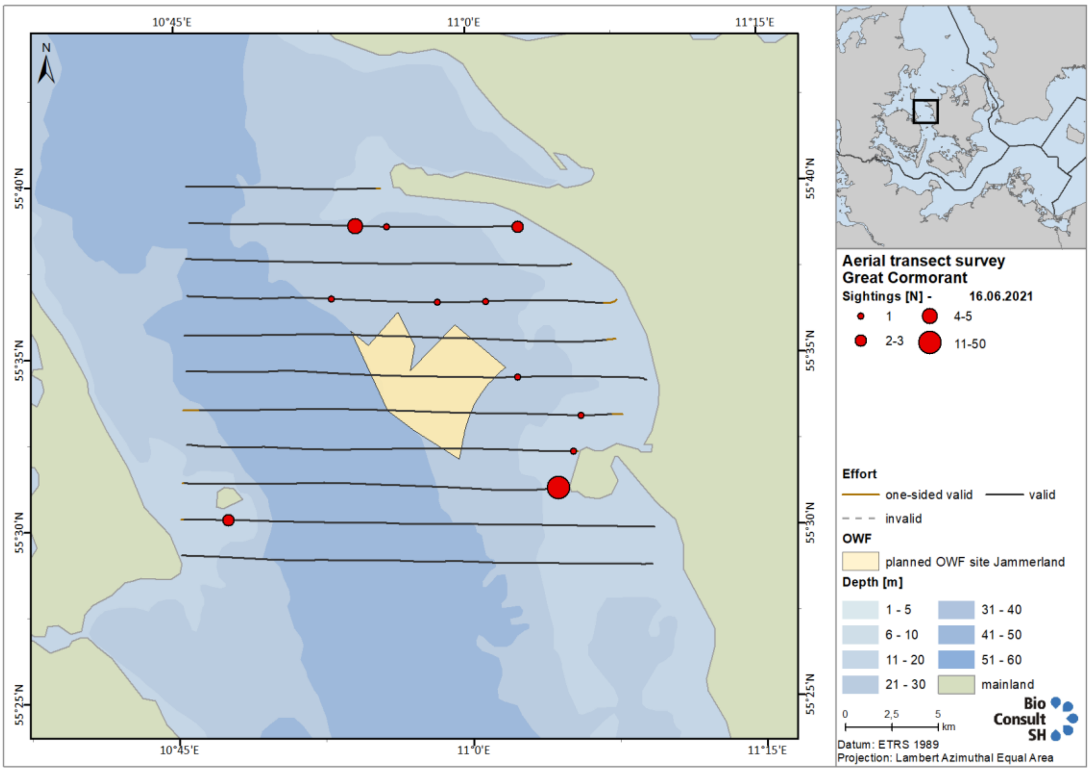

Figure A. 48 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 16th Juni 2021.

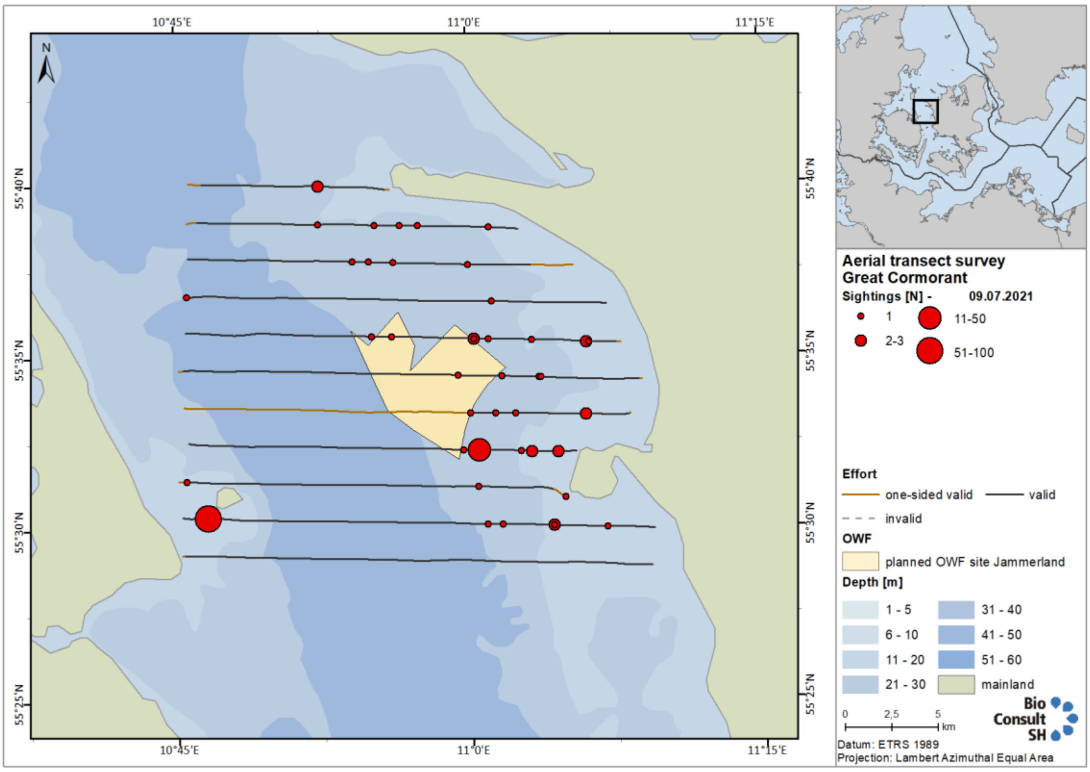

Figure A. 49 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

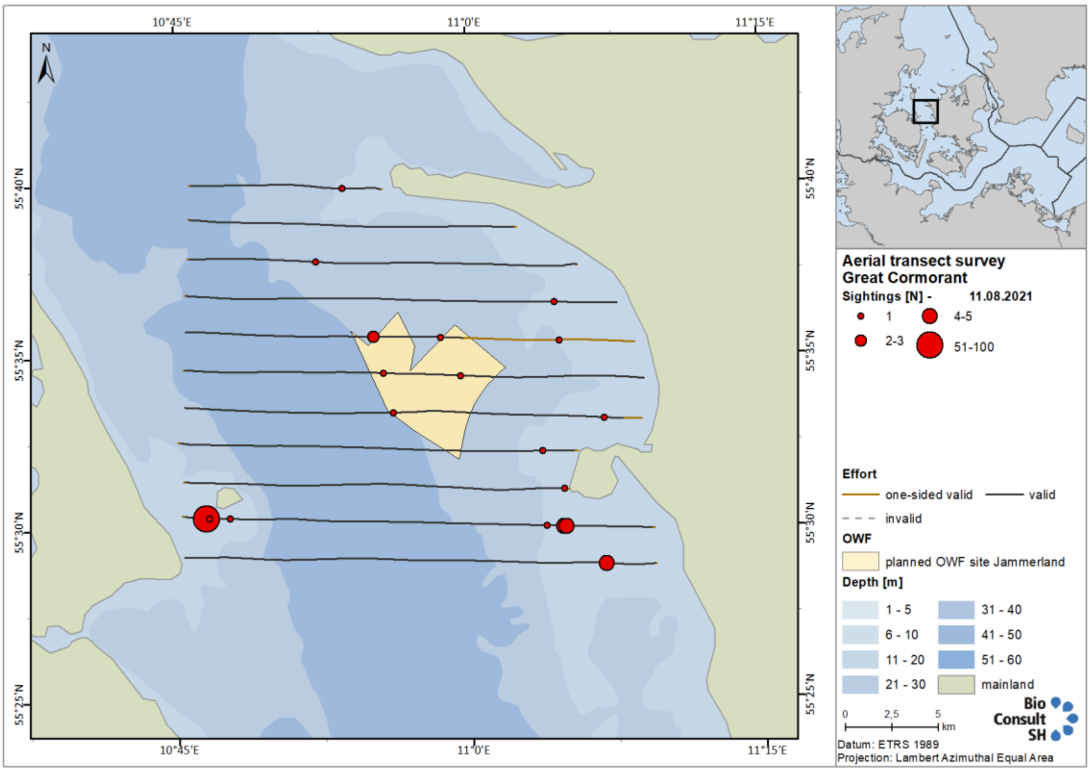

Figure A. 50 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

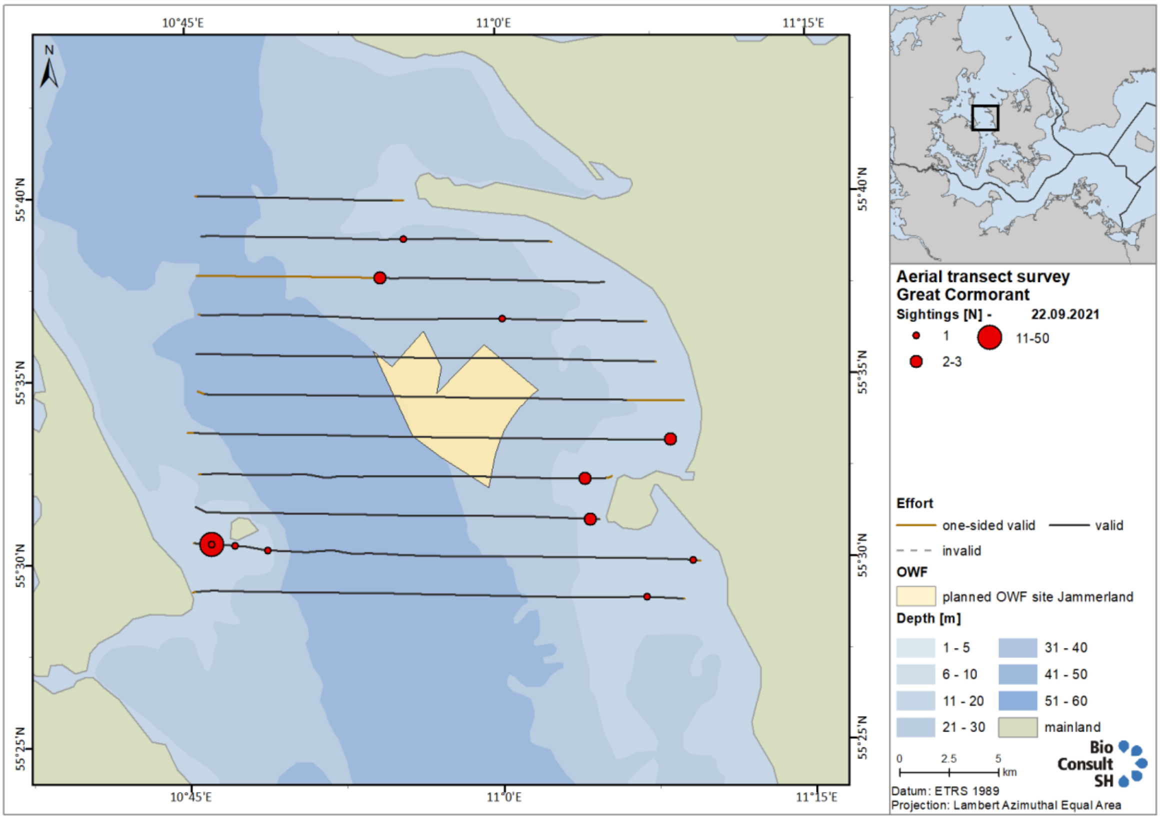

Figure A. 51 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

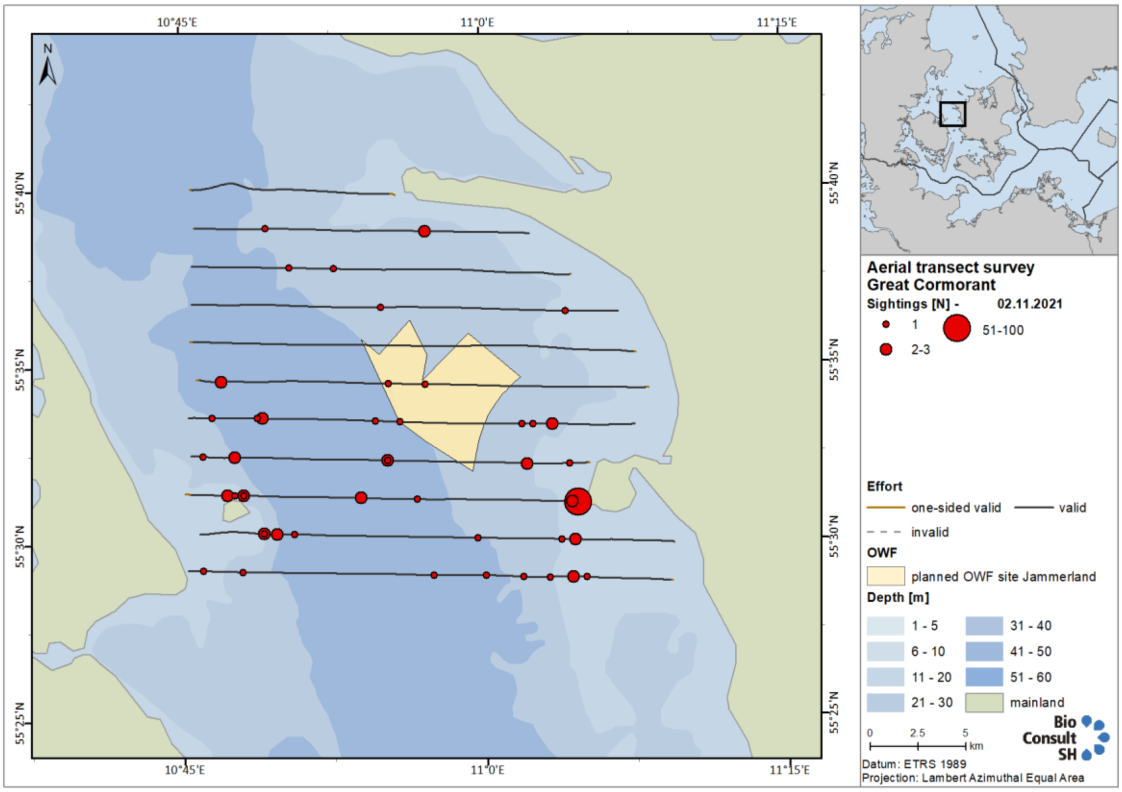

Figure A. 52 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

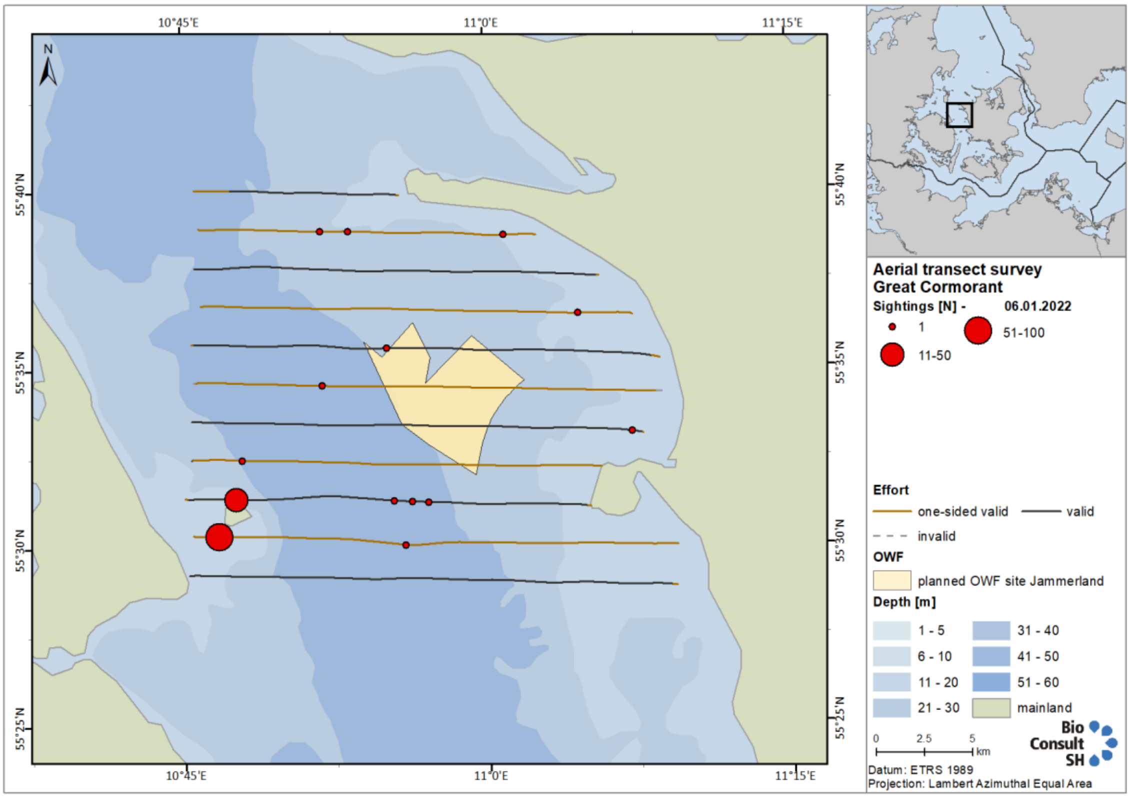

Figure A. 53 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

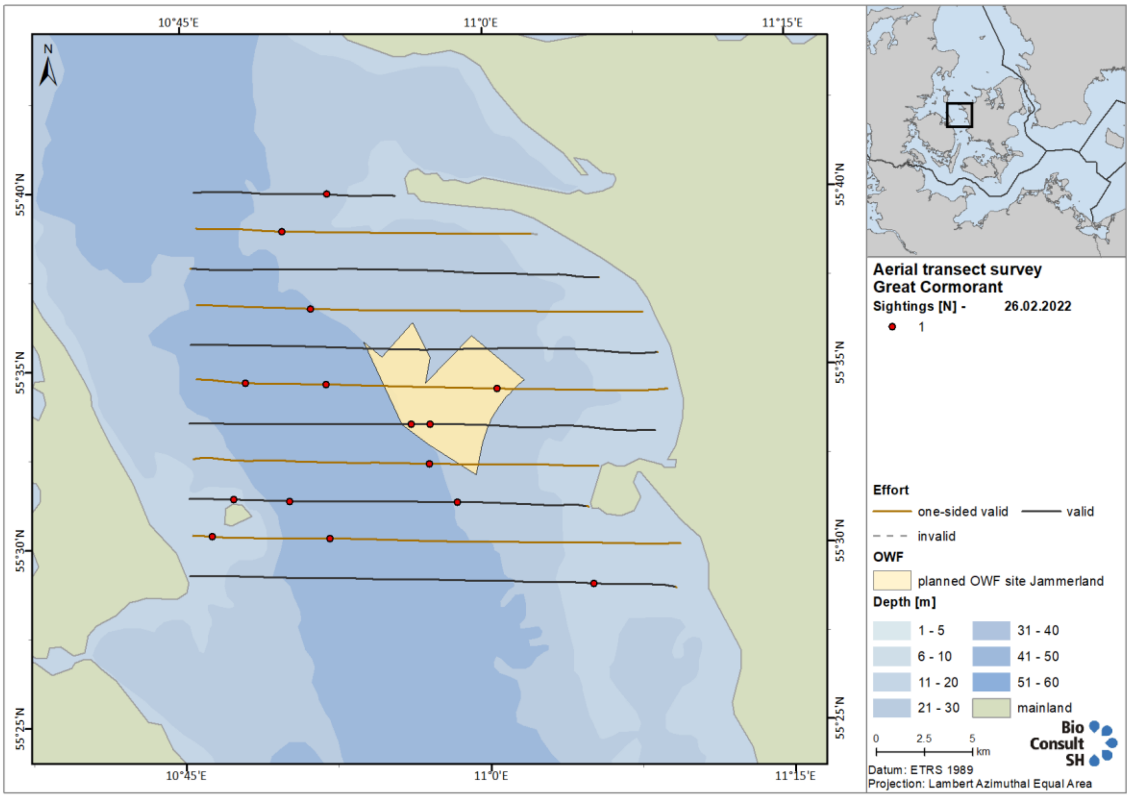

Figure A. 54 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

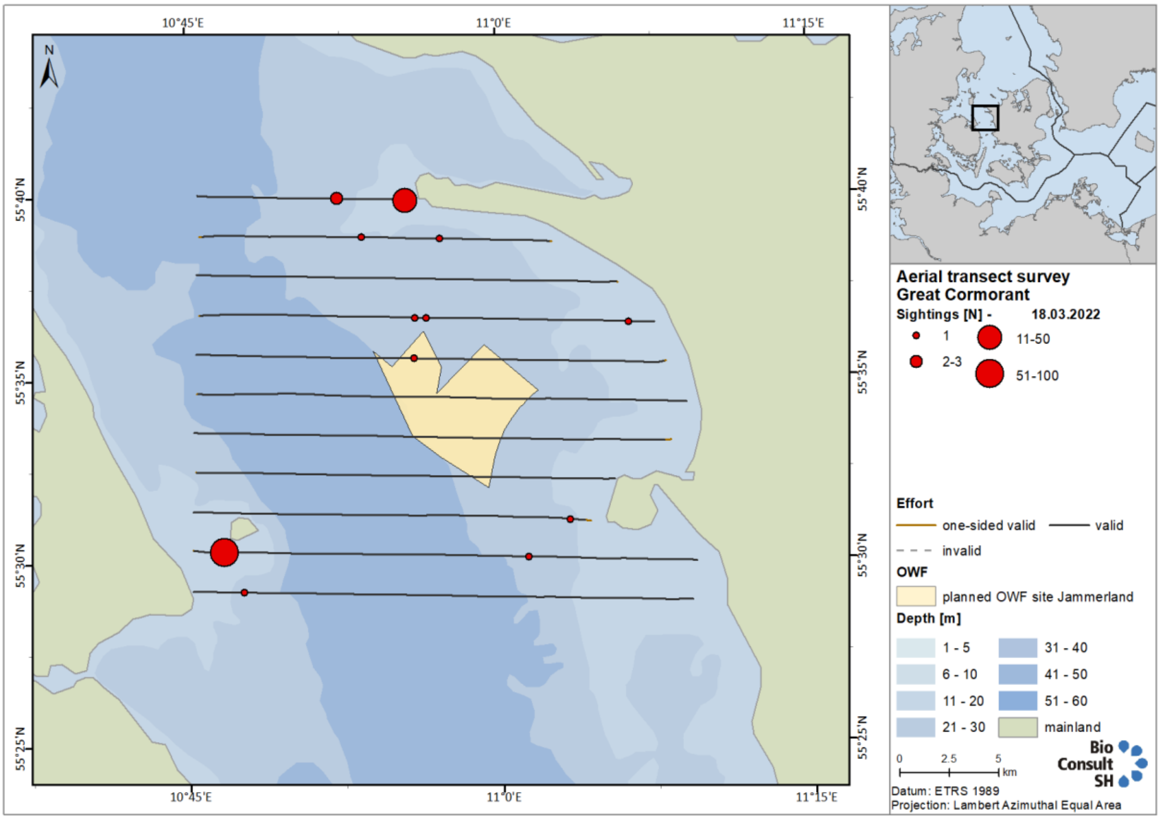

Figure A. 55 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

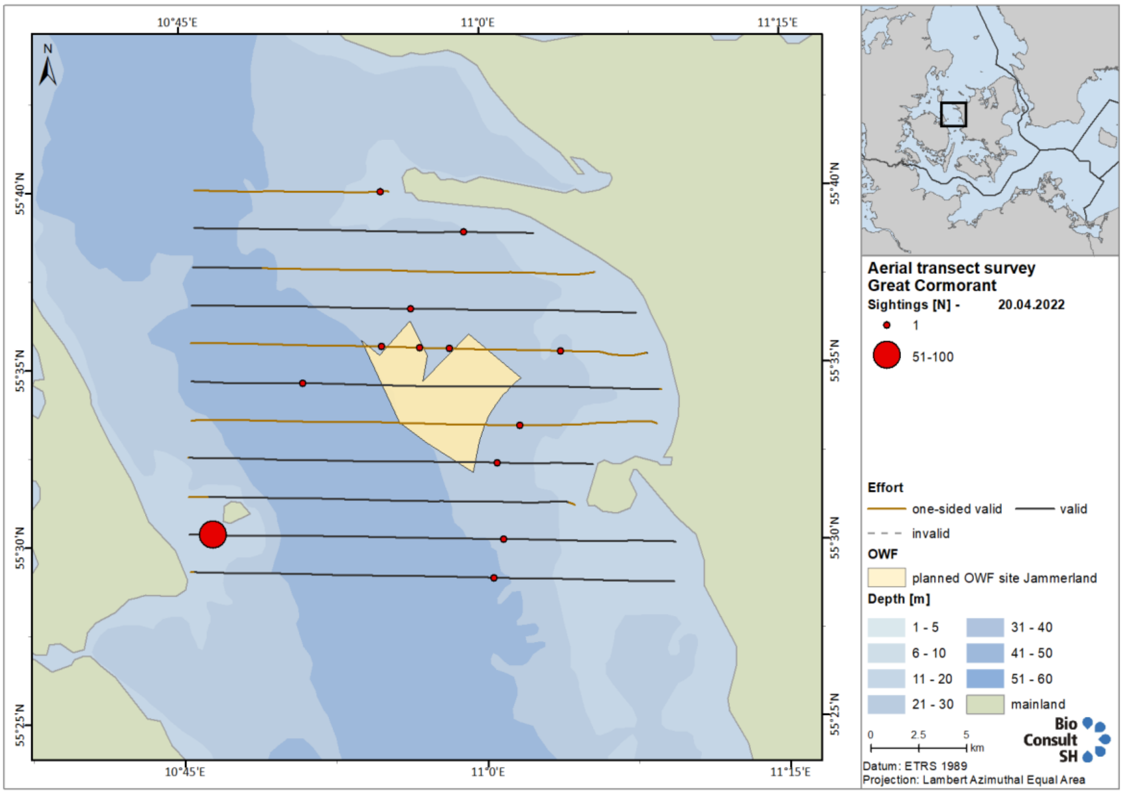

Figure A. 56 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

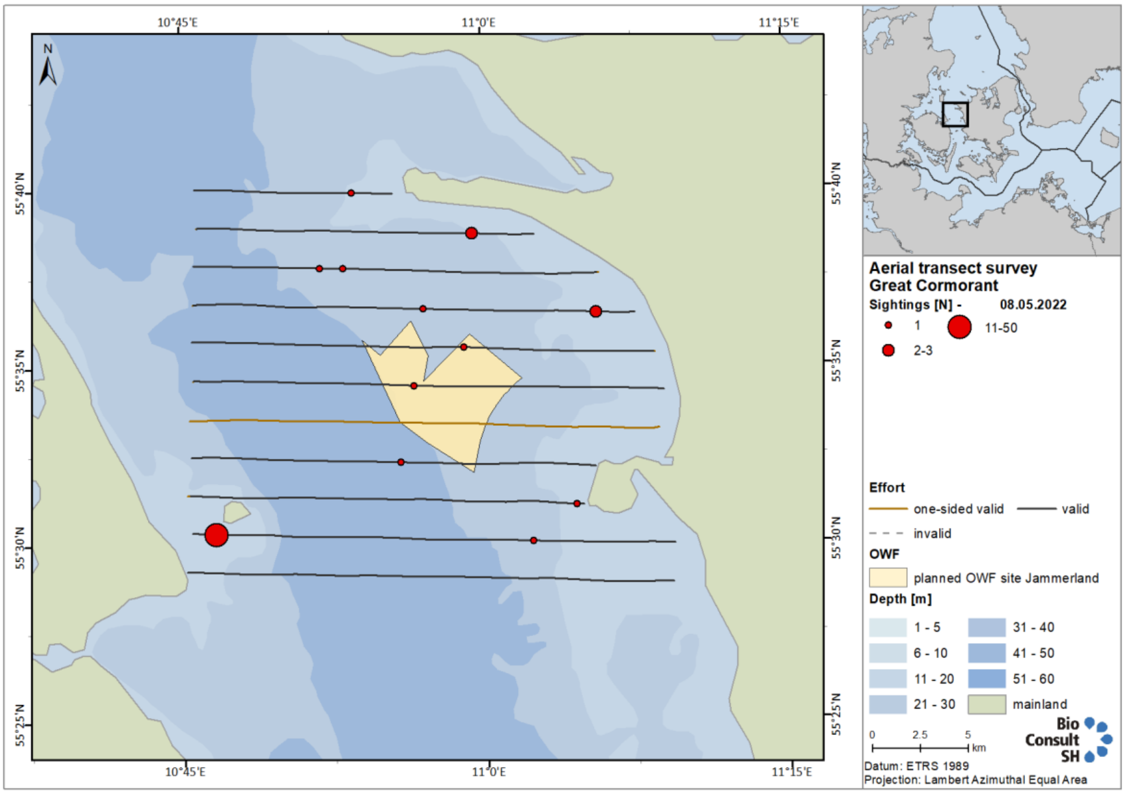

Figure A. 57 Great Cormorant distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.6 Swans (Mute Swan, Whooper Swan)

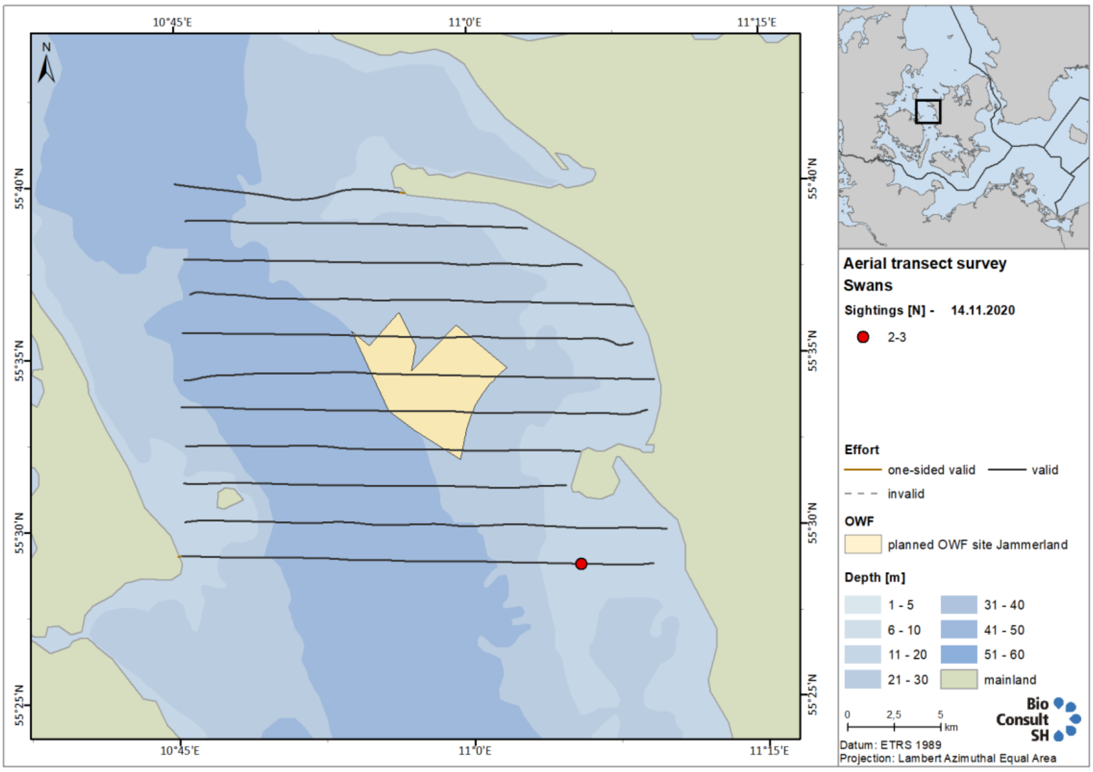

Figure A. 58 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

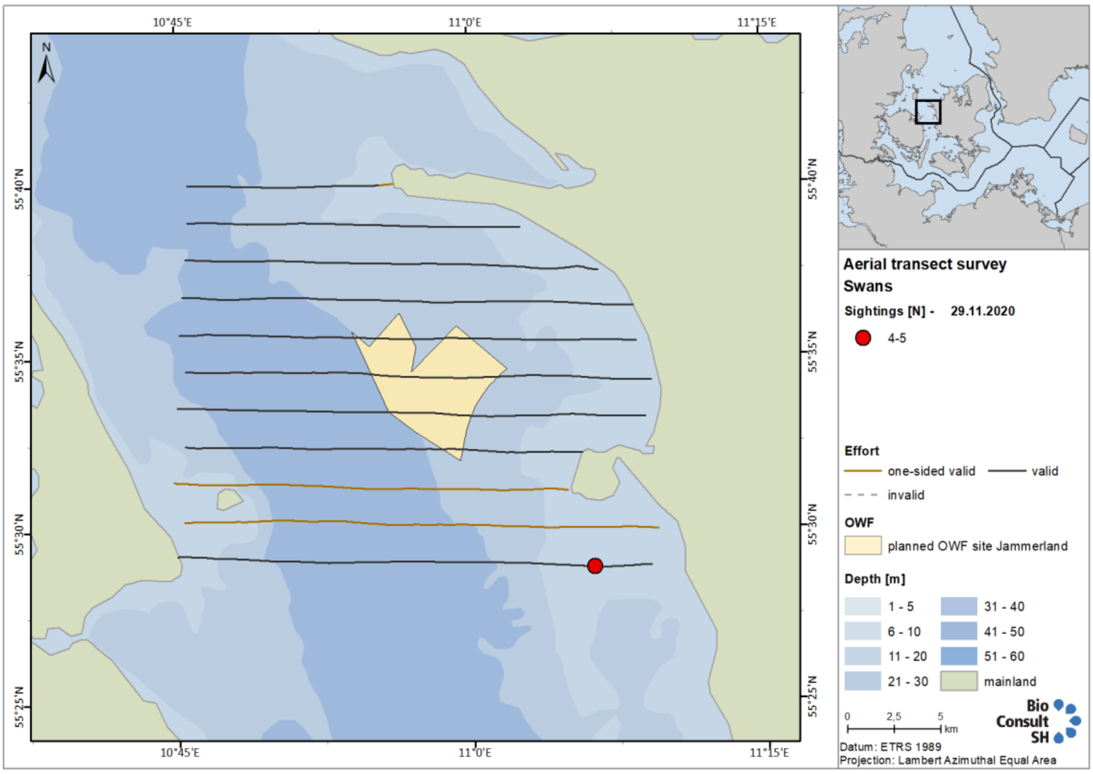

Figure A. 59 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

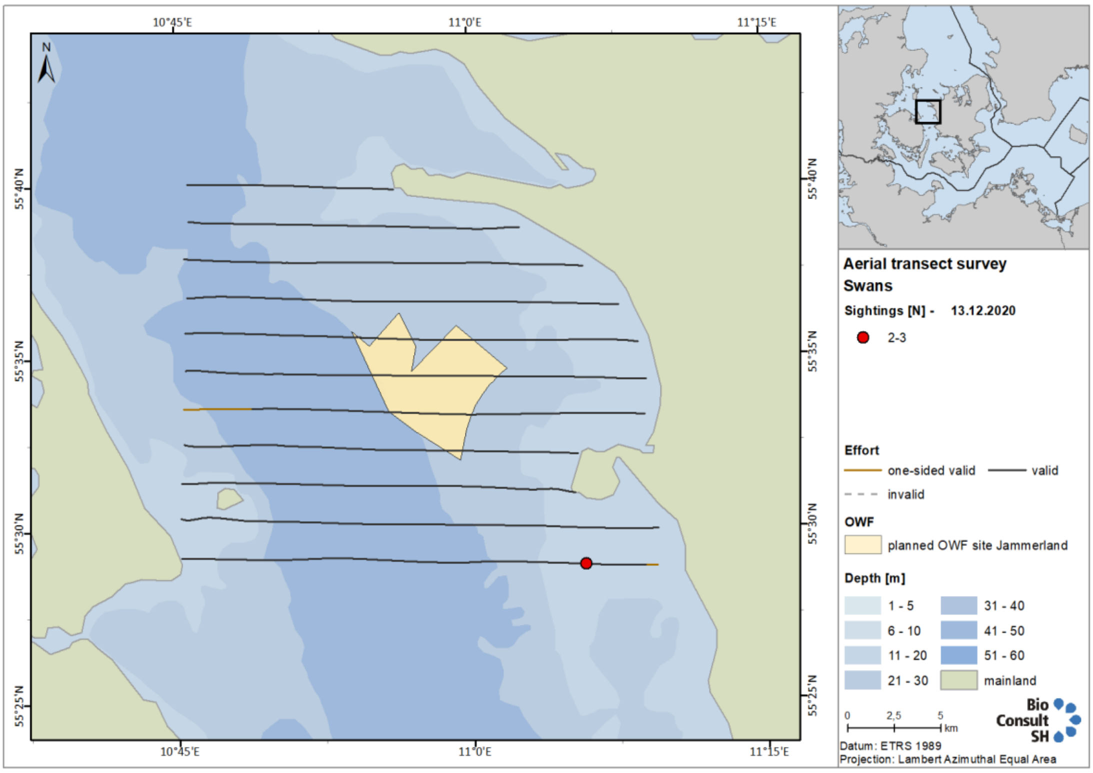

Figure A. 60 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

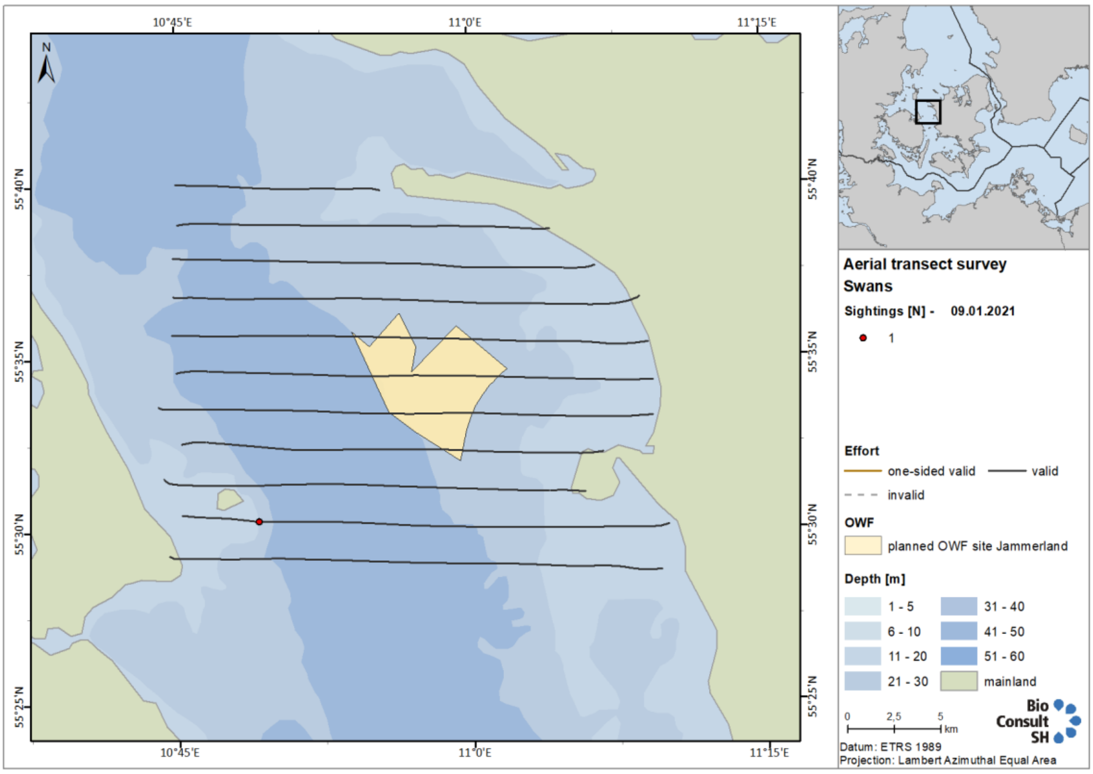

Figure A. 61 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

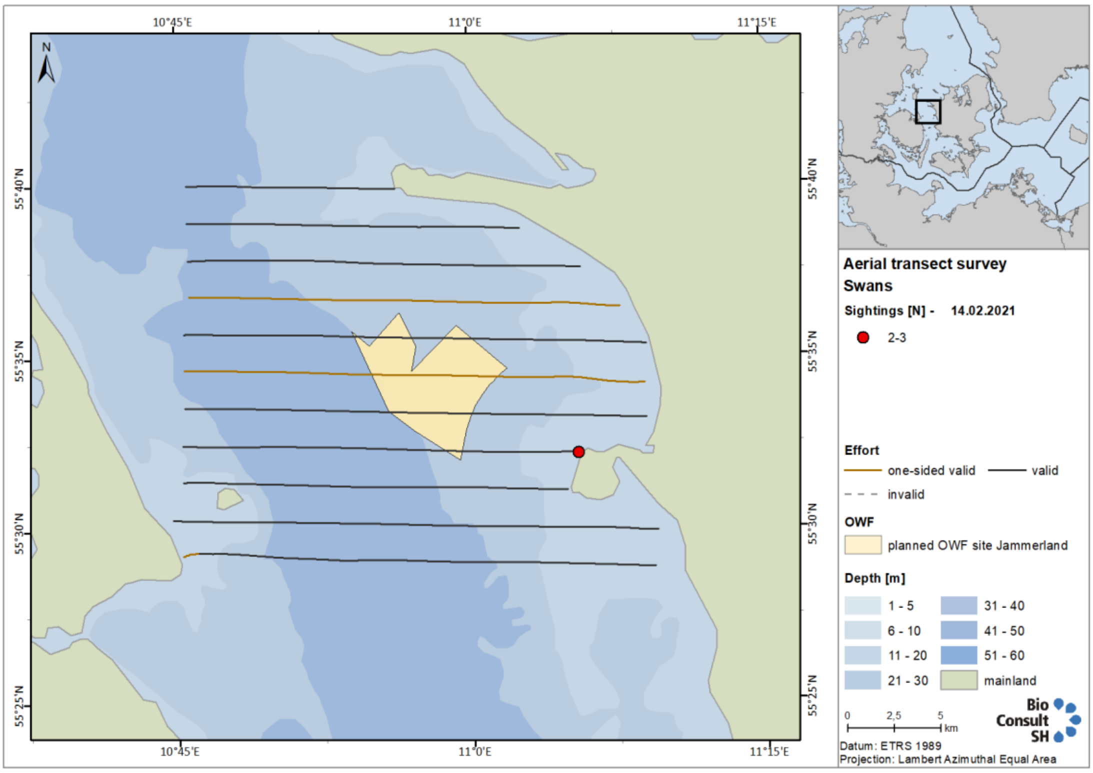

Figure A. 62 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

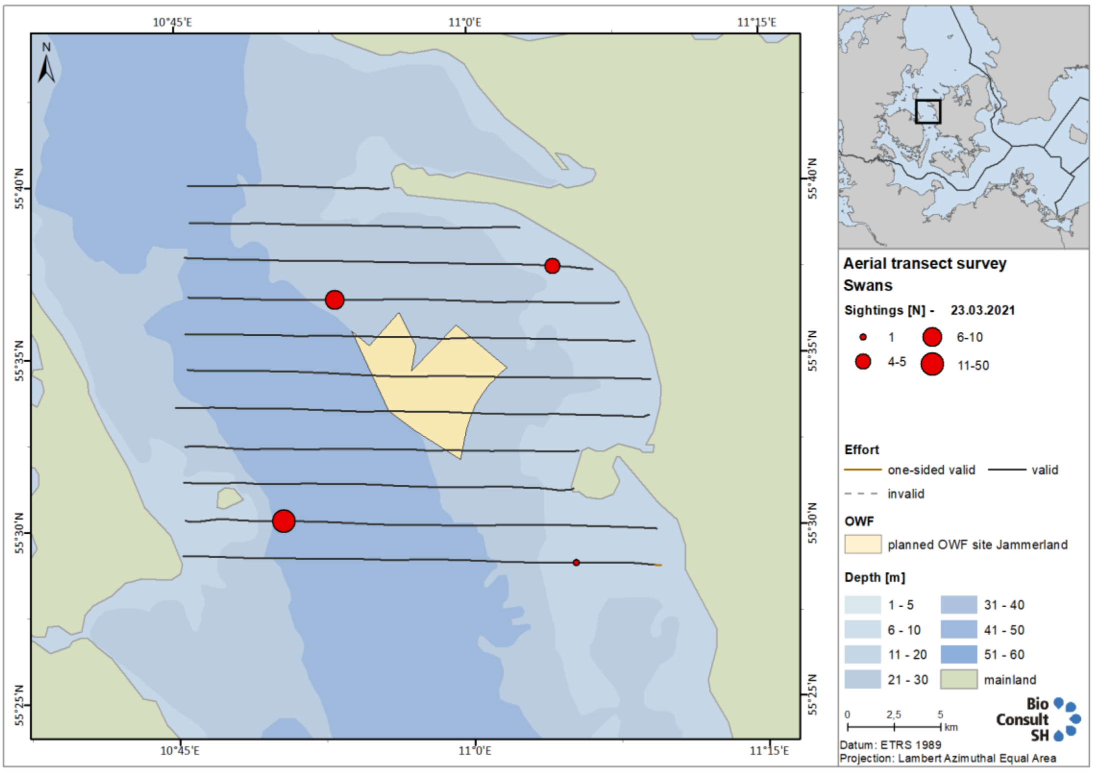

Figure A. 63 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

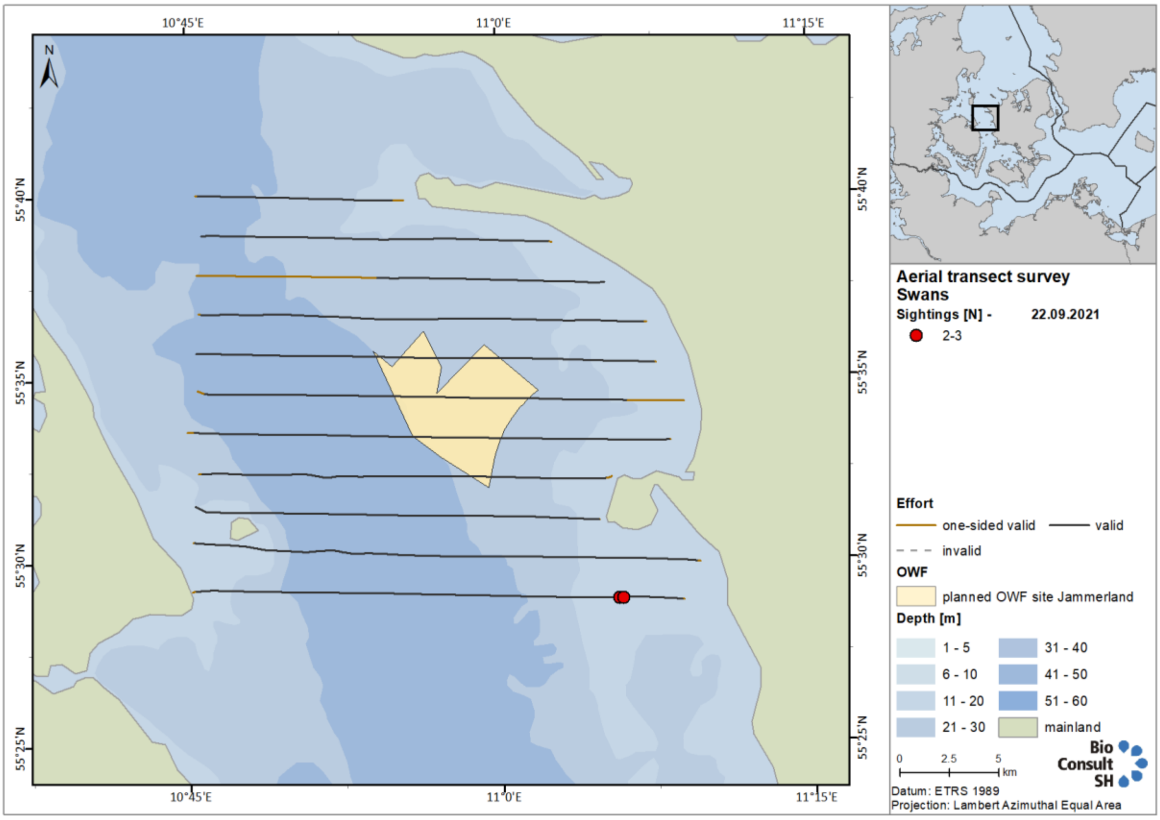

Figure A. 64 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

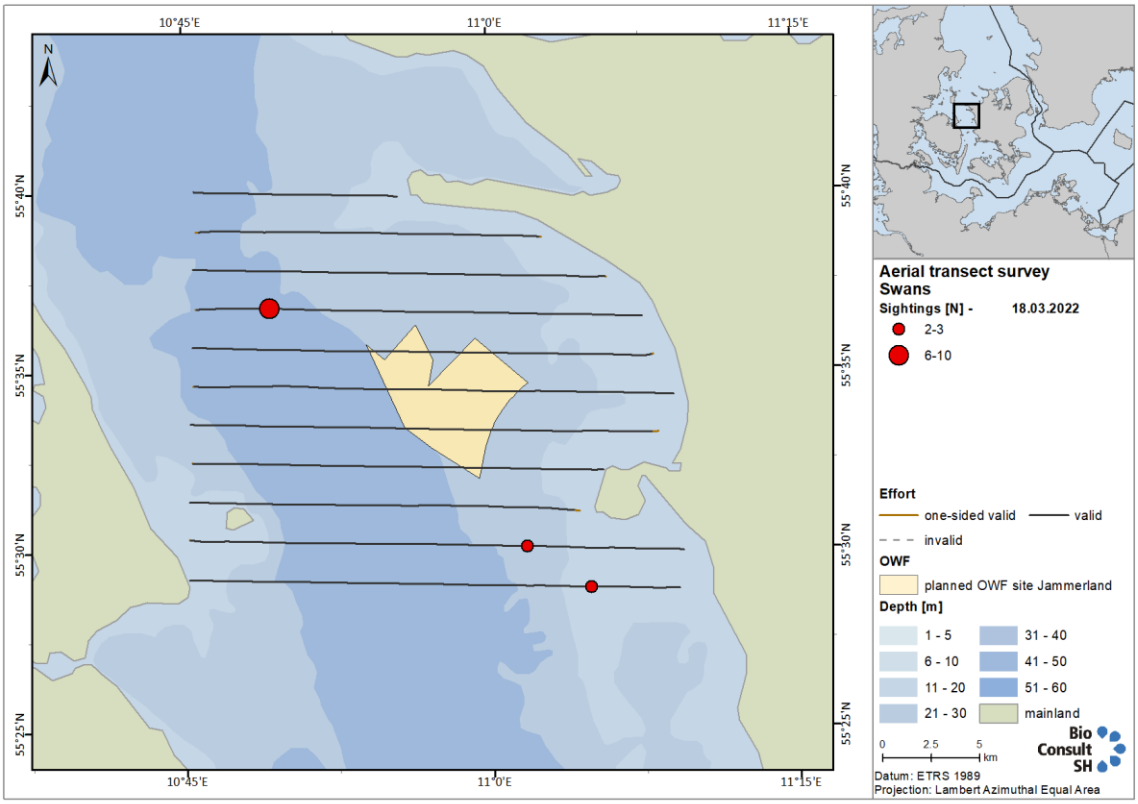

Figure A. 65 Mute Swan and Whooper Swan distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

A.1.7 Geese

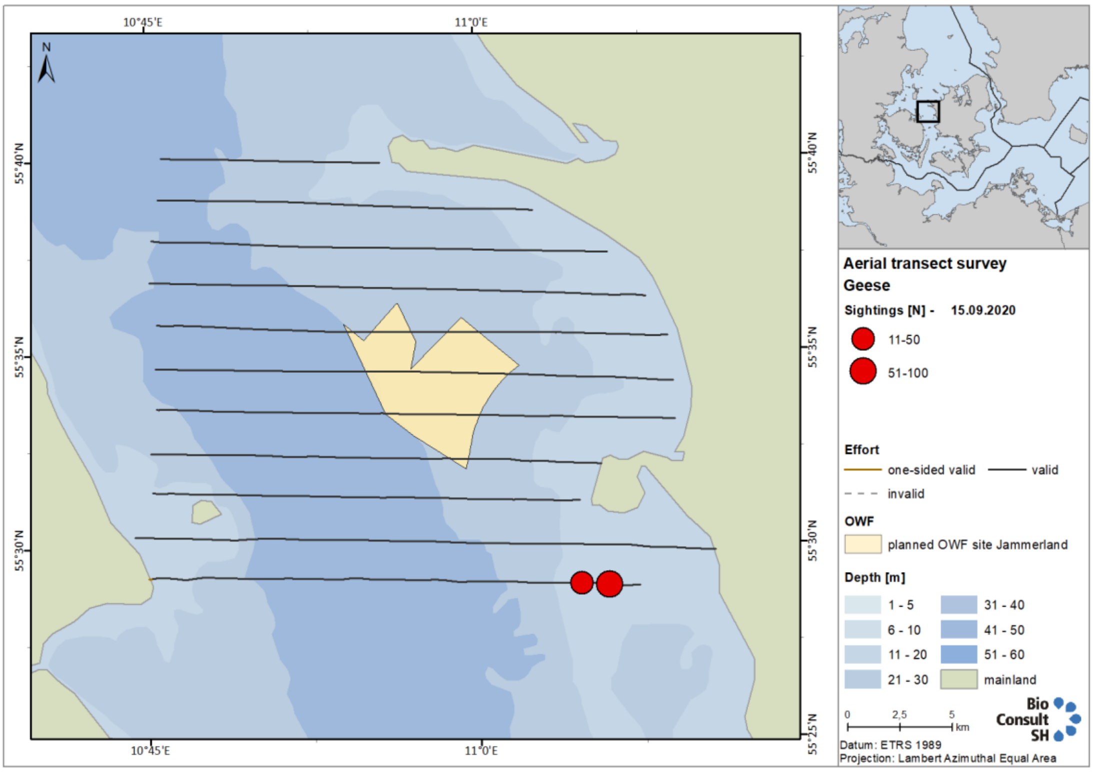

Figure A. 66 Geese distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

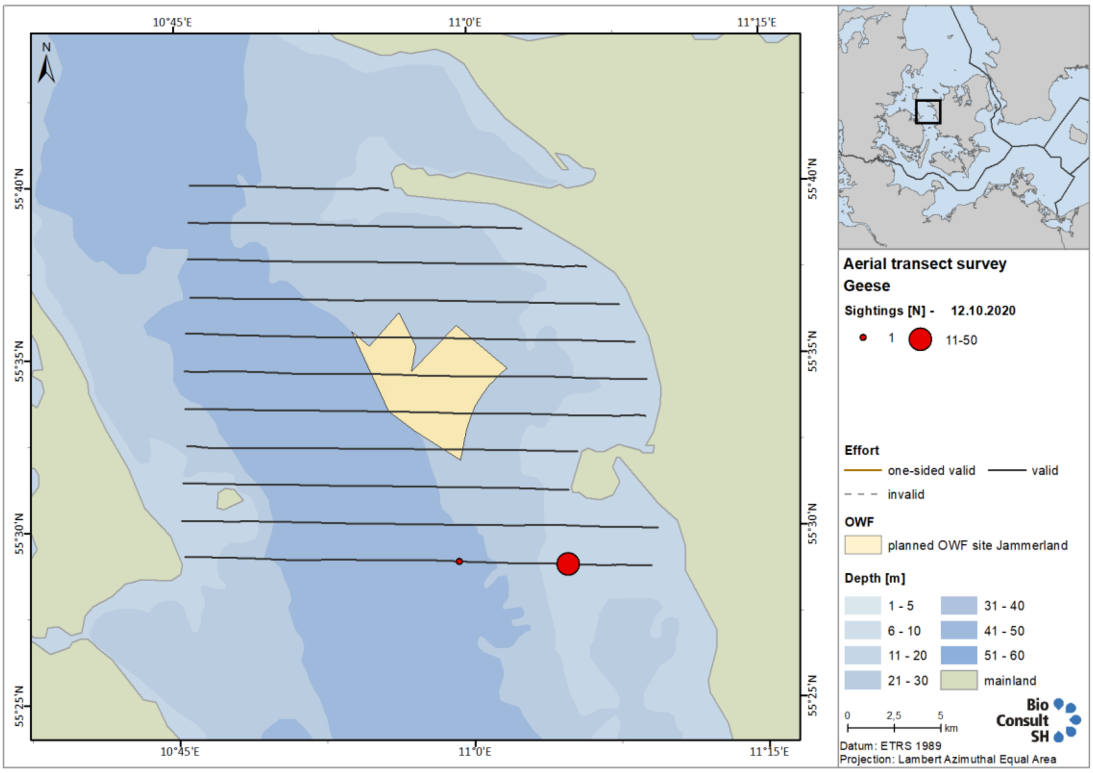

Figure A. 67 Geese distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

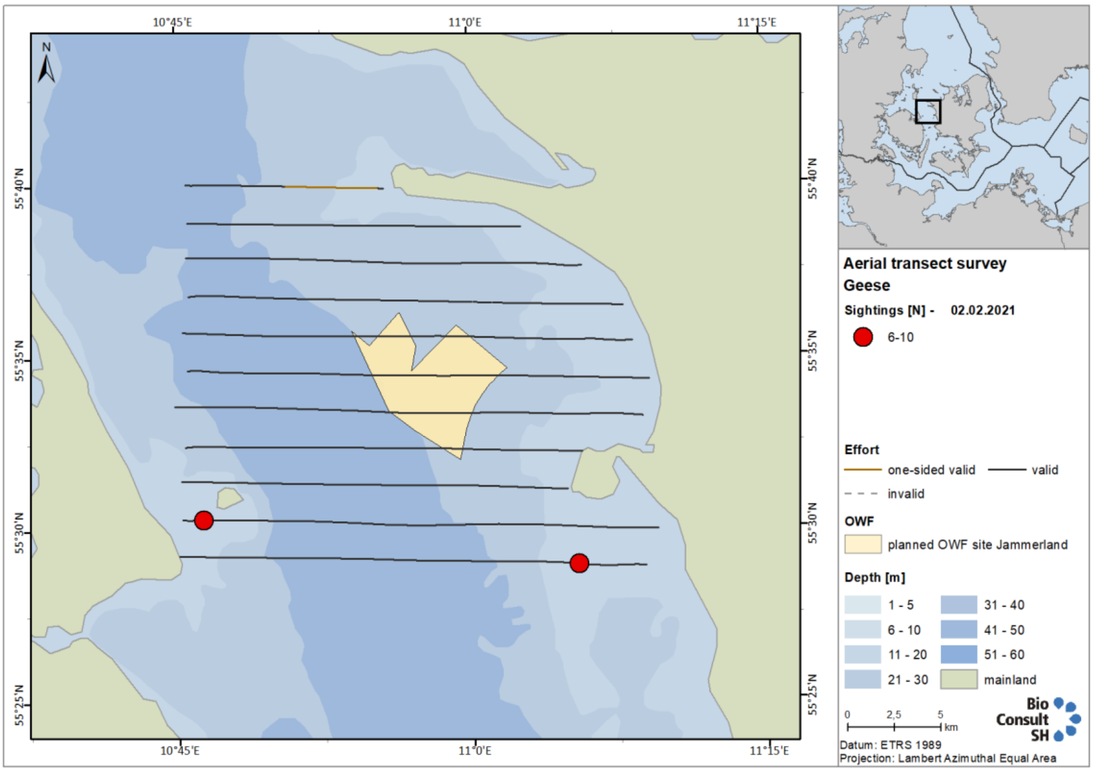

Figure A. 68 Geese distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

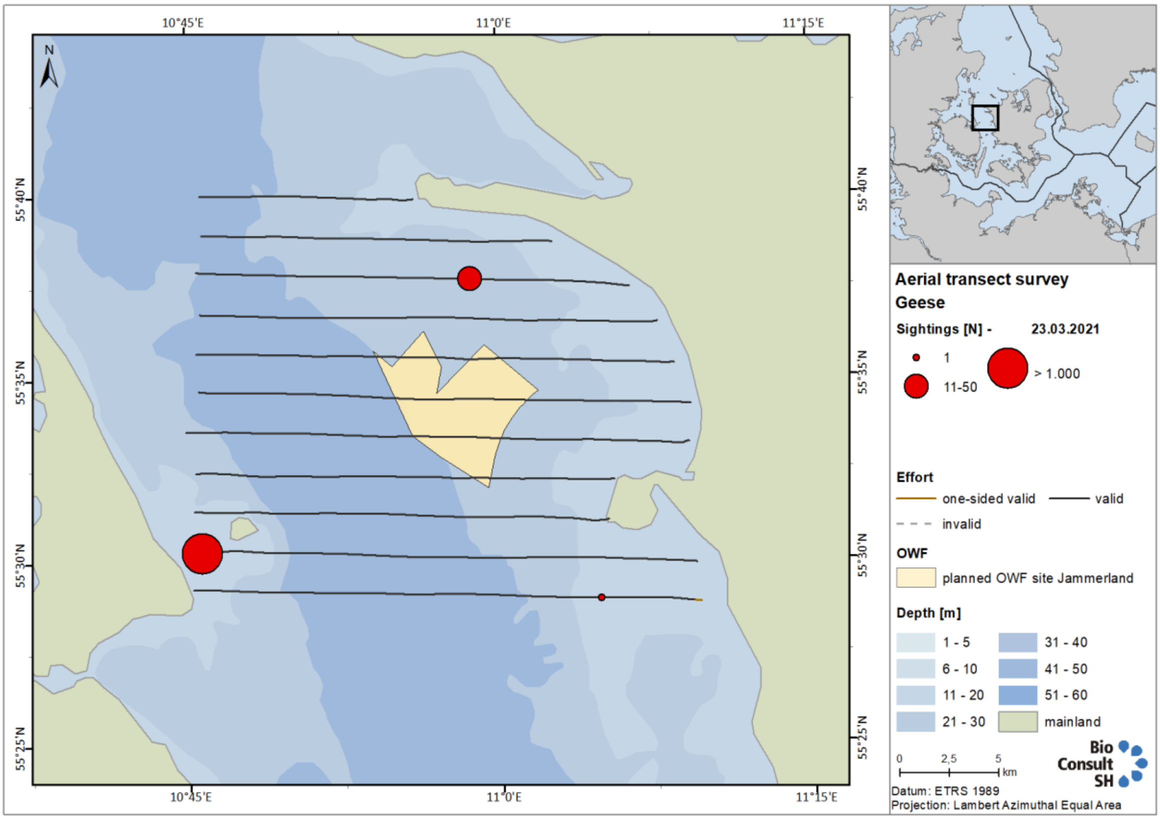

Figure A. 69 Geese distribution in the Jammerland area during the aerial survey flight on 3rd March 2021.

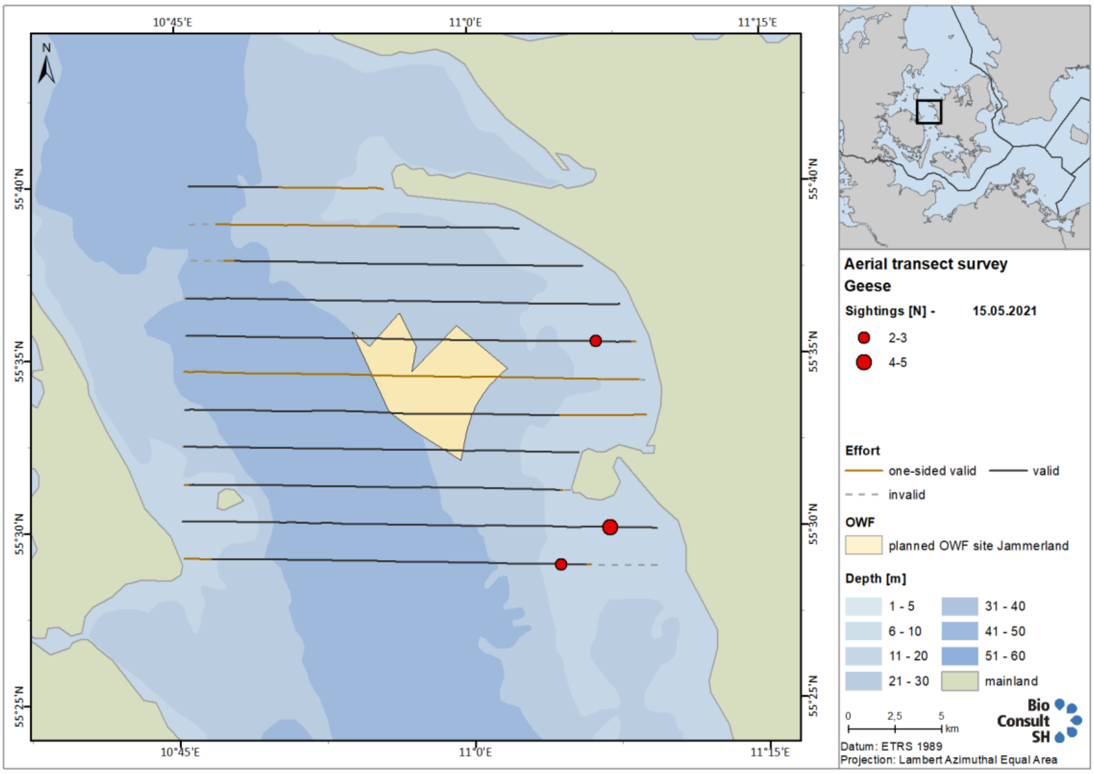

Figure A. 70 Geese distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

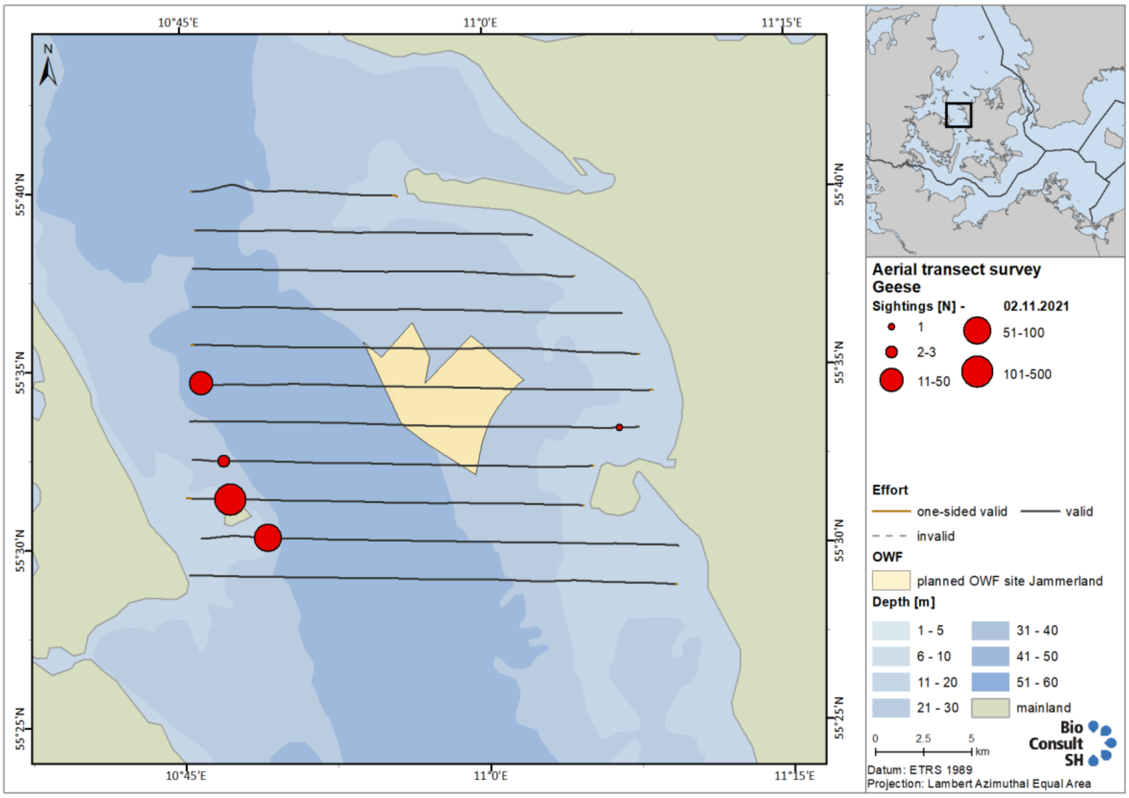

Figure A. 71 Geese distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

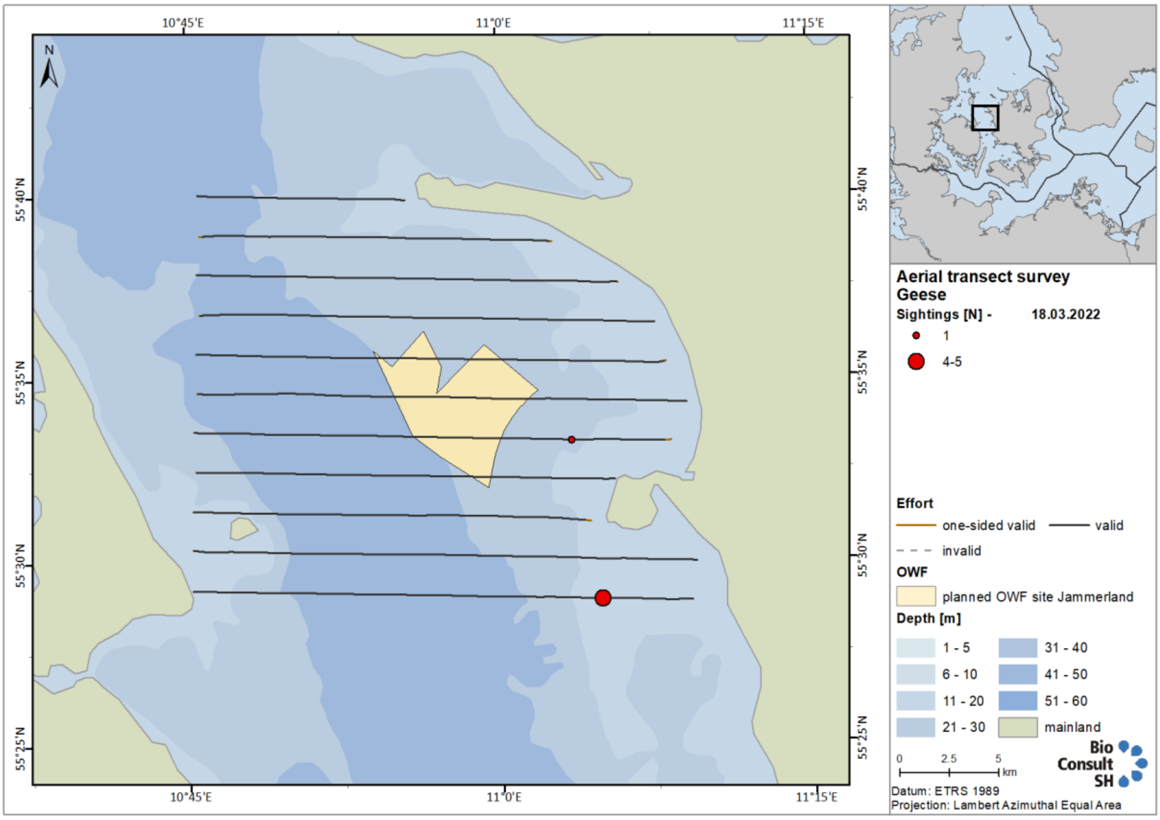

Figure A. 72 Geese distribution in the Jammerland area during the aerial survey flight on 18th Macrh 2022.

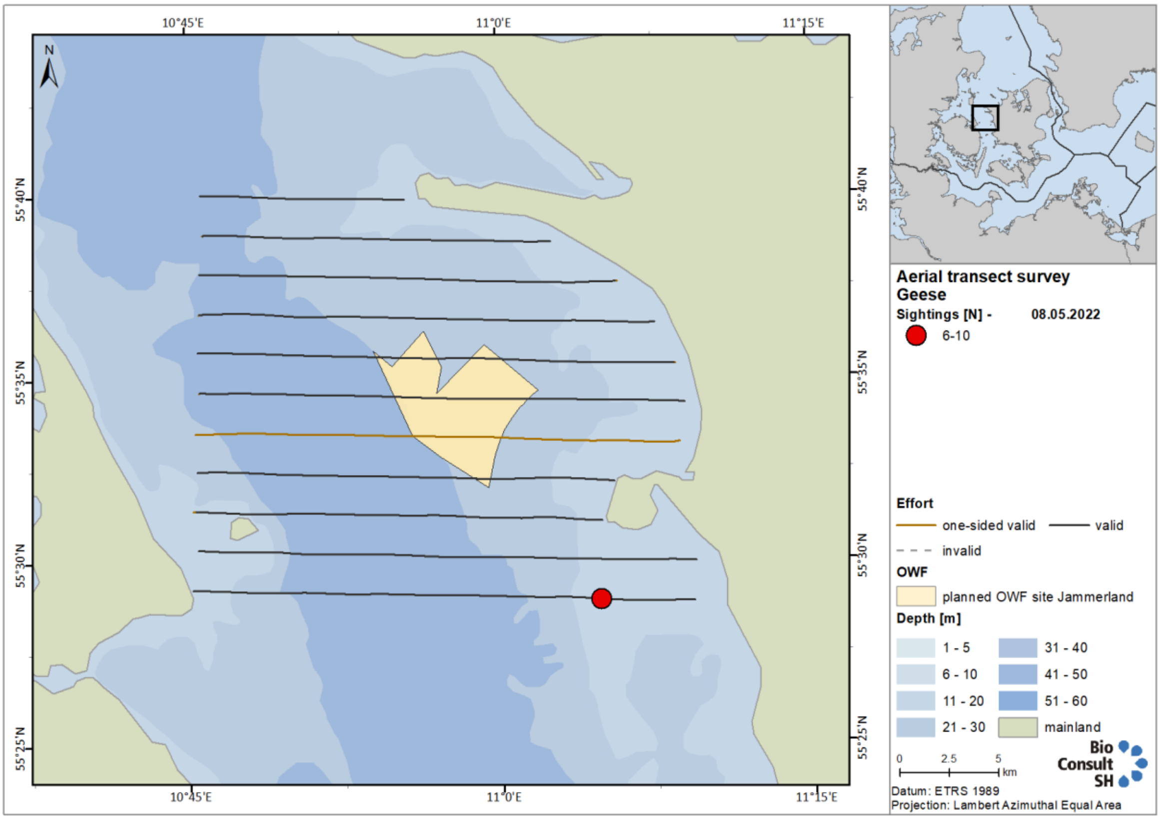

Figure A. 73 Geese distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.8 Dabbling Ducks

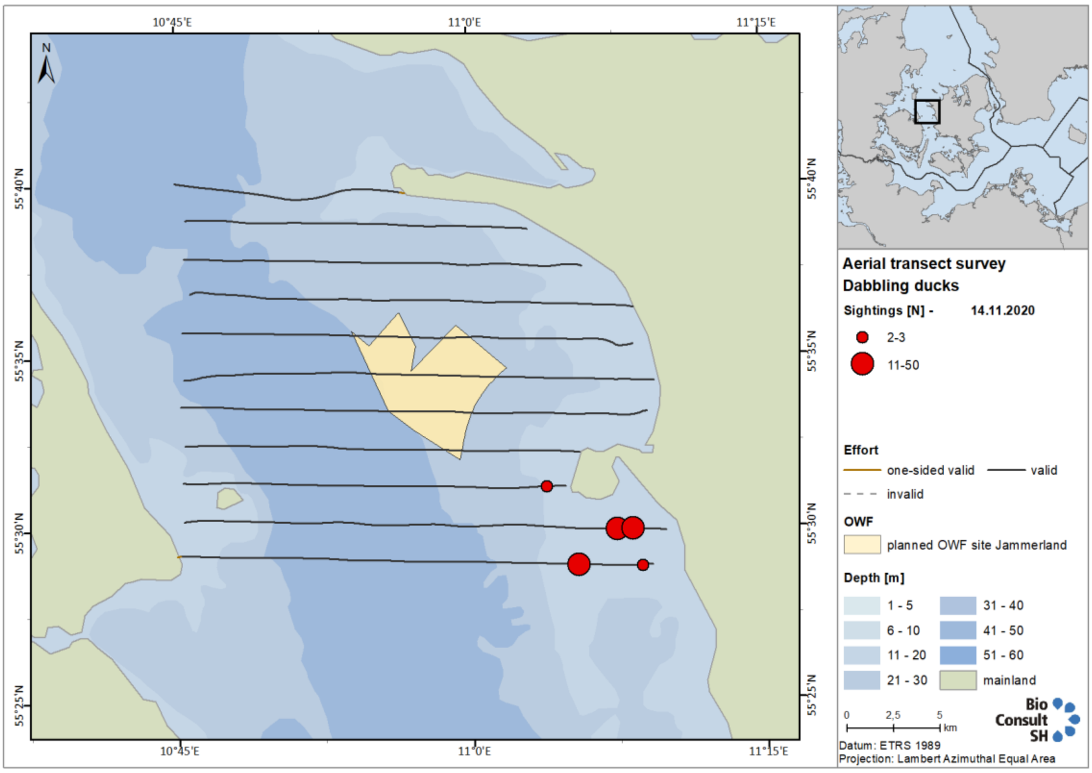

Figure A. 74 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

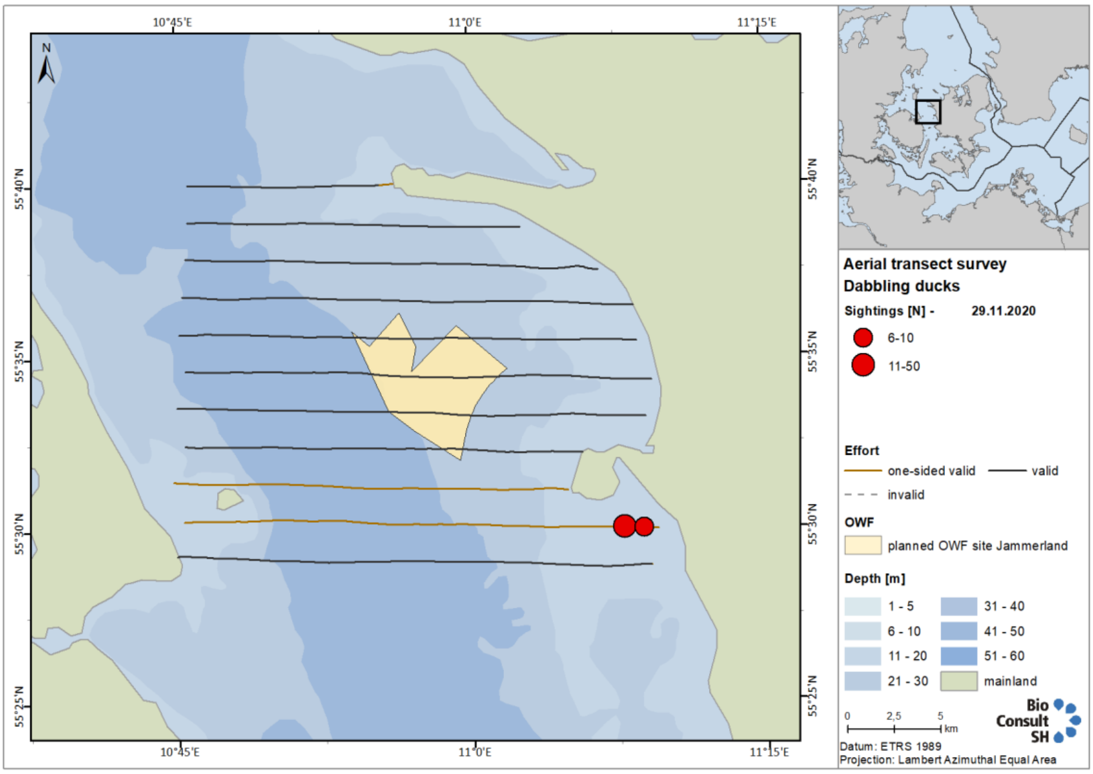

Figure A. 75 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

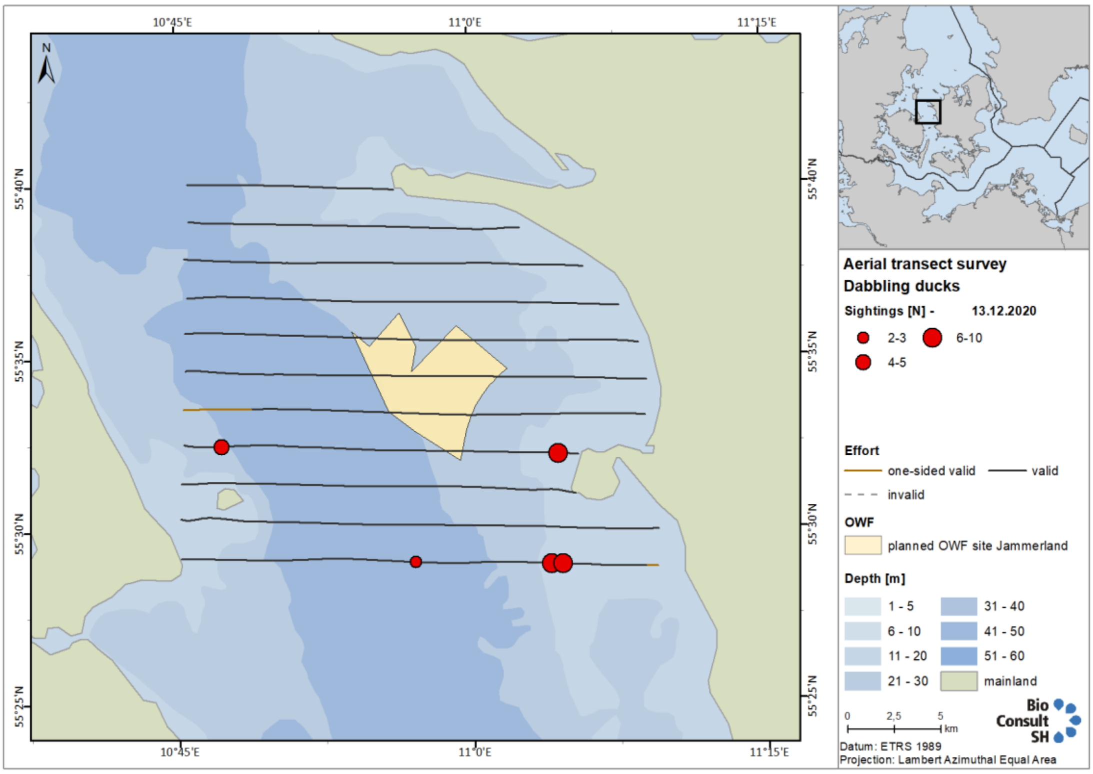

Figure A. 76 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

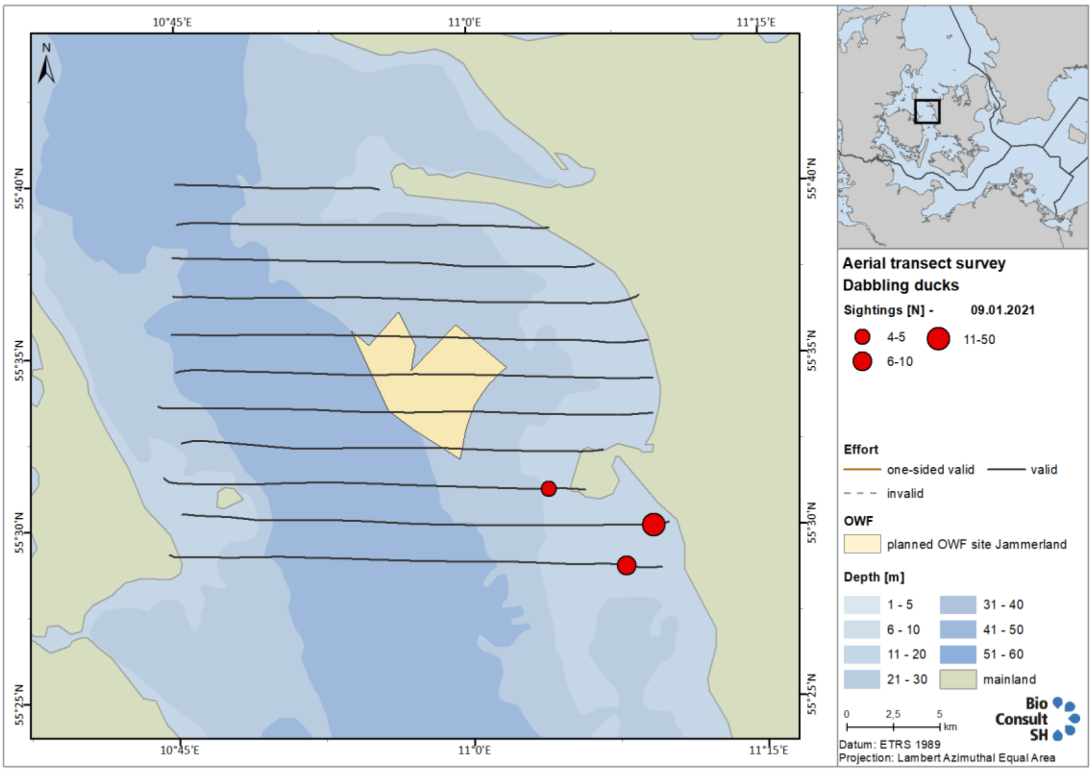

Figure A. 77 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

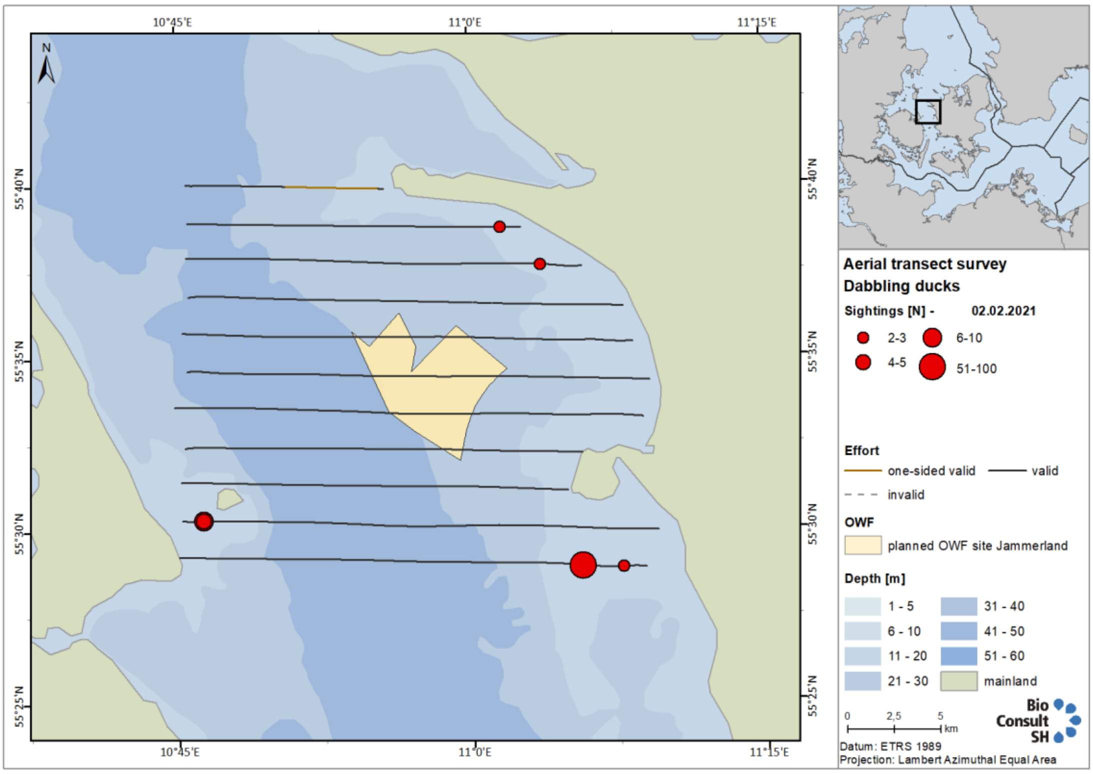

Figure A. 78 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

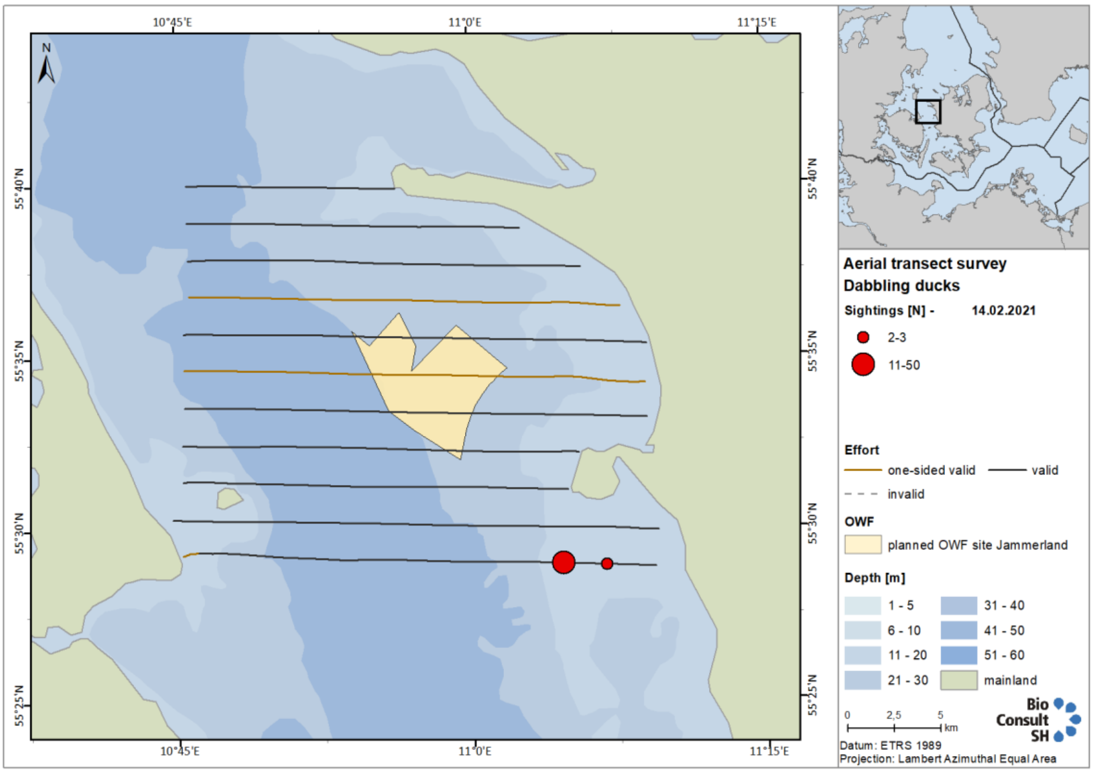

Figure A. 79 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

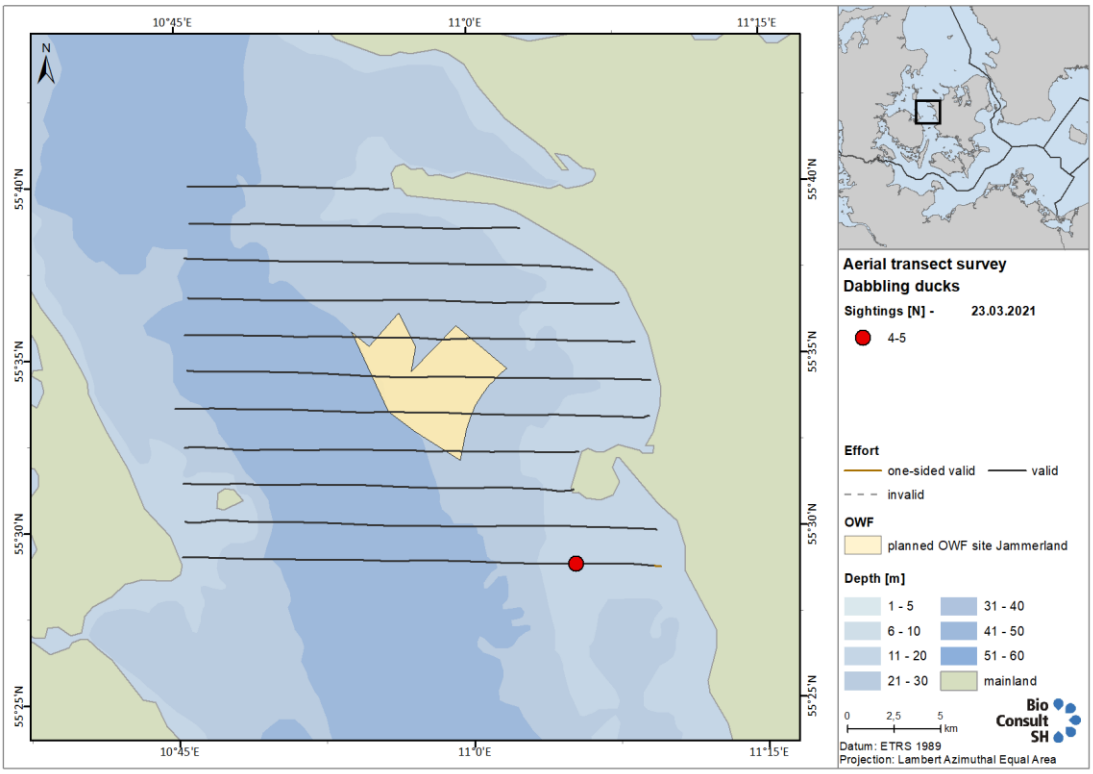

Figure A. 80 Dabbling duck. distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

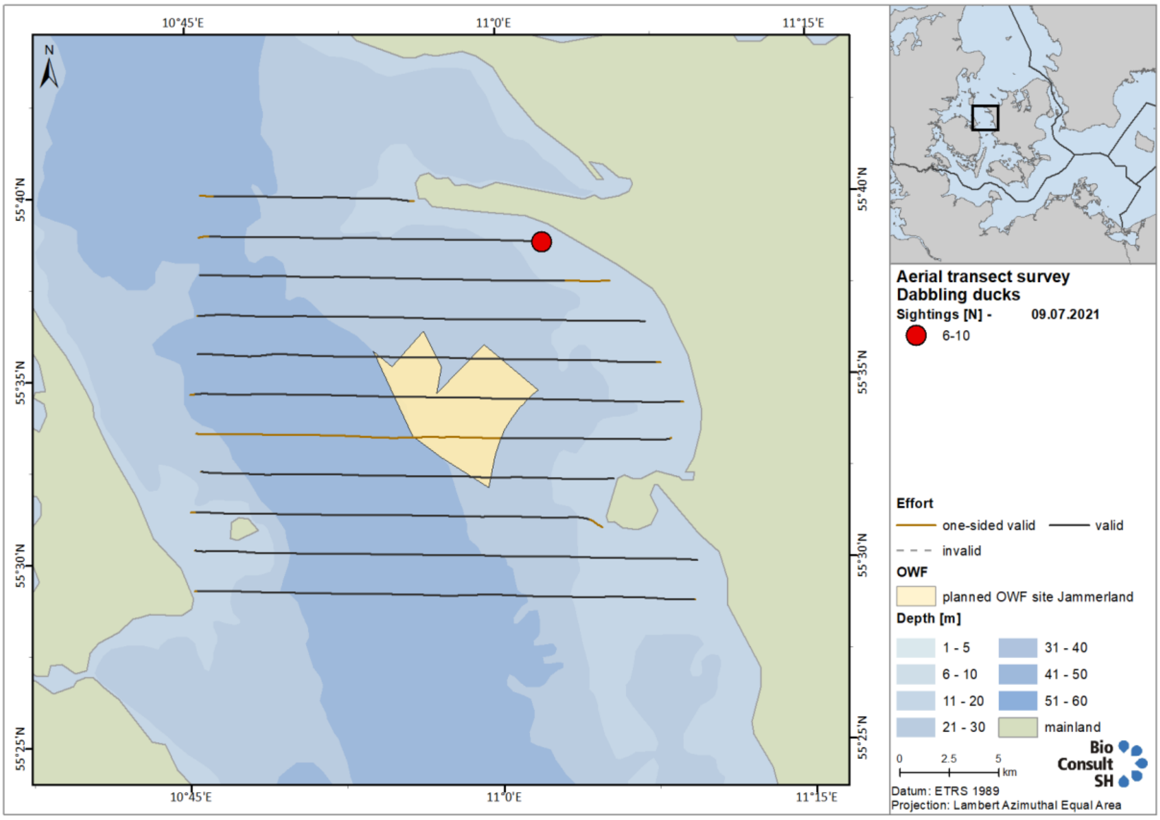

Figure A. 81 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

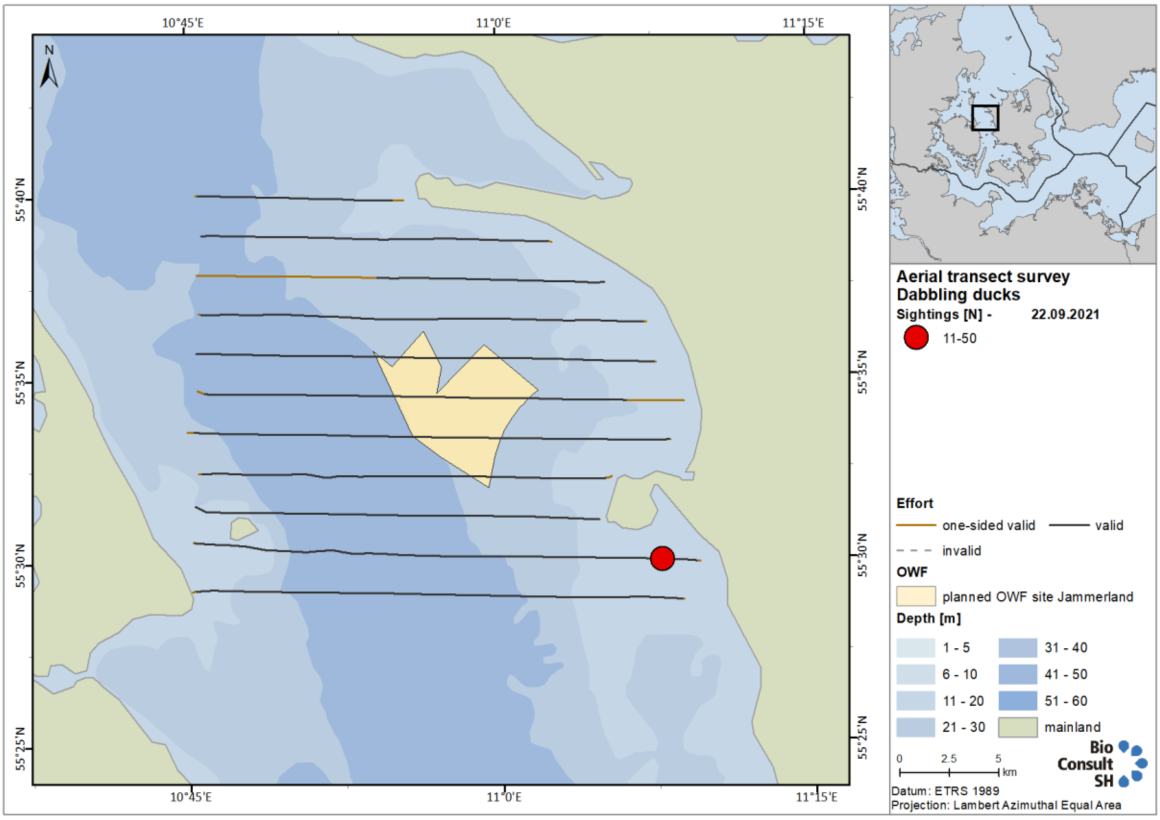

Figure A. 82 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

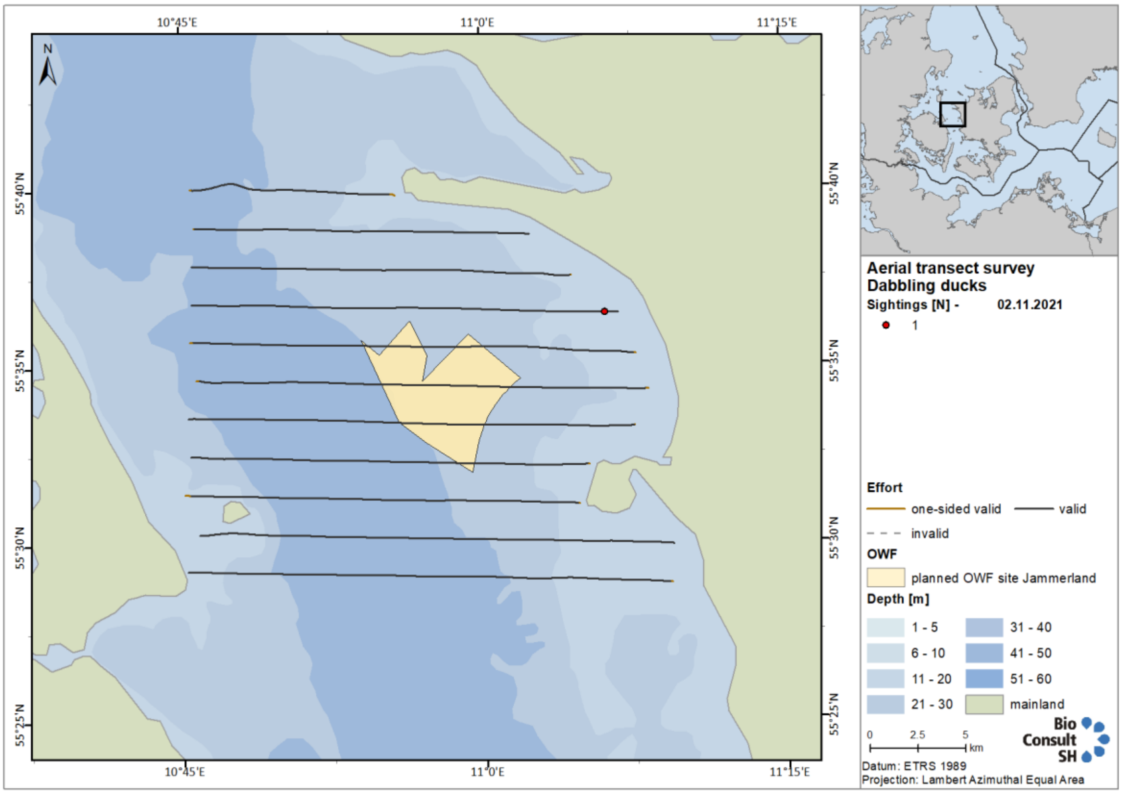

Figure A. 83 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

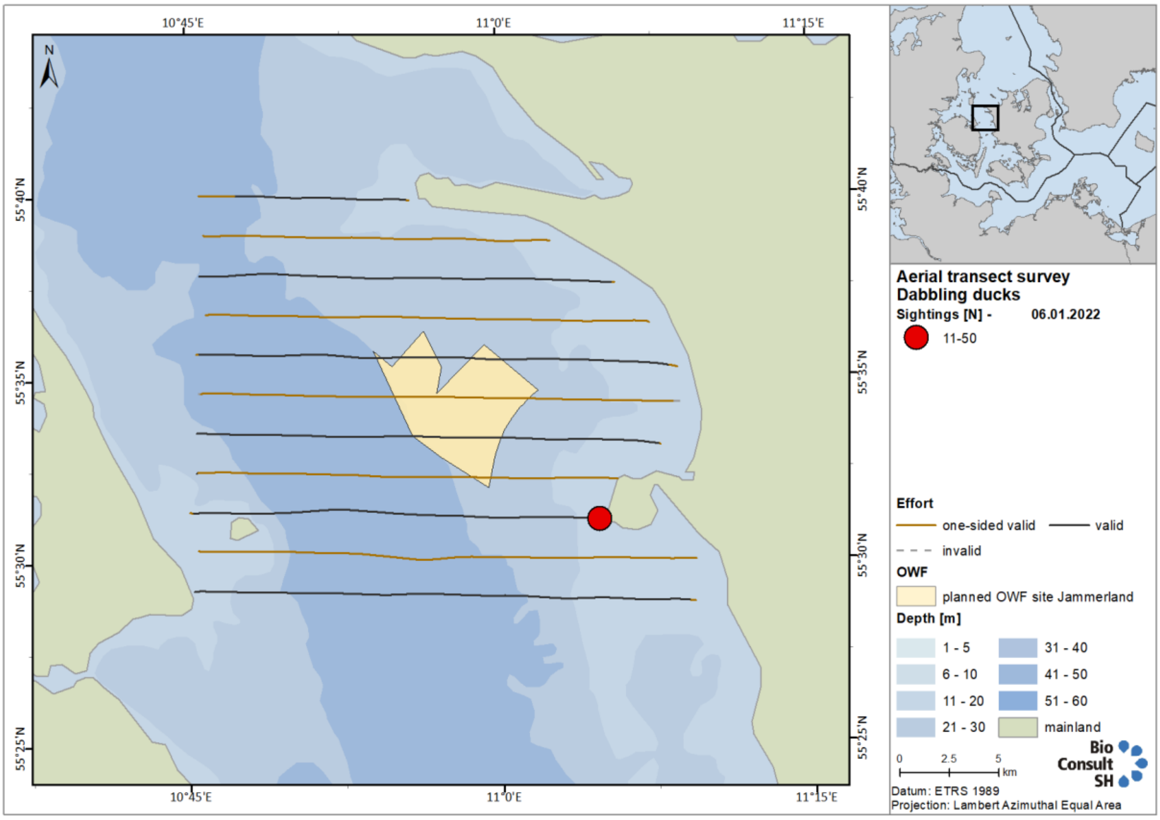

Figure A. 84 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

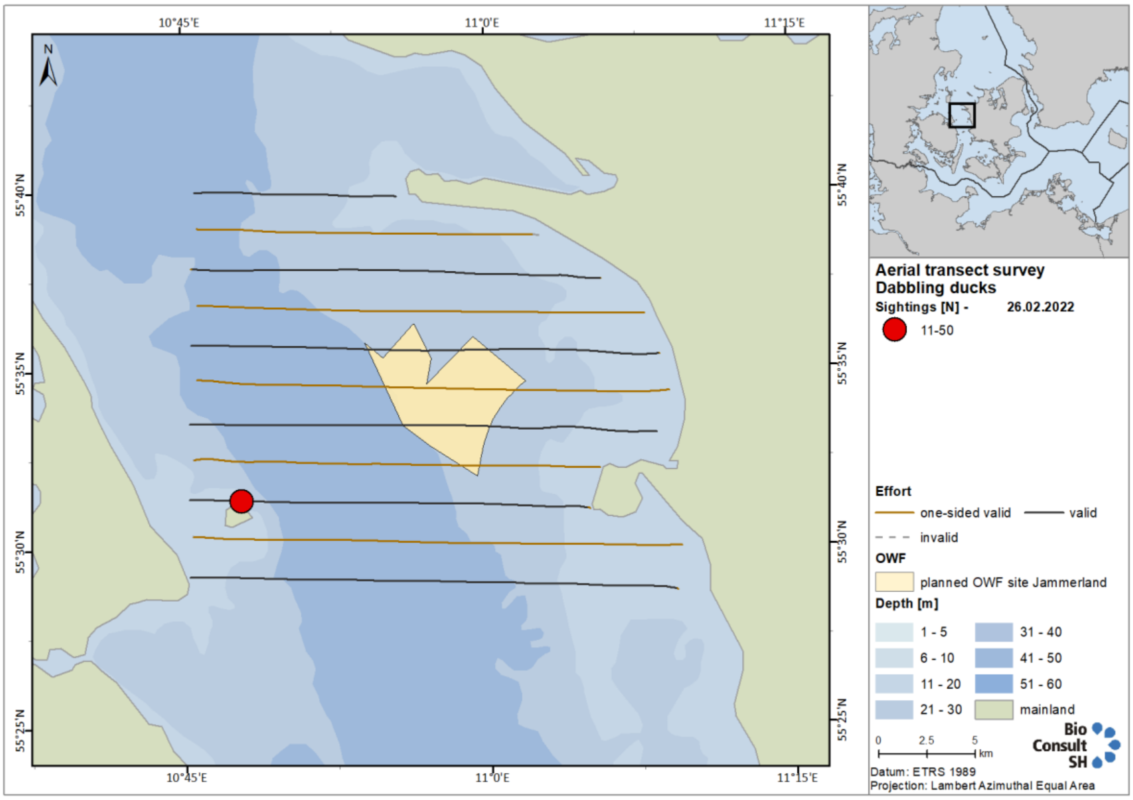

Figure A. 85 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

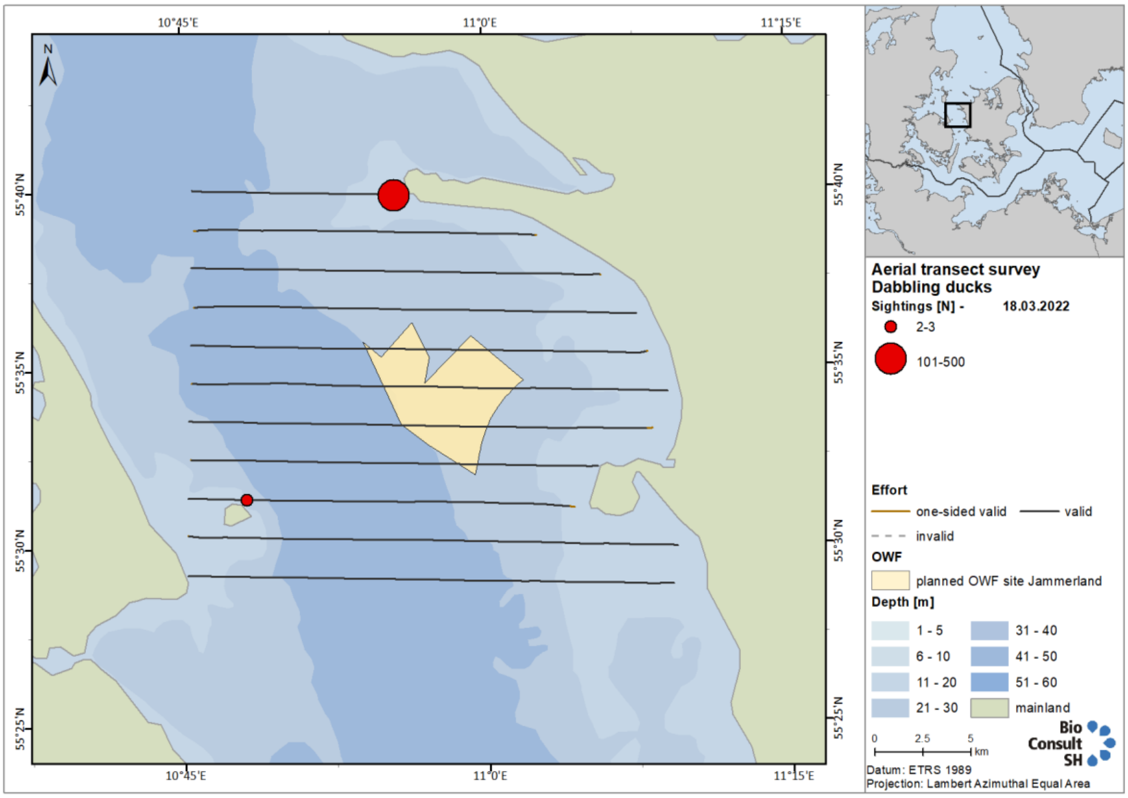

Figure A. 86 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

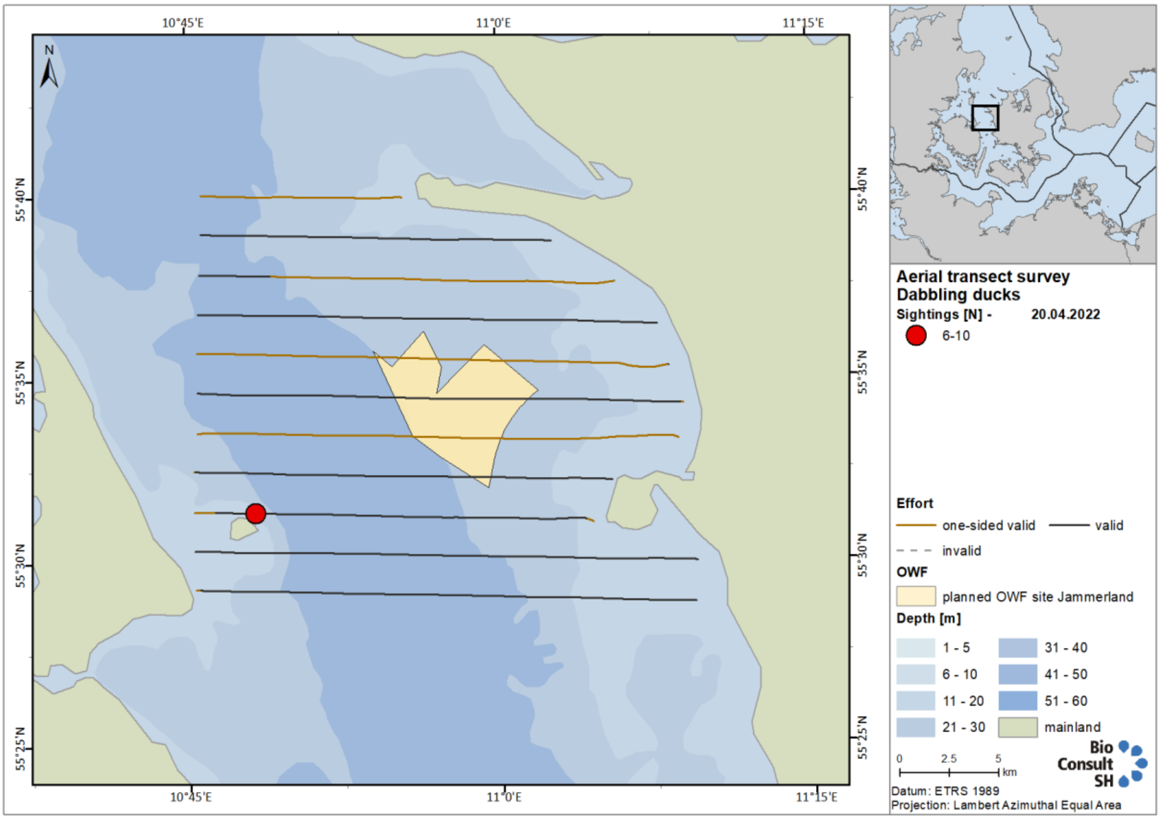

Figure A. 87 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

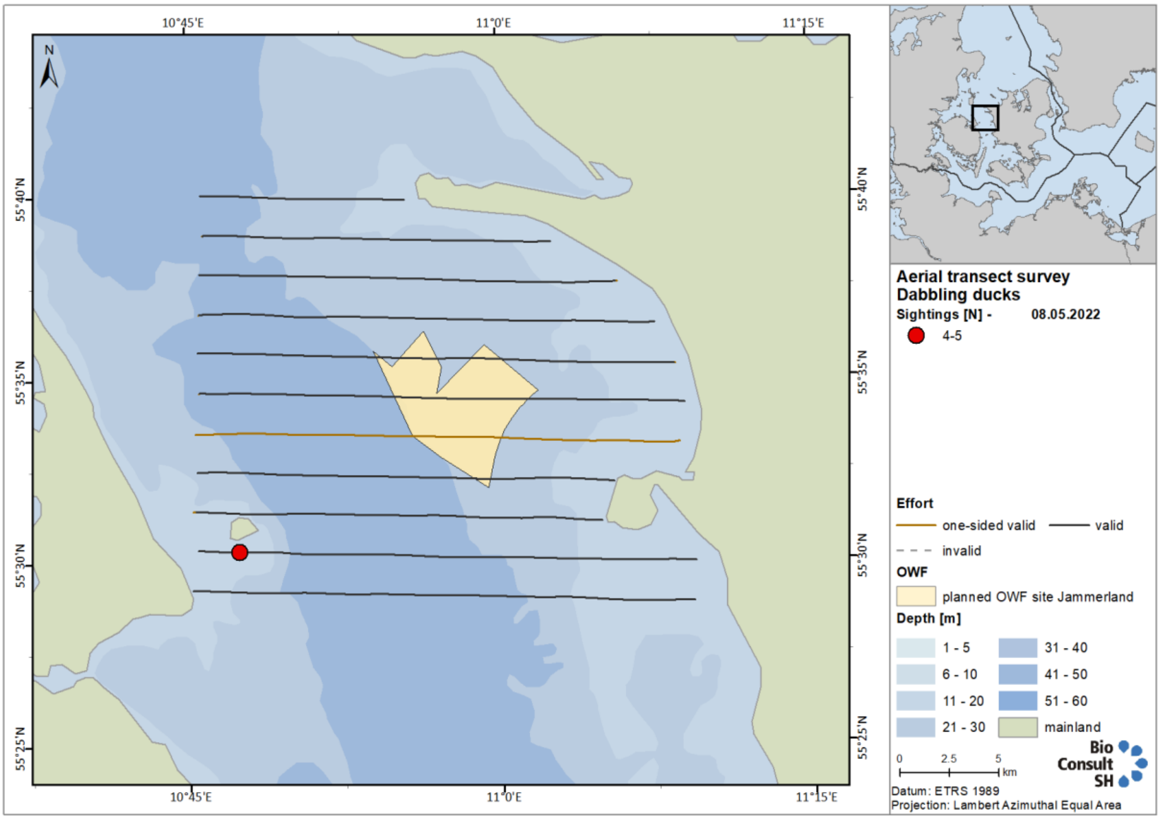

Figure A. 88 Dabbling duck distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.9 Mallard

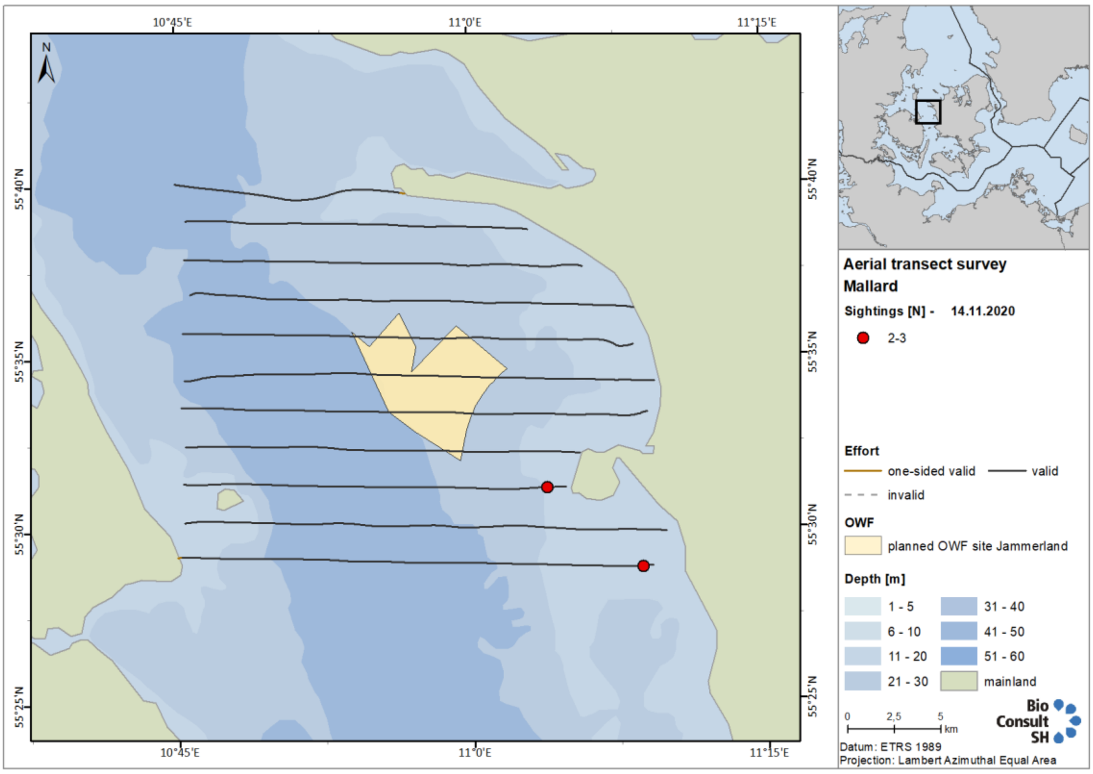

Figure A. 89 Mallard distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

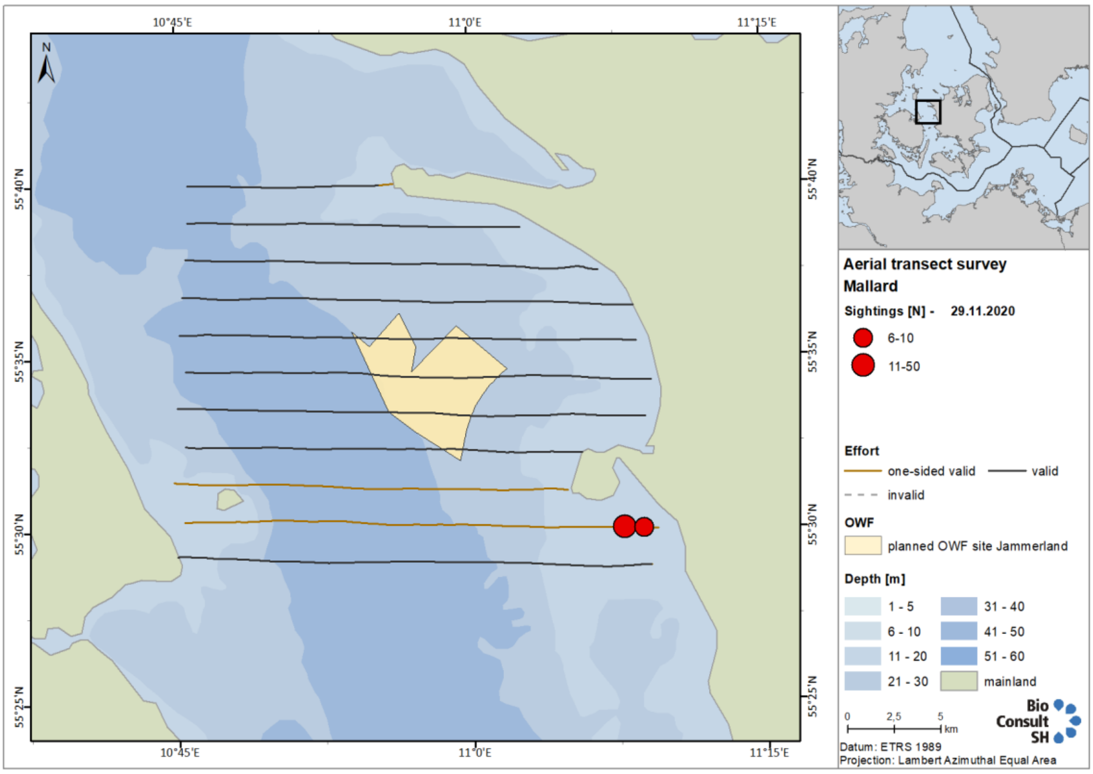

Figure A. 90 Mallard distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

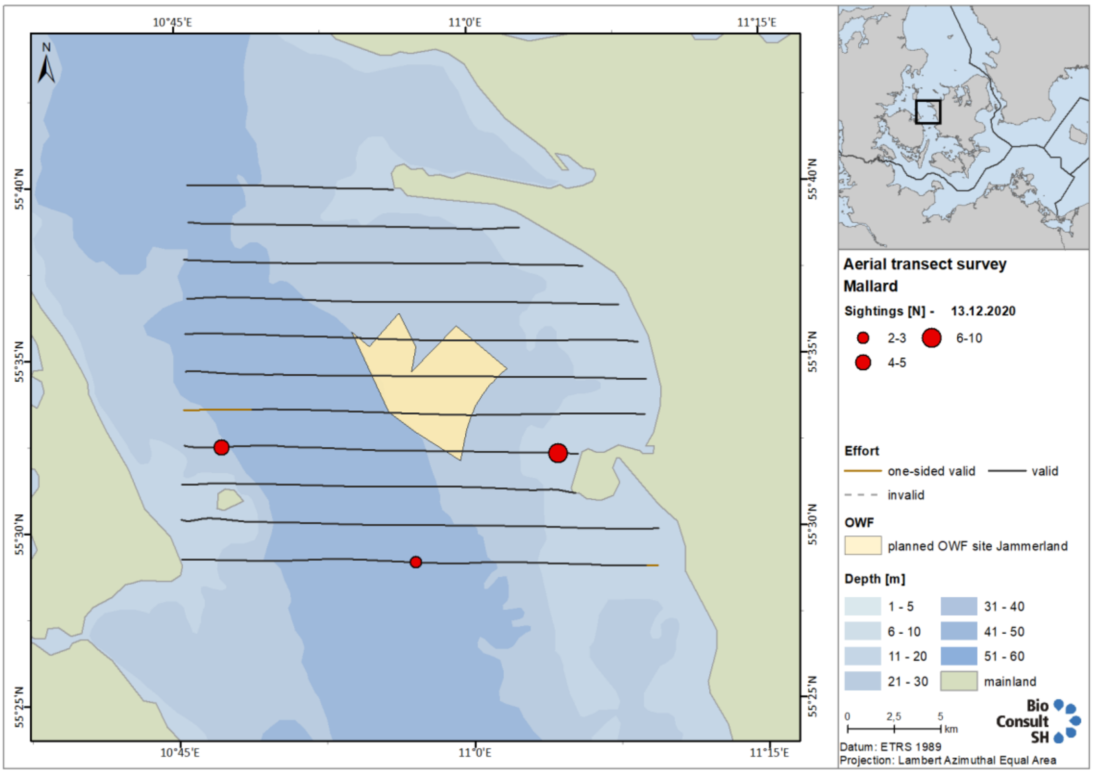

Figure A. 91 Mallard distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

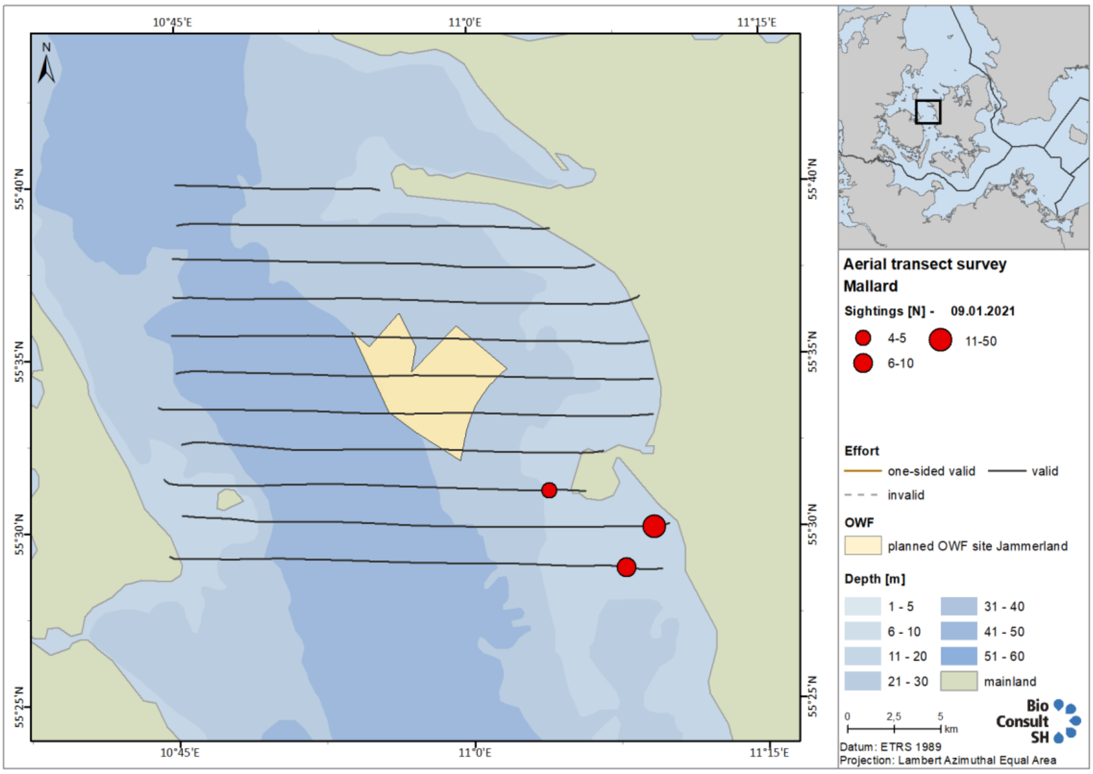

Figure A. 92 Mallard distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

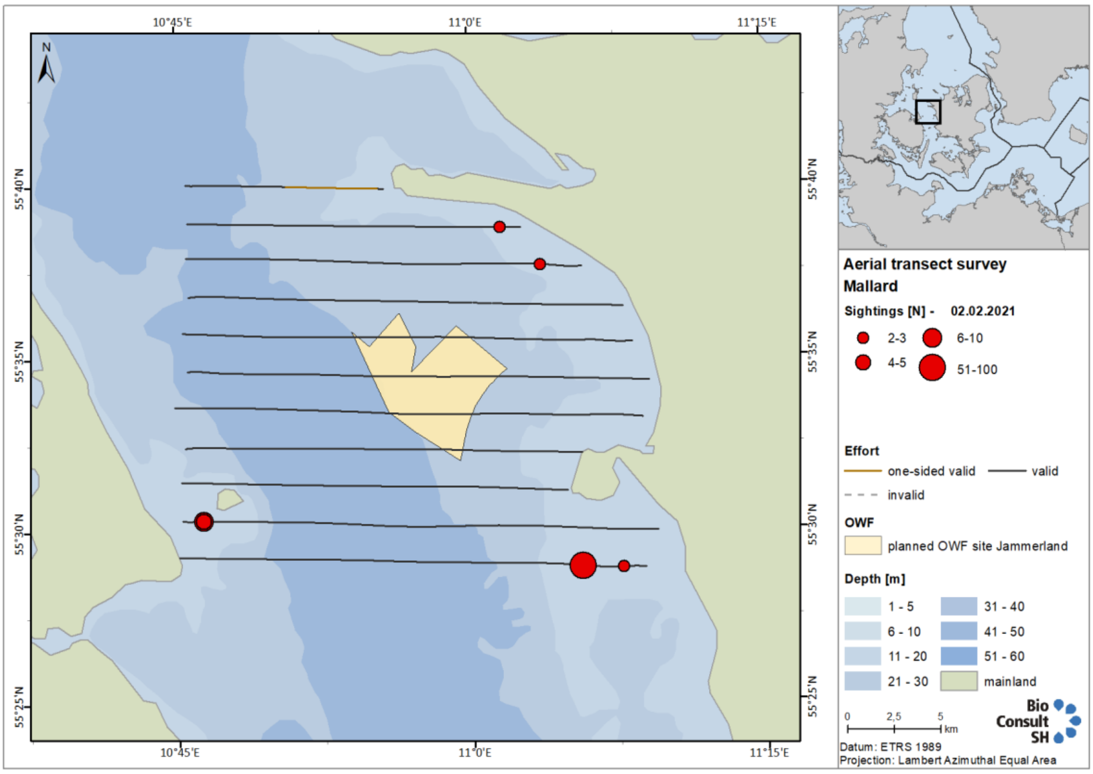

Figure A. 93 Mallard distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

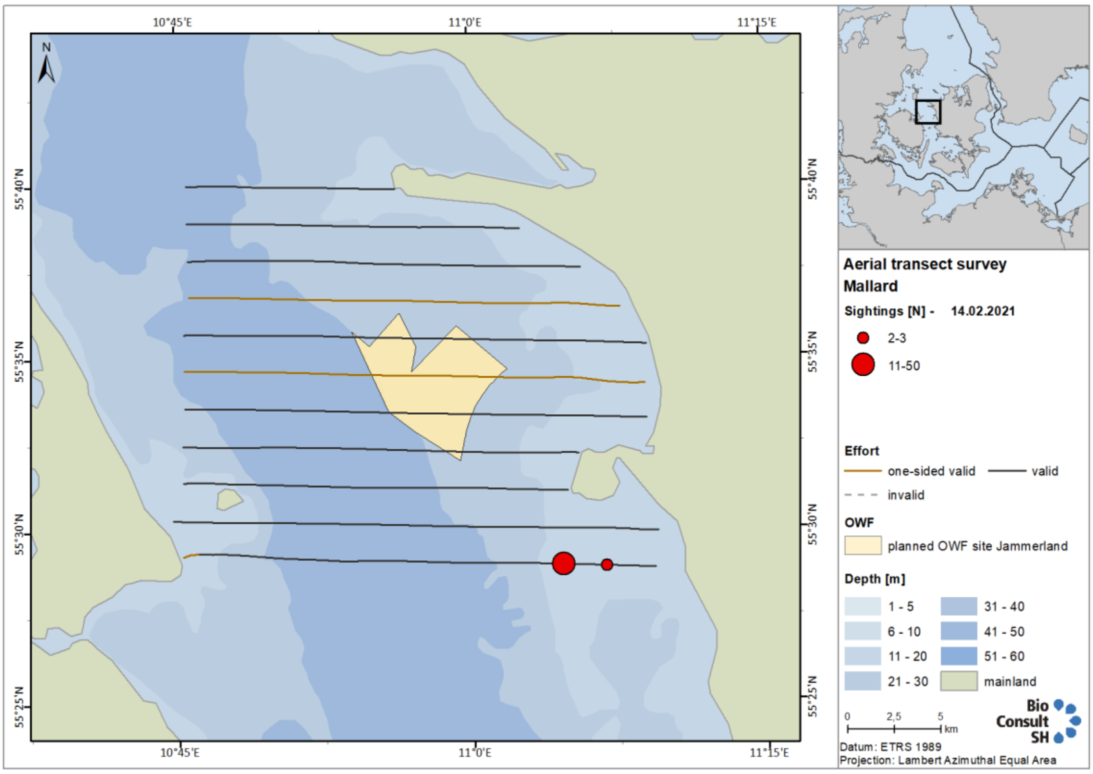

Figure A. 94 Mallard distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

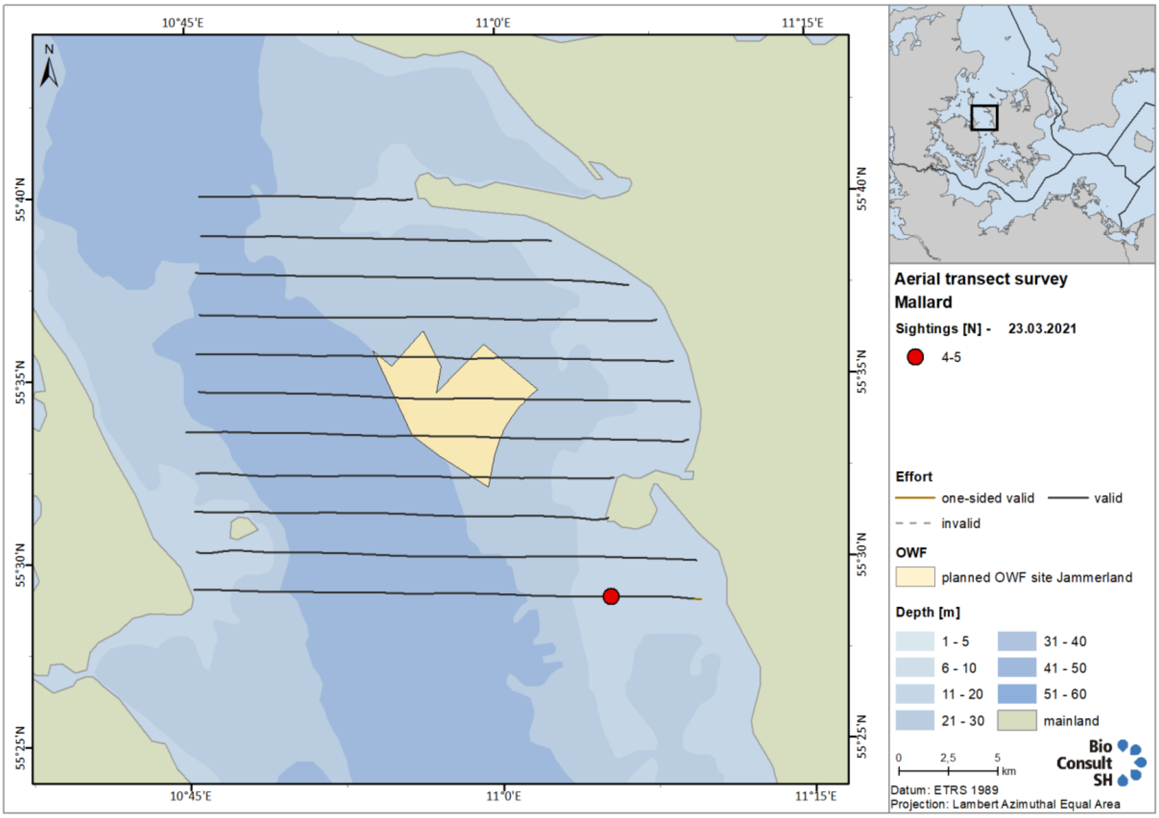

Figure A. 95 Mallard distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

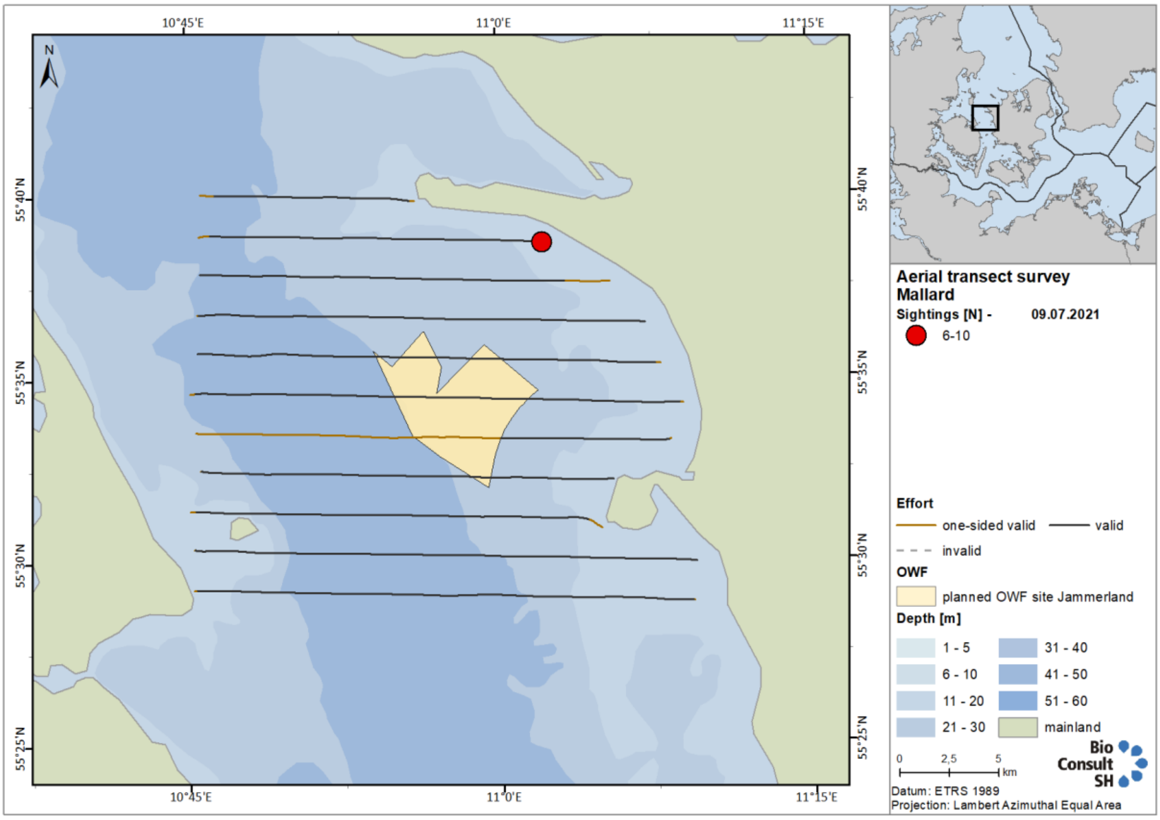

Figure A. 96 Mallard distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

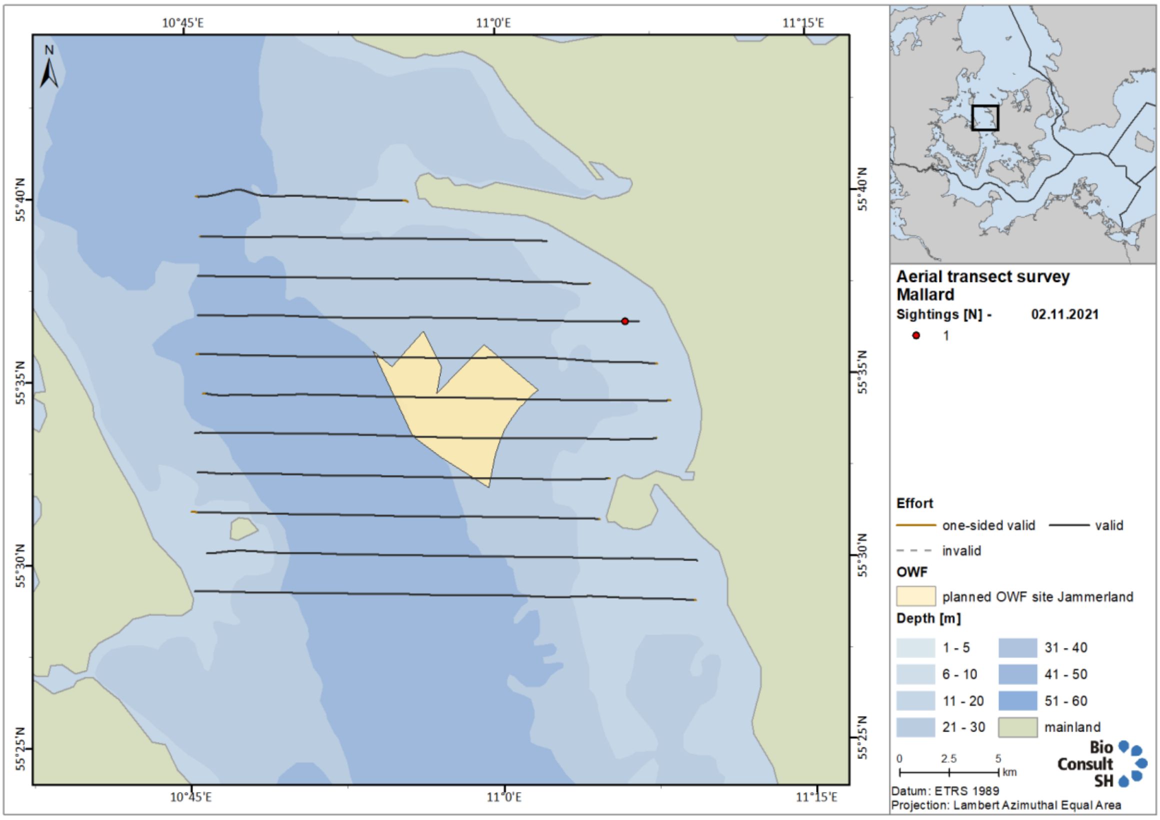

Figure A. 97 Mallard distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

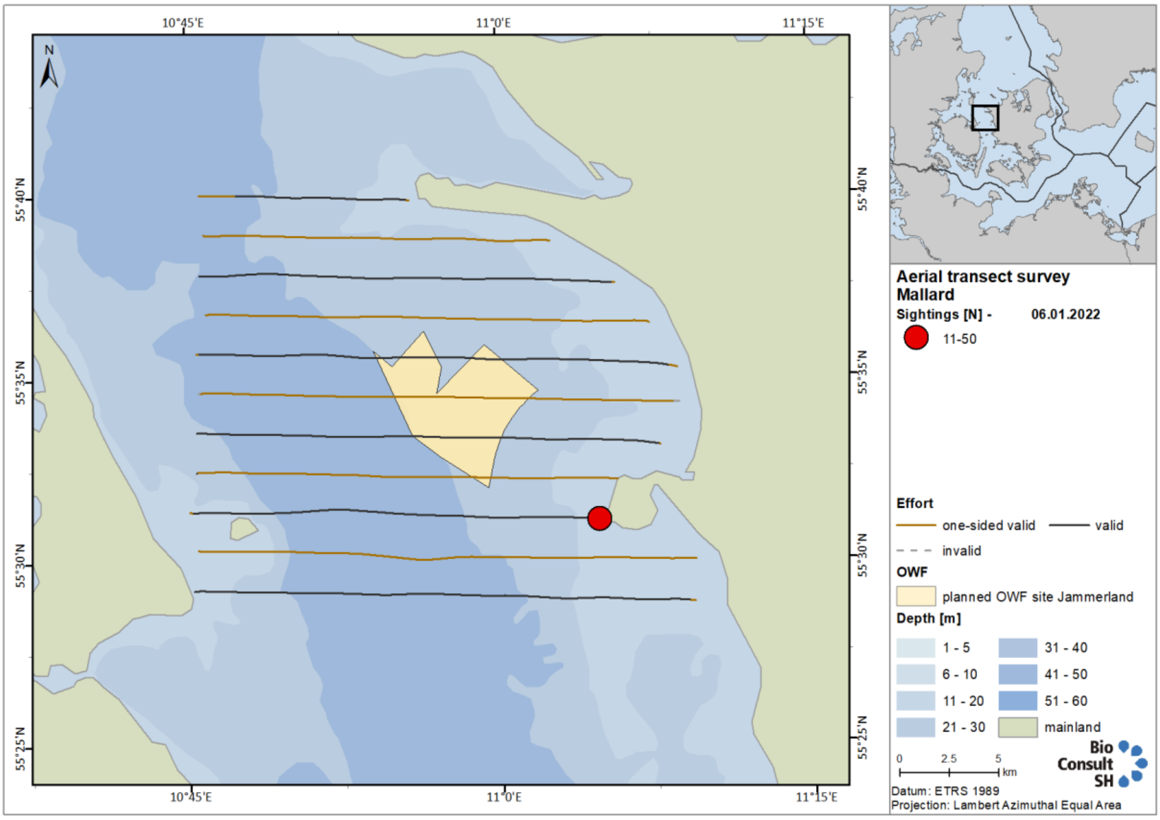

Figure A. 98 Mallard distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

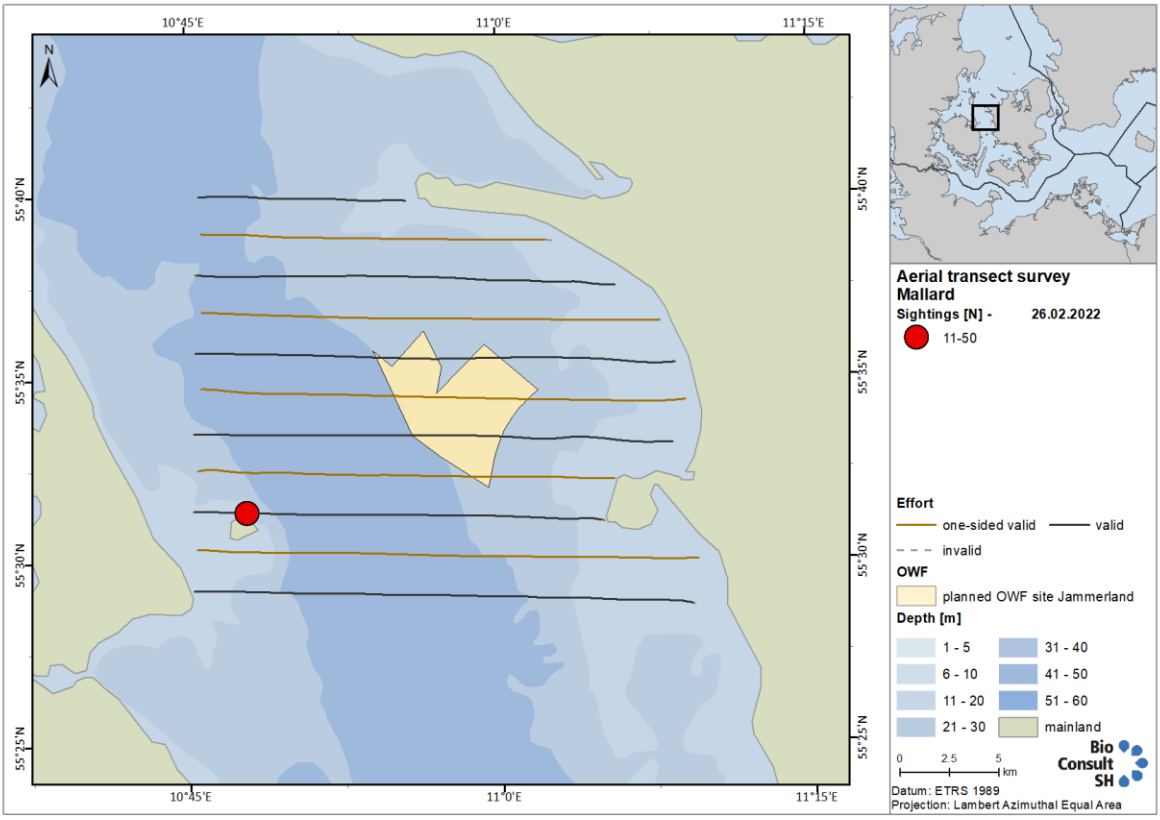

Figure A. 99 Mallard distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

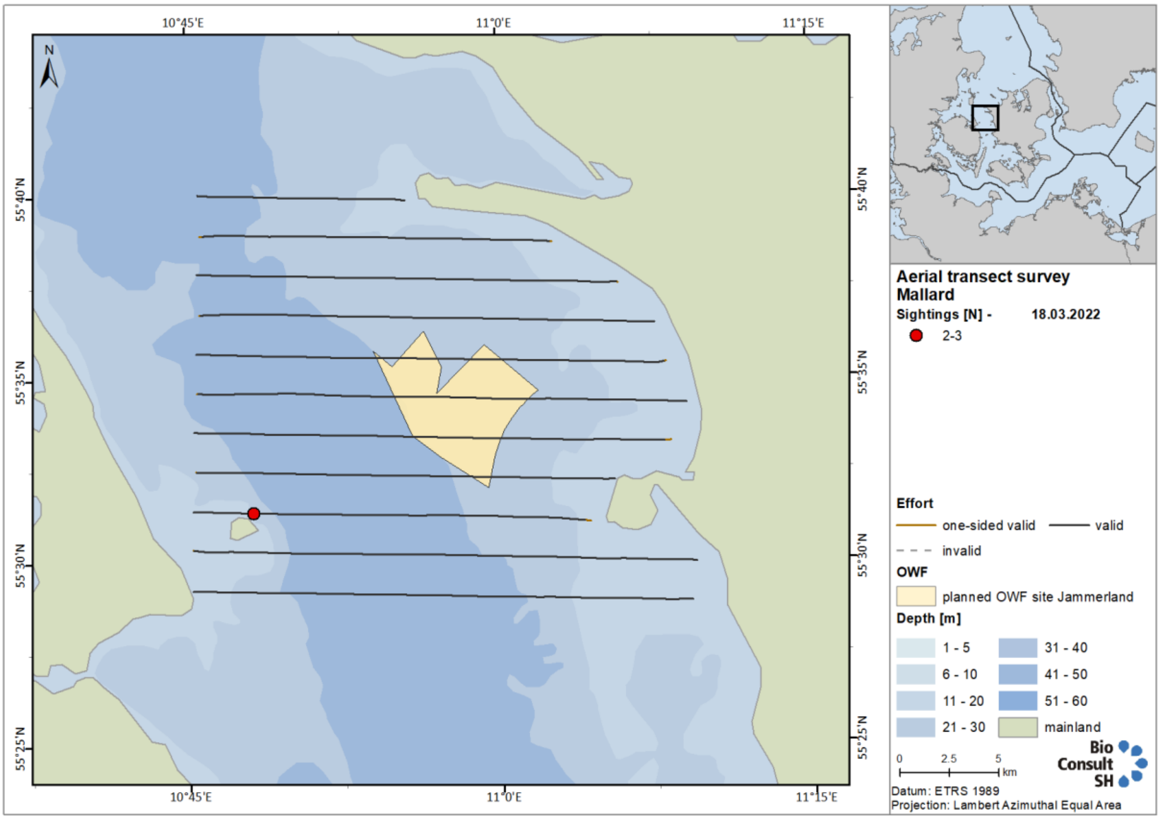

Figure A. 100 Mallard distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

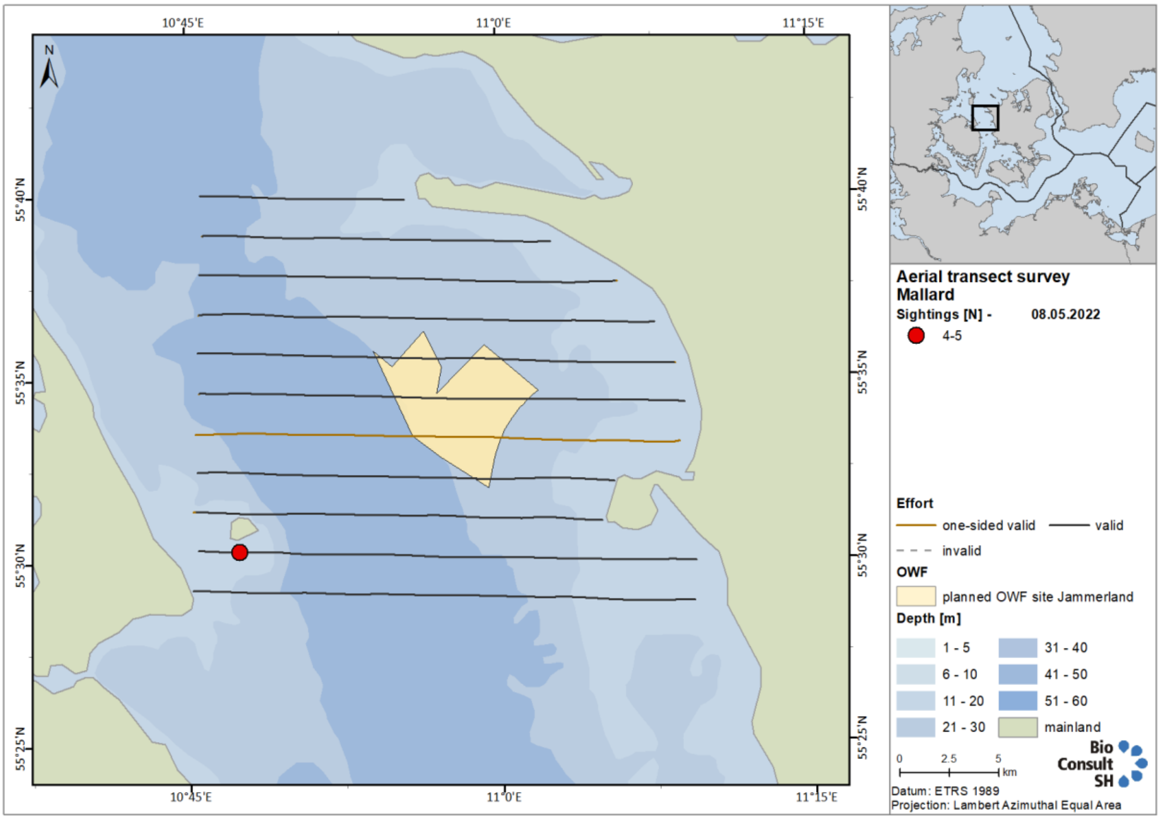

Figure A. 101 Mallard distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.10 Common Eider

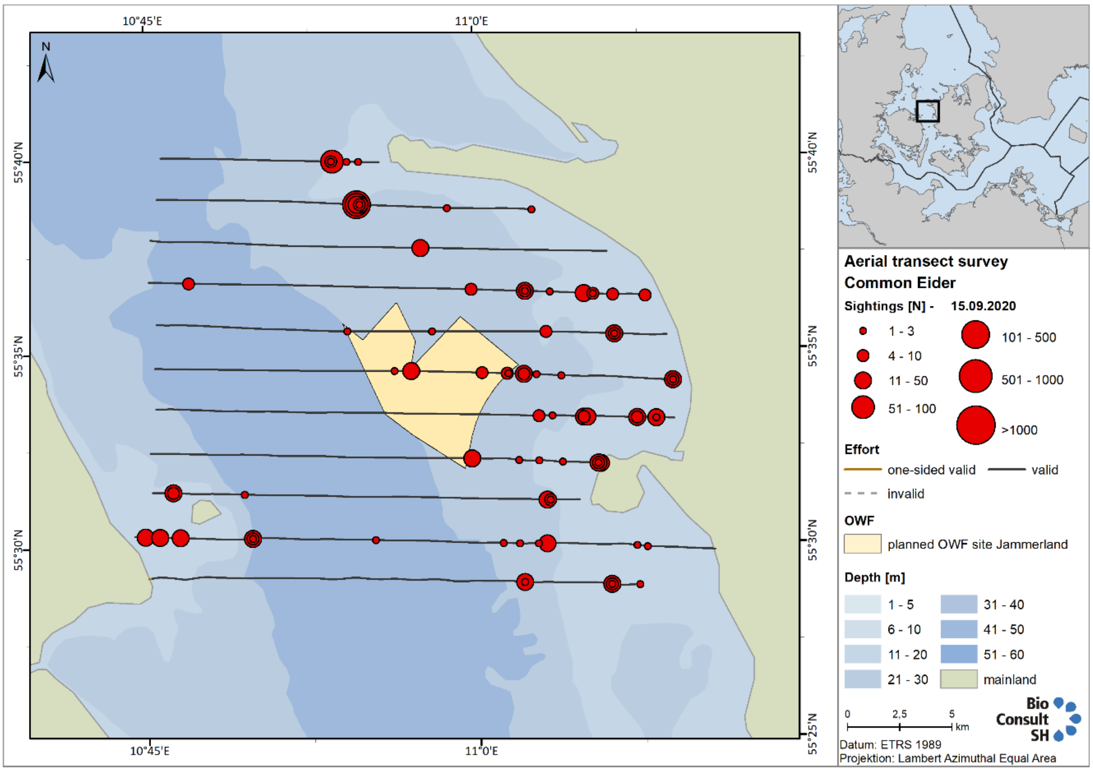

Figure A. 102 Common Eider distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

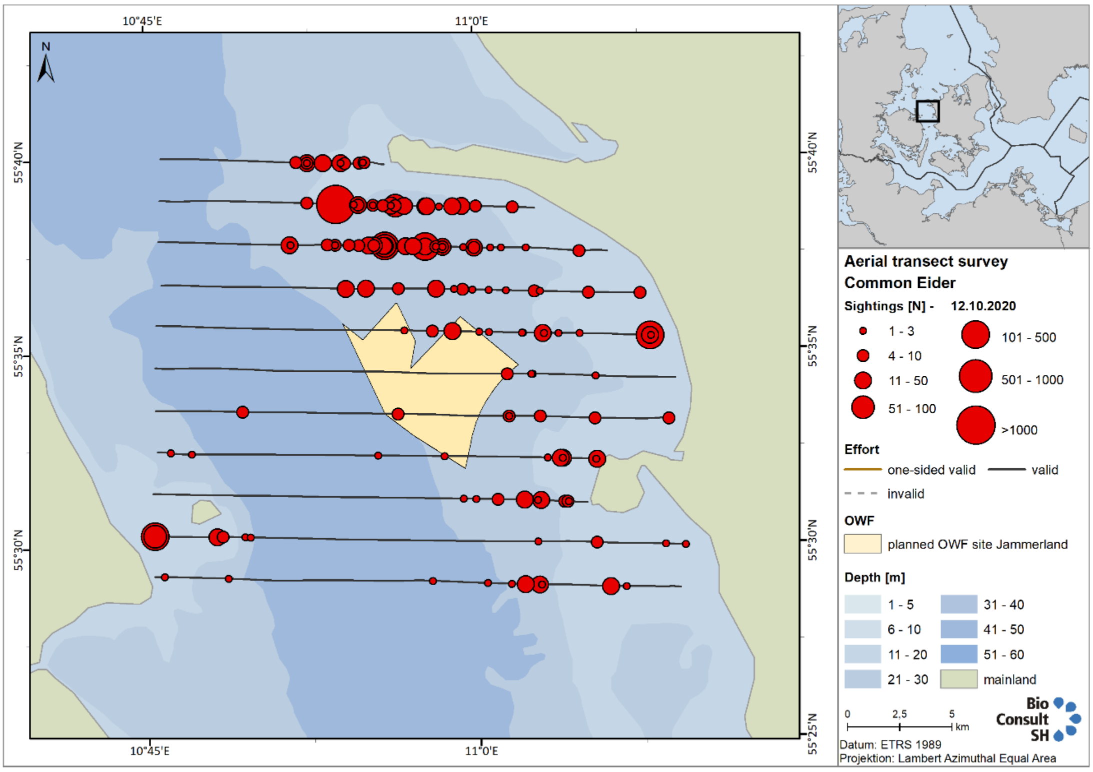

Figure A. 103 Common Eider distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

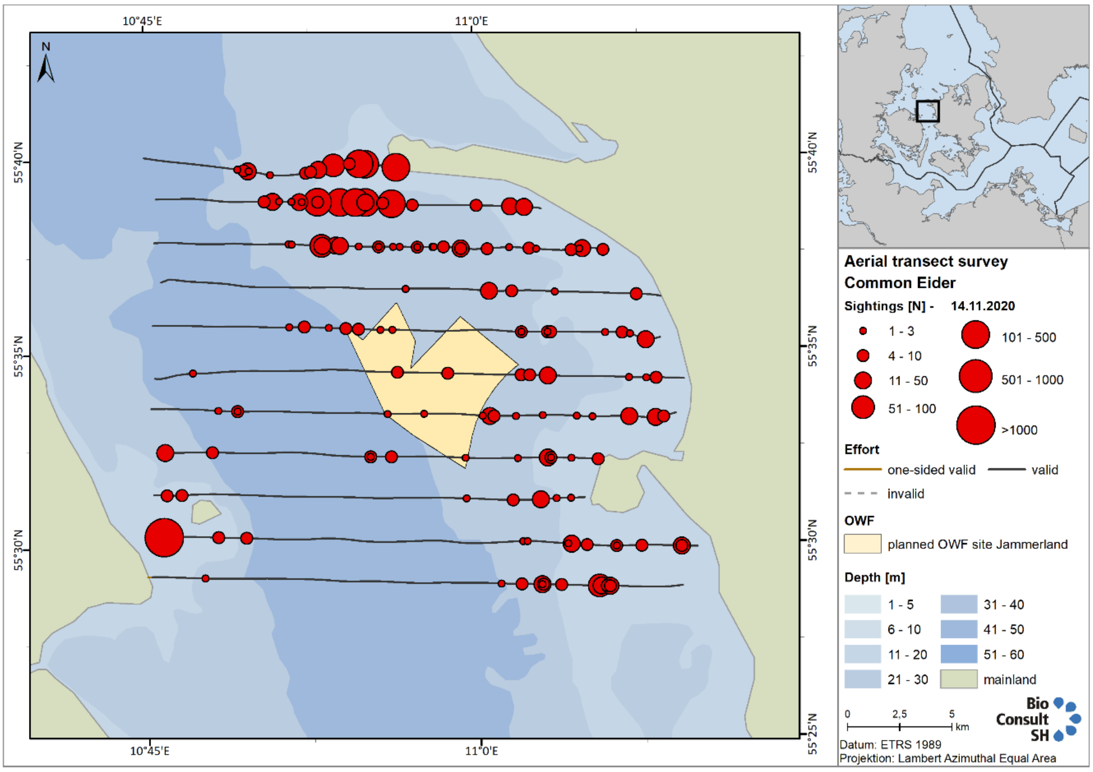

Figure A. 104 Common Eider distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

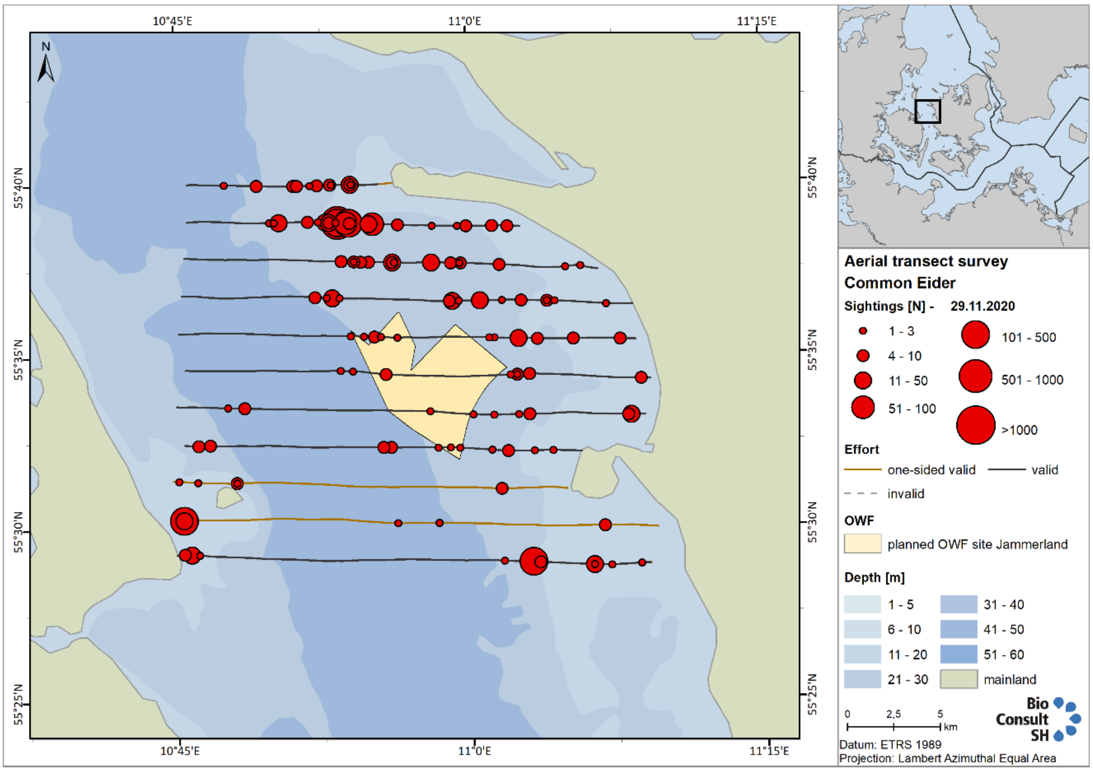

Figure A. 105 Common Eider distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

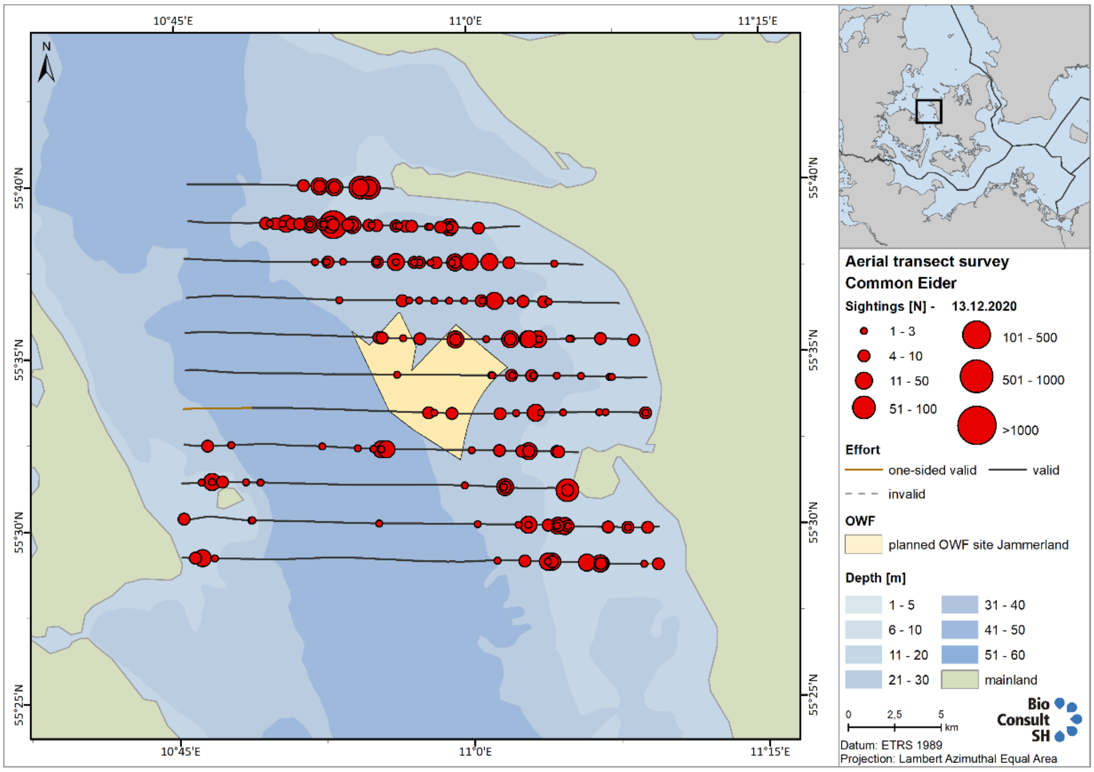

Figure A. 106 Common Eider distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

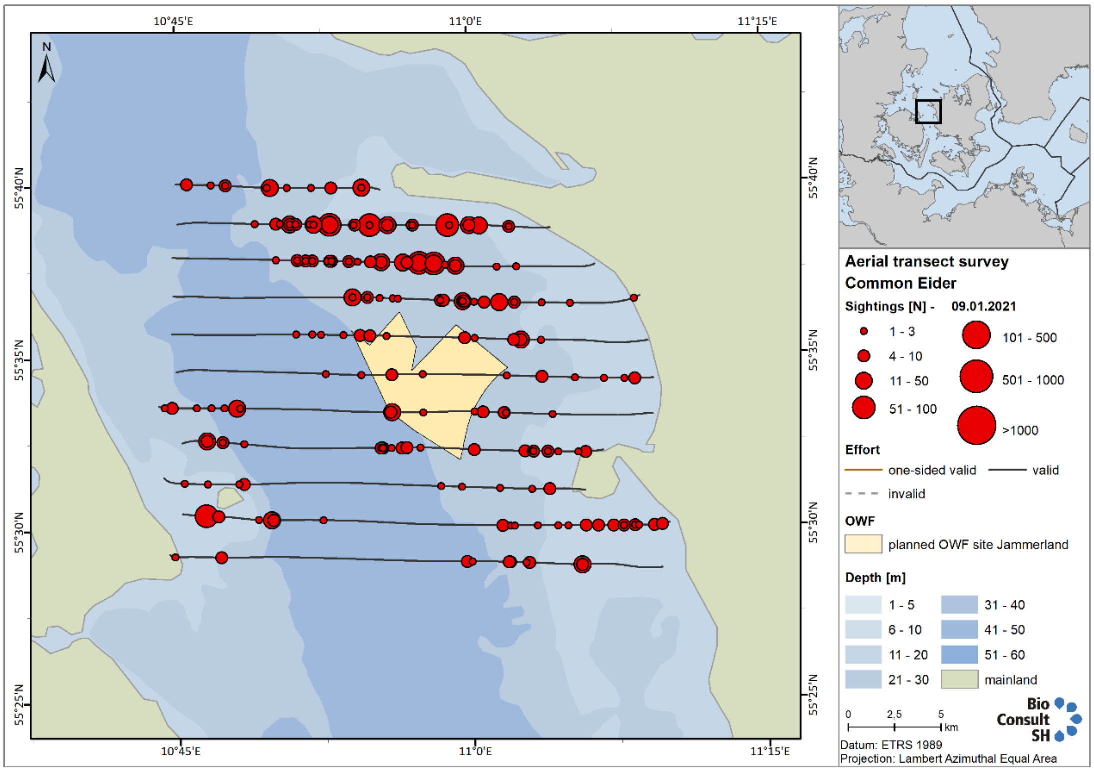

Figure A. 107 Common Eider distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

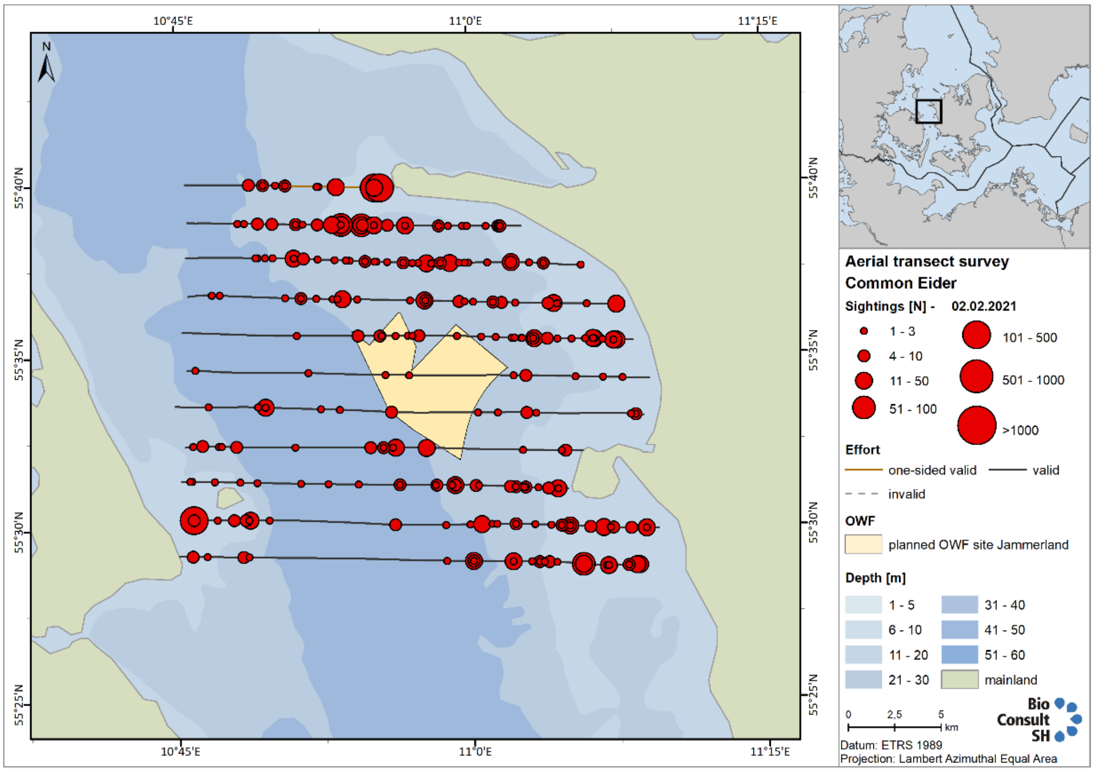

Figure A. 108 Common Eider distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

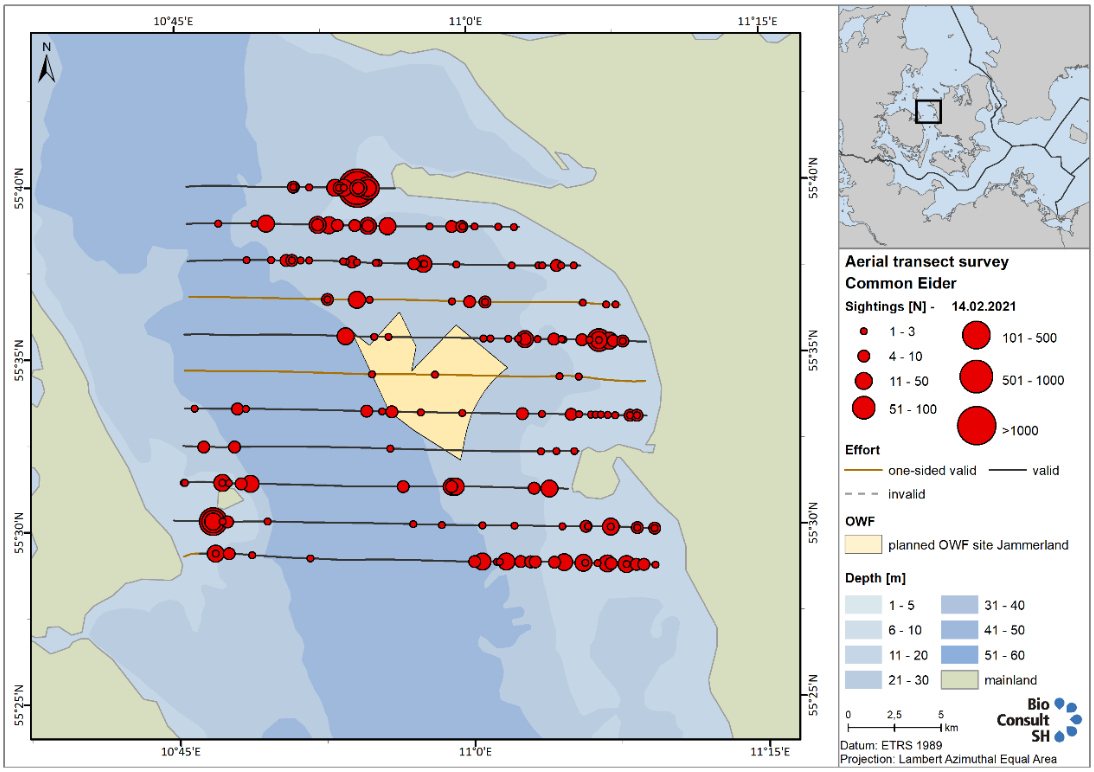

Figure A. 109 Common Eider distribution in the Jammerland area during the aerial survey on 14th February 2021.

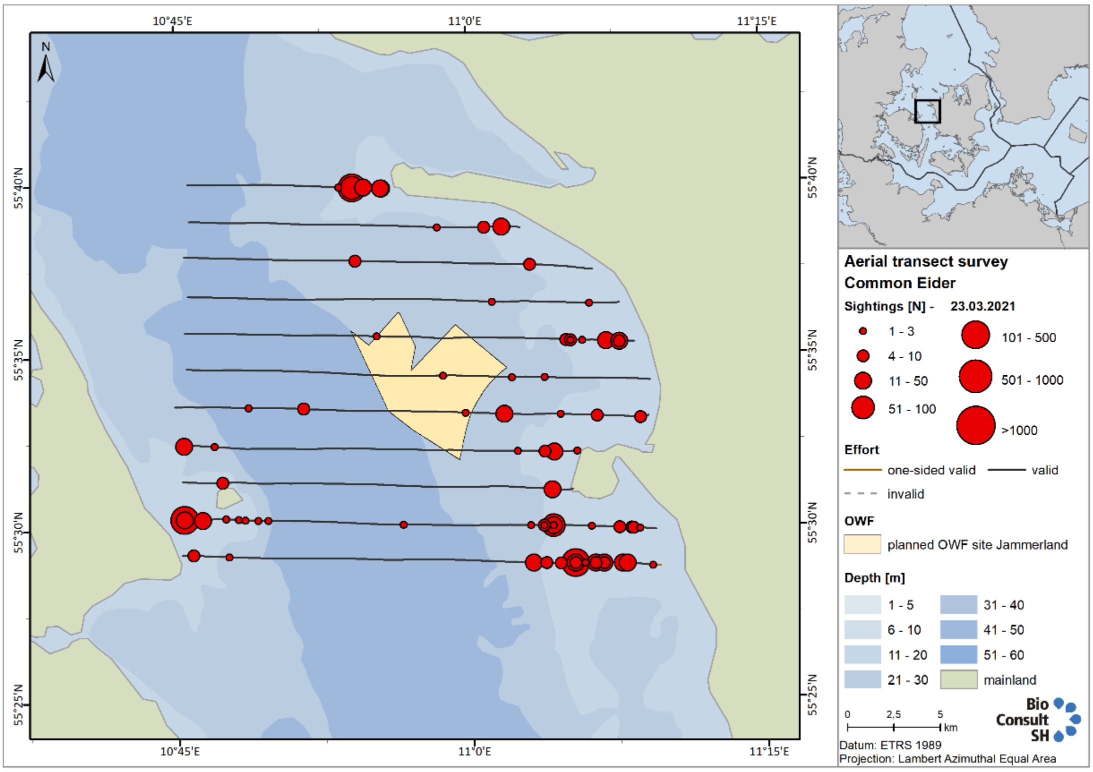

Figure A. 110 Common Eider distribution in the Jammerland area during the aerial survey on 23rd March 2021.

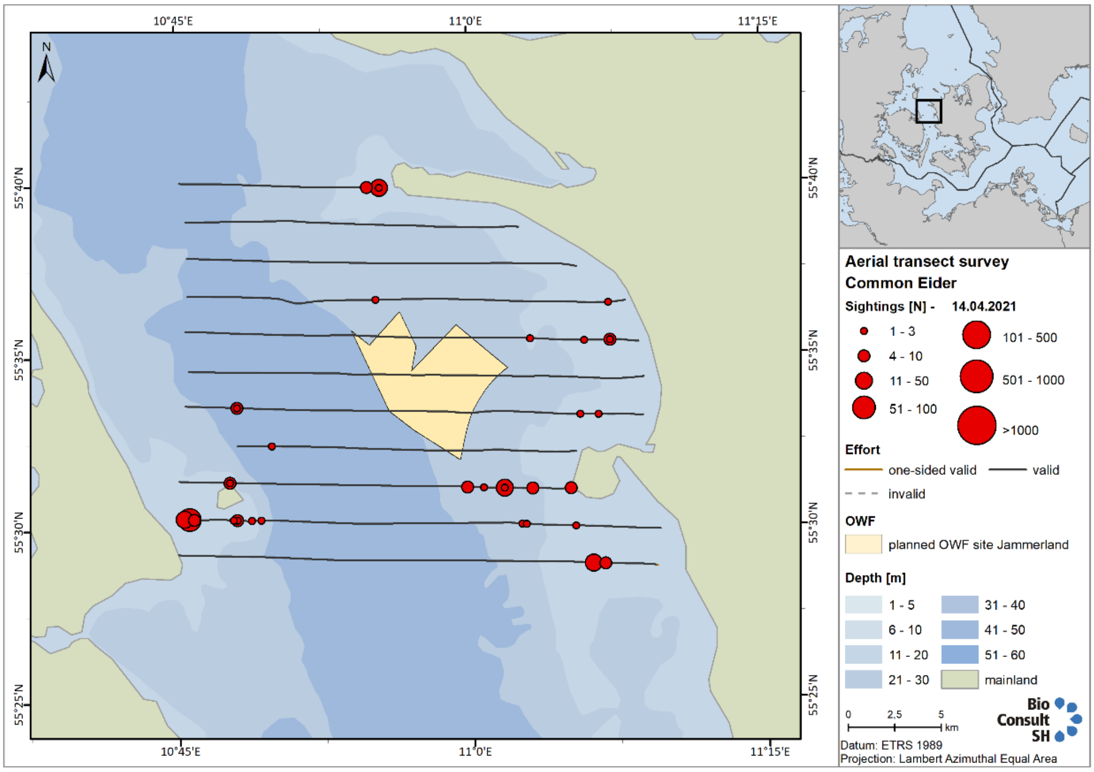

Figure A. 111 Common Eider distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

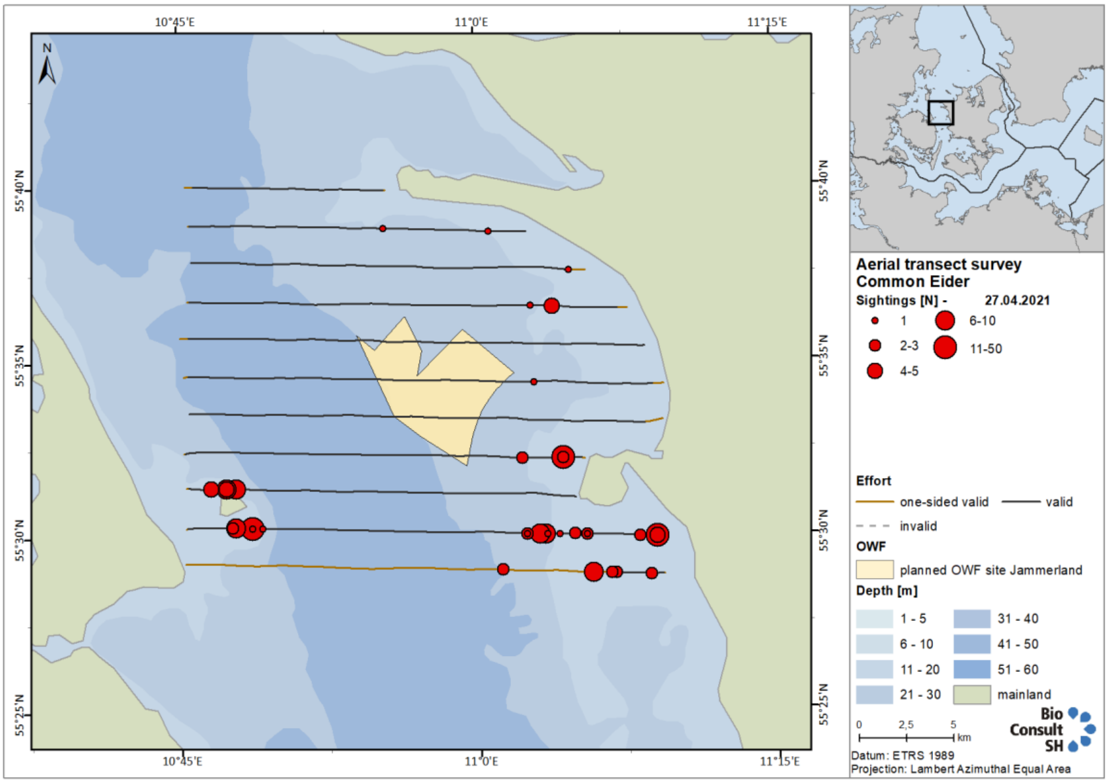

Figure A. 112 Common Eider distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

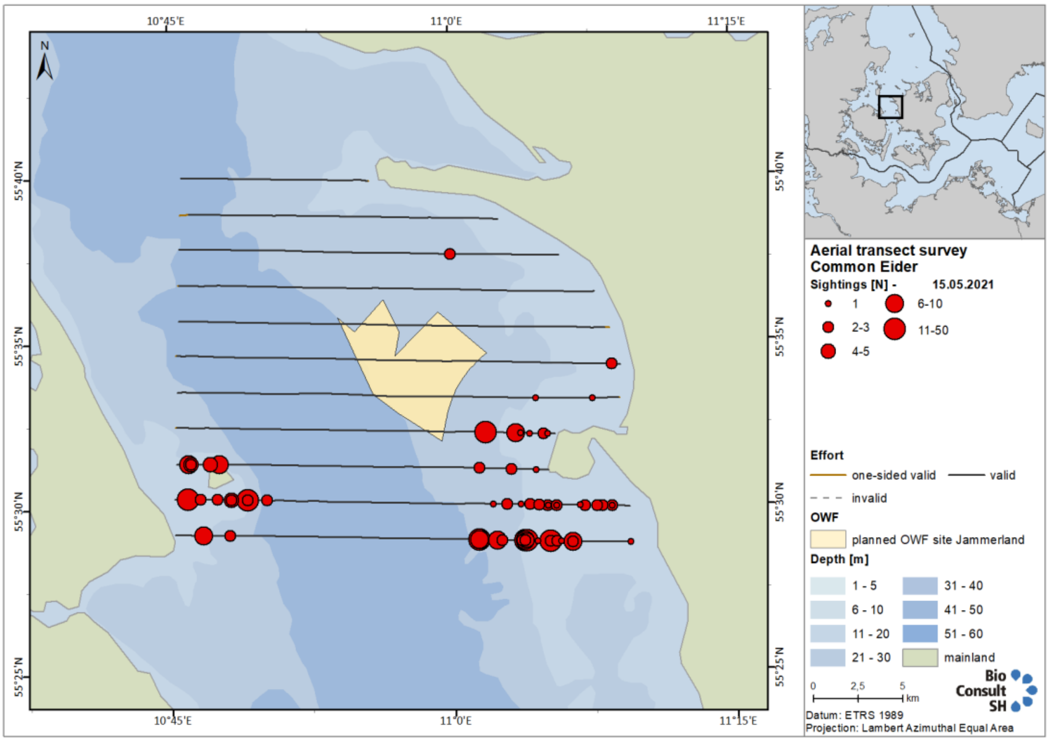

Figure A. 113 Common Eider distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

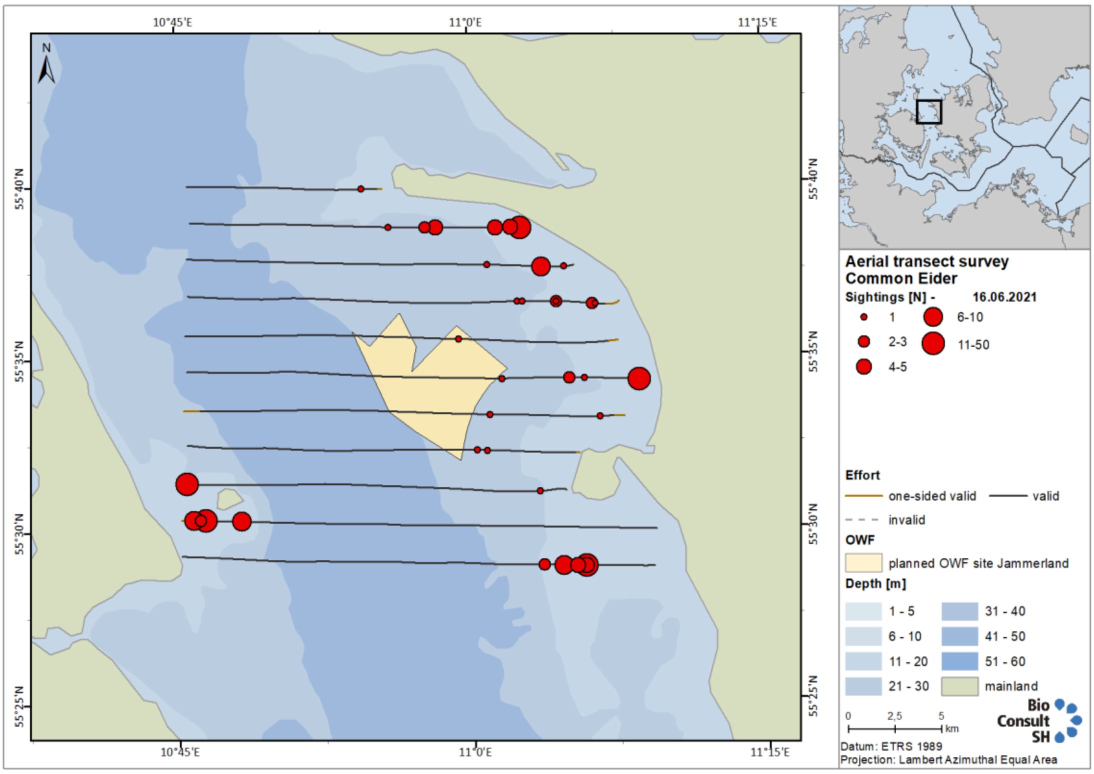

Figure A. 114 Common Eider distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

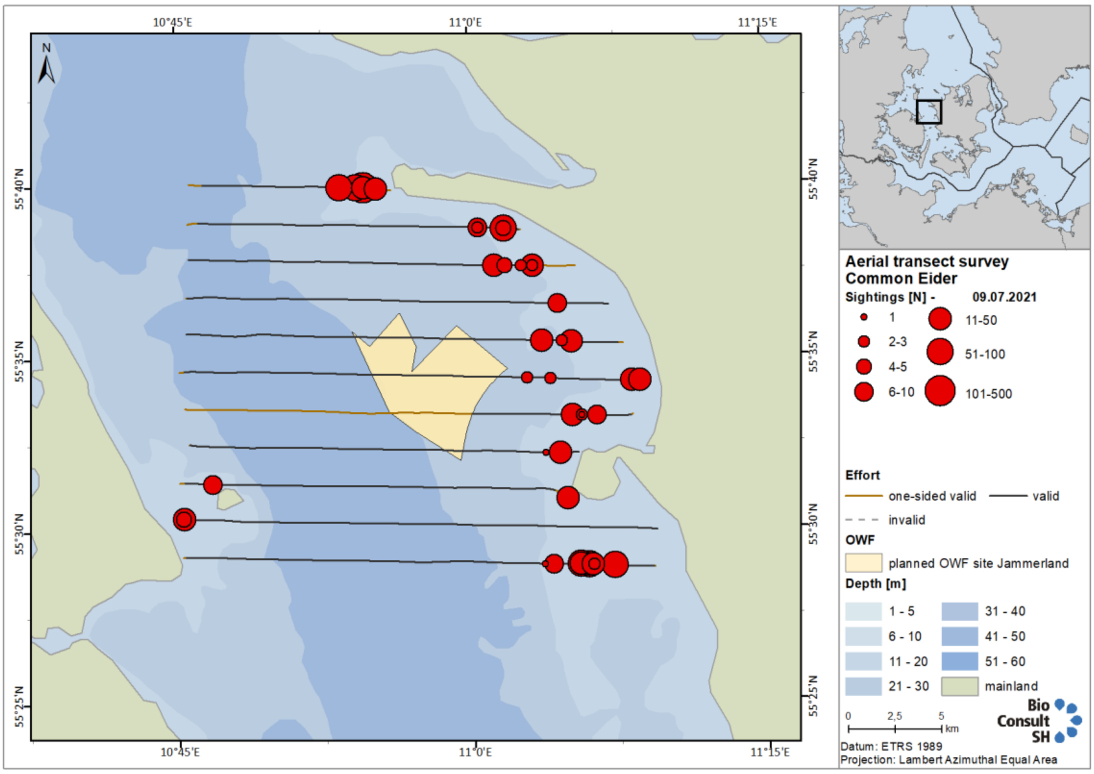

Figure A. 115 Common Eider distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

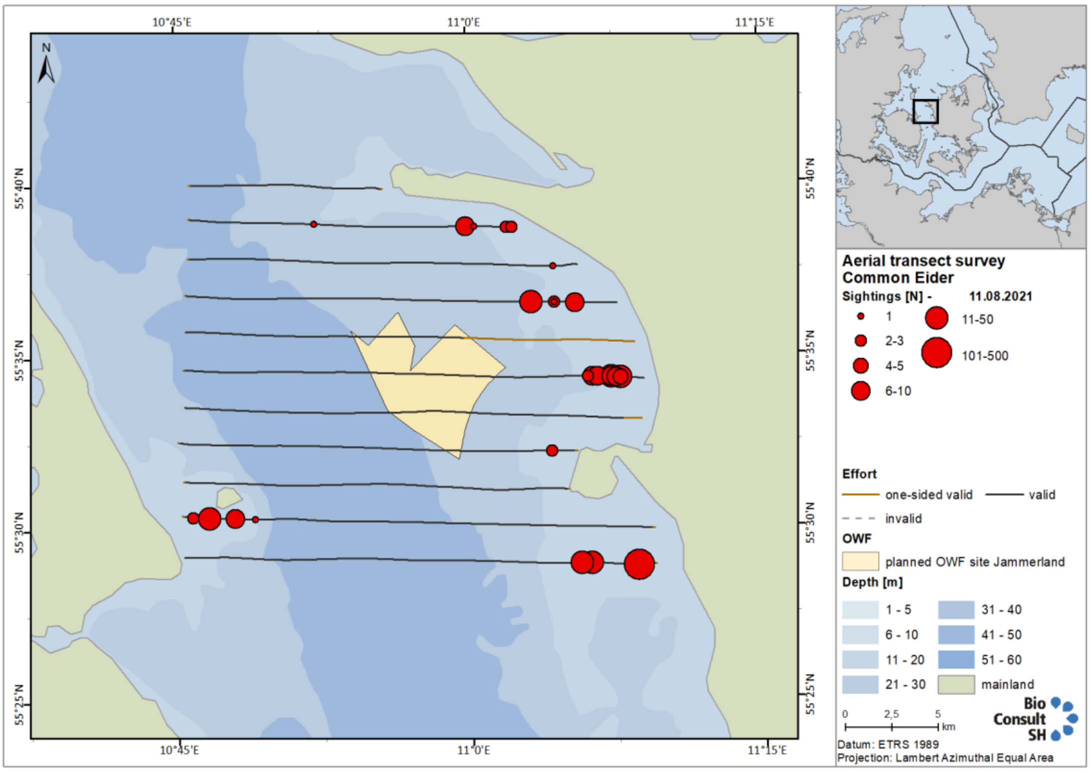

Figure A. 116 Common Eider distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

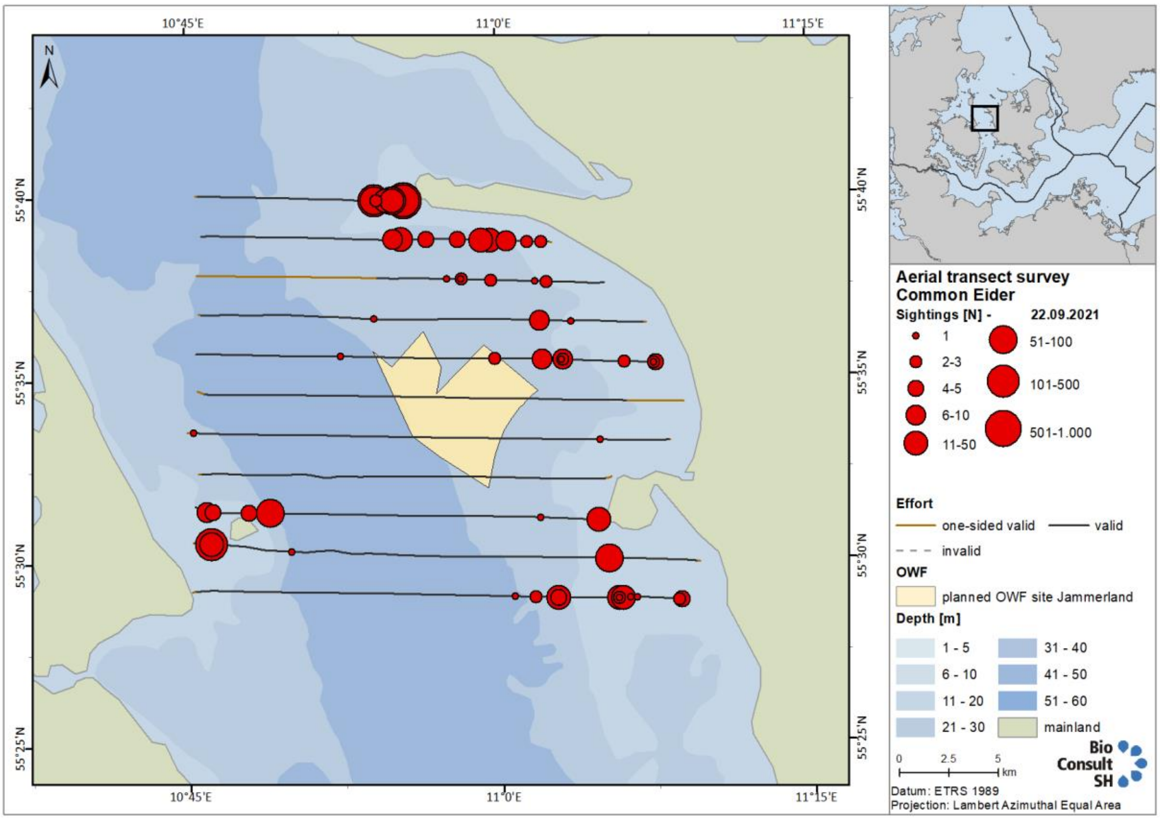

Figure A. 117 Common Eider distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

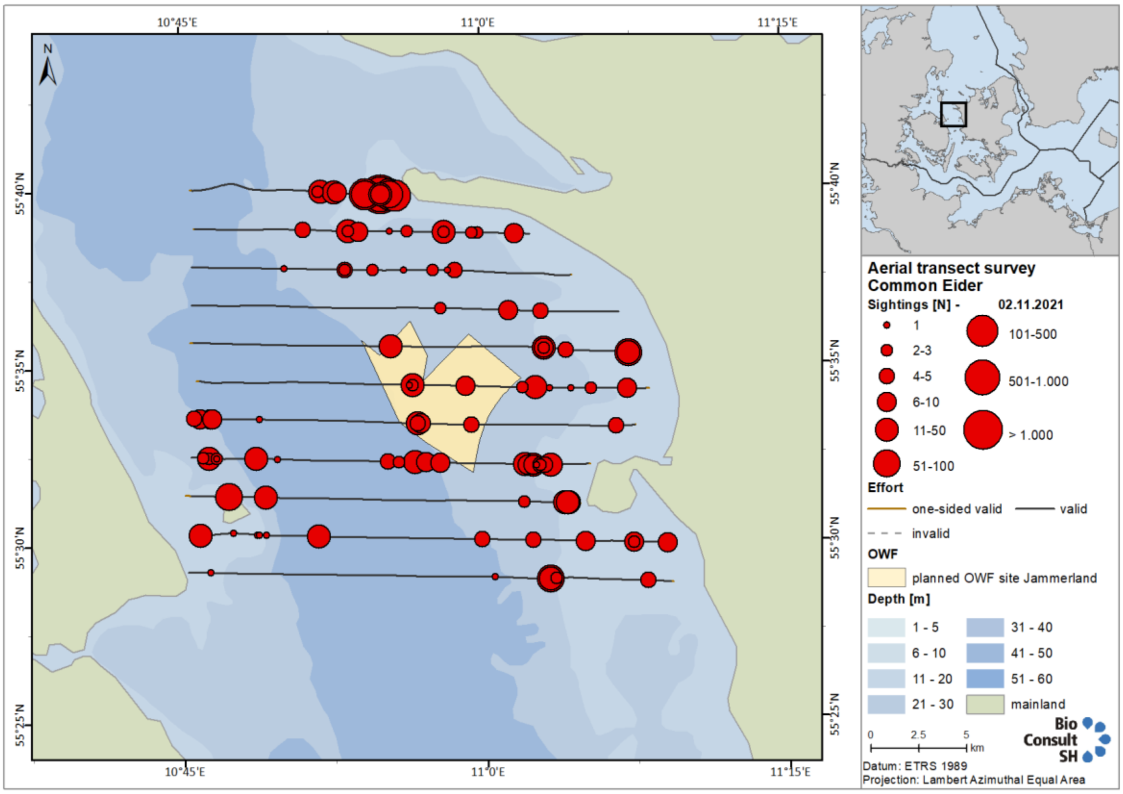

Figure A. 118 Common Eider distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

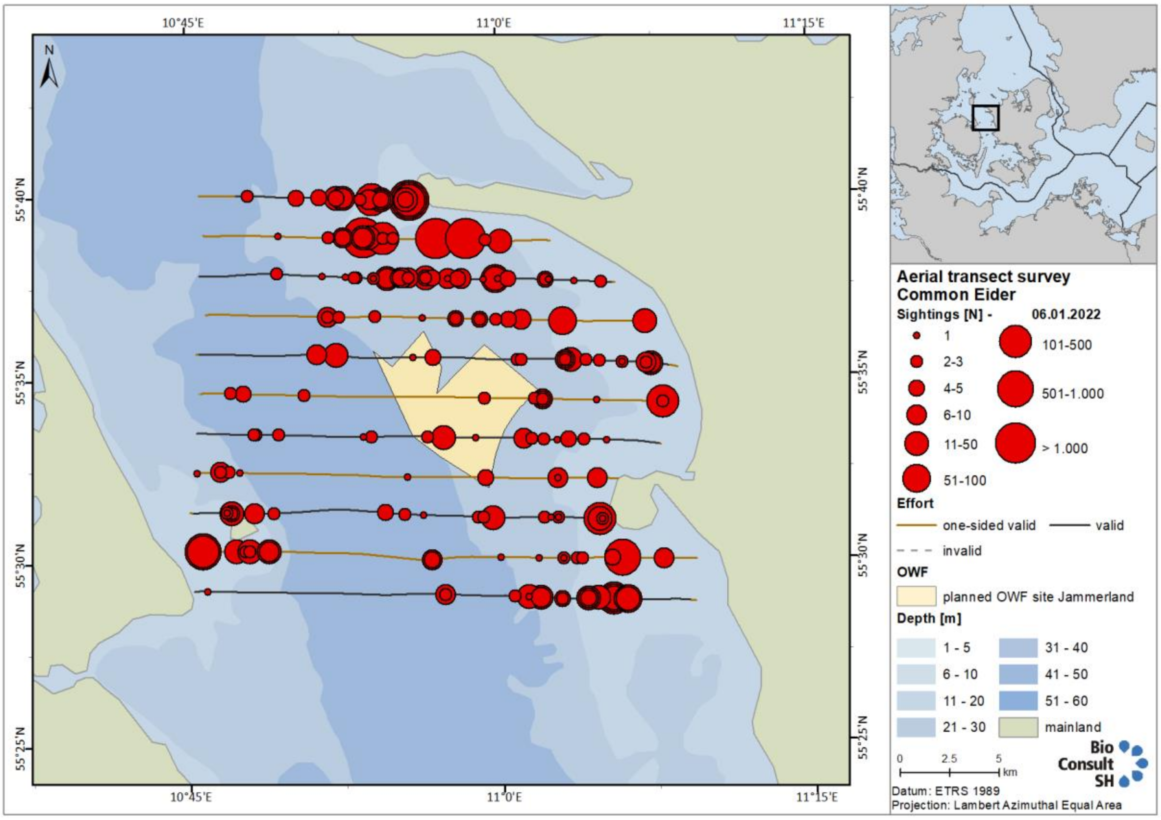

Figure A. 119 Common Eider distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

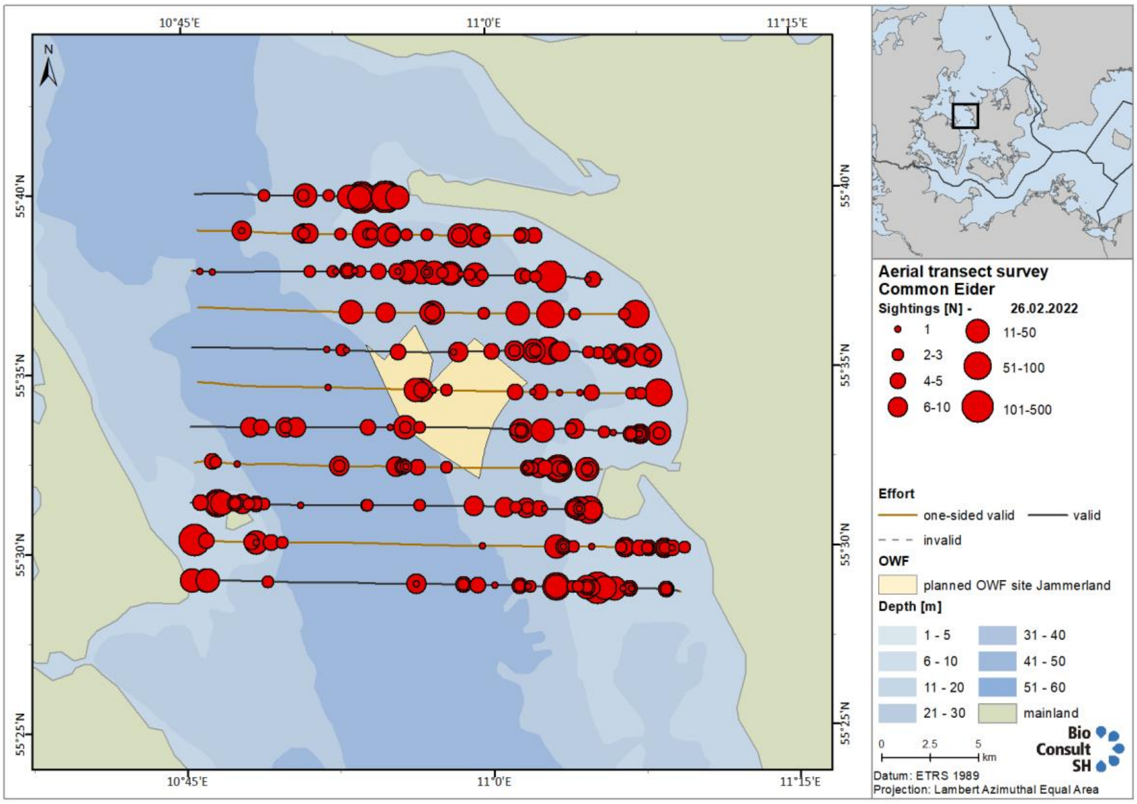

Figure A. 120 Common Eider distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

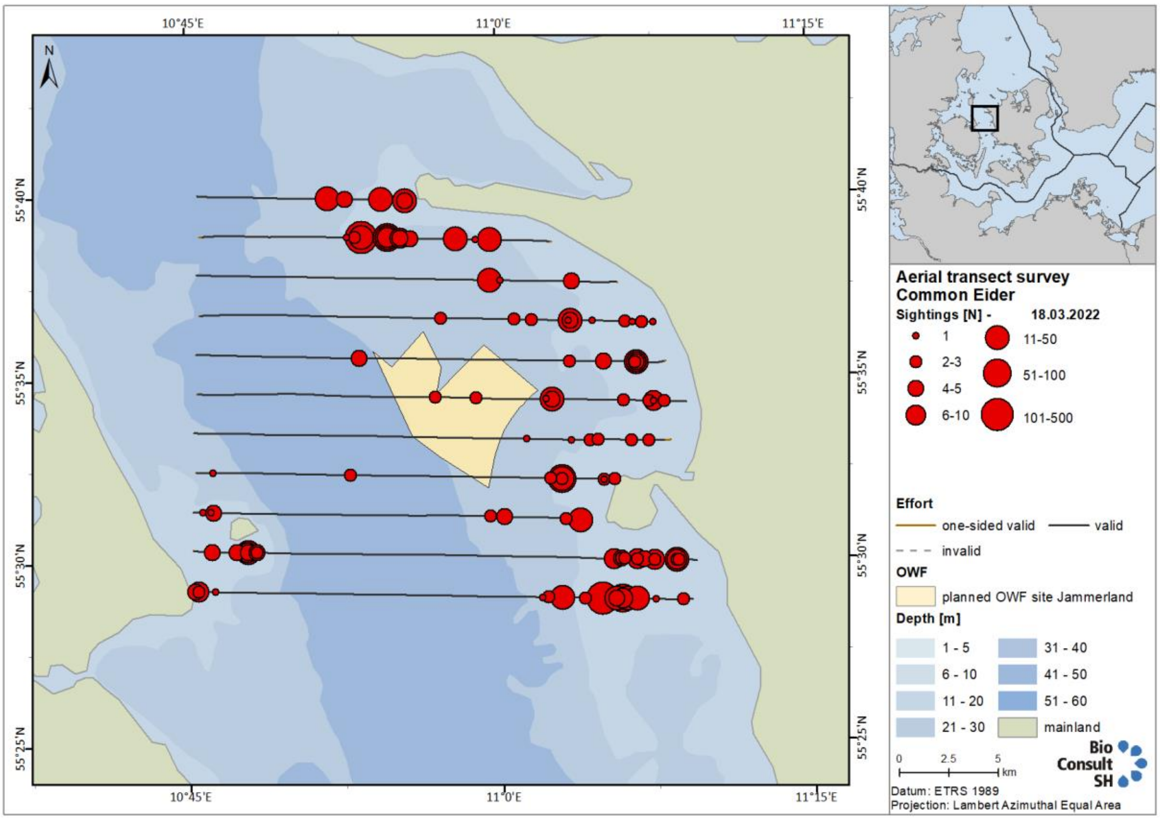

Figure A. 121 Common Eider distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

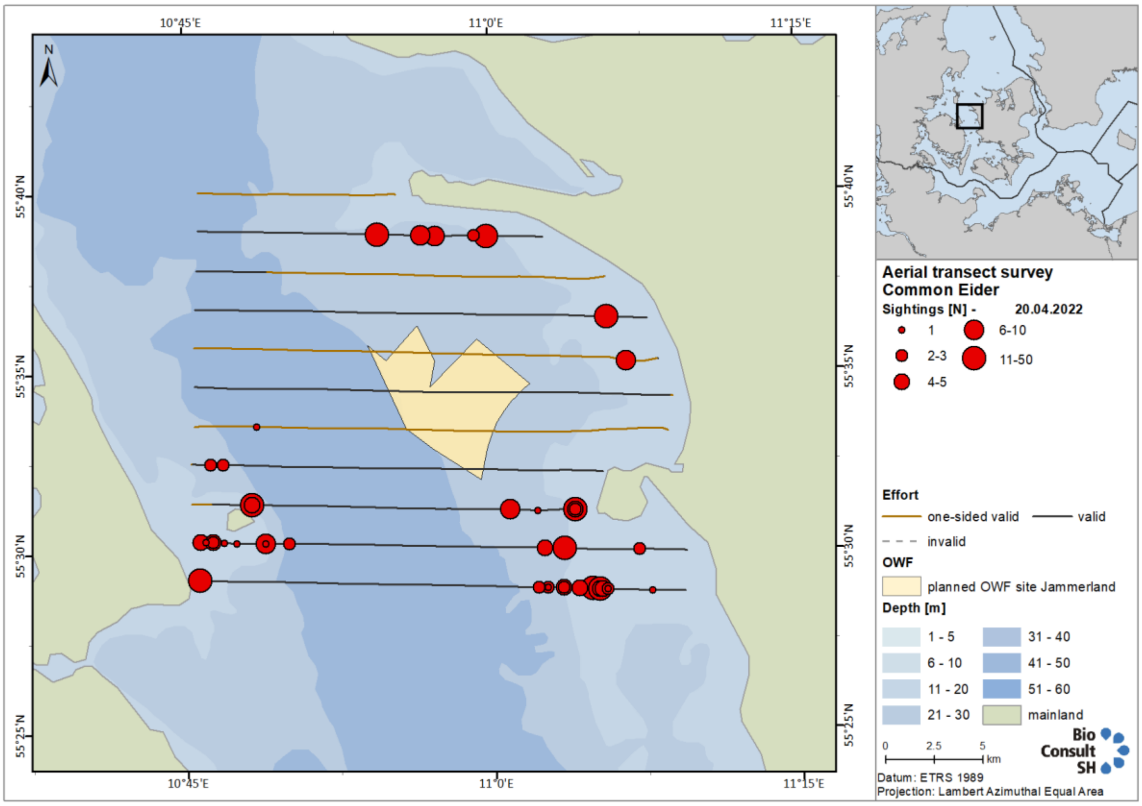

Figure A. 122 Common Eider distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

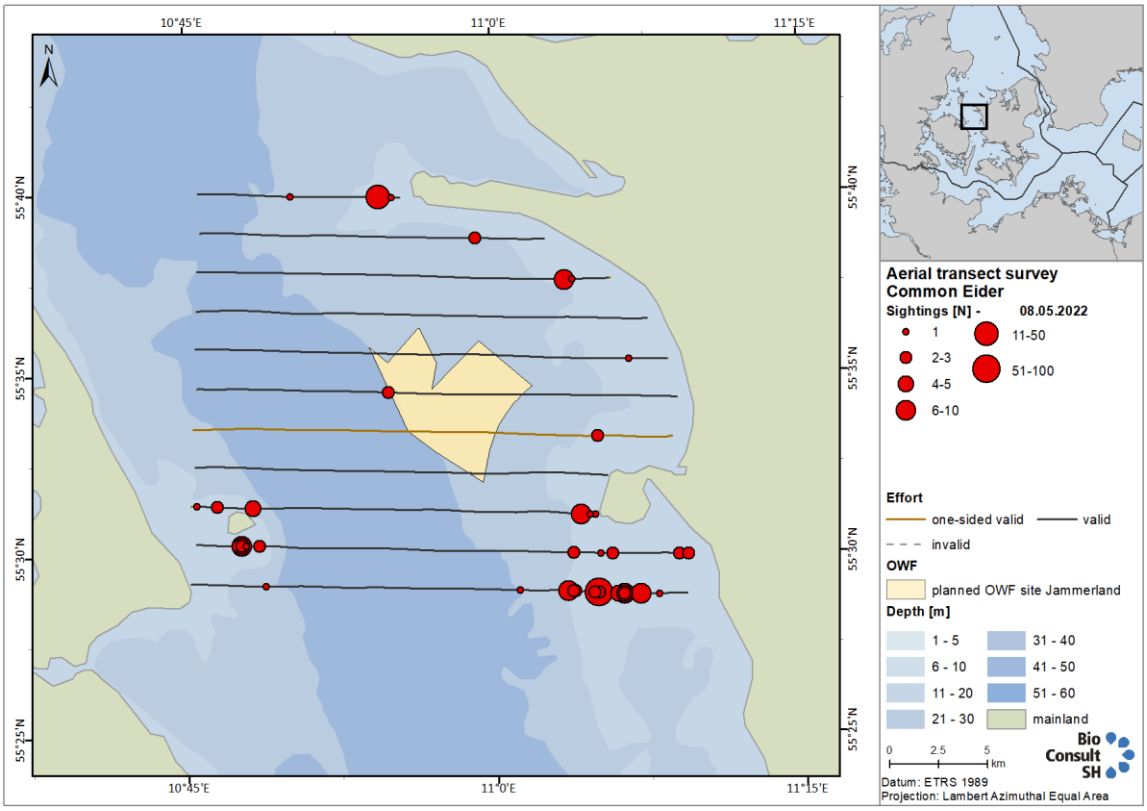

Figure A. 123 Common Eider distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.11 Long-tailed Duck

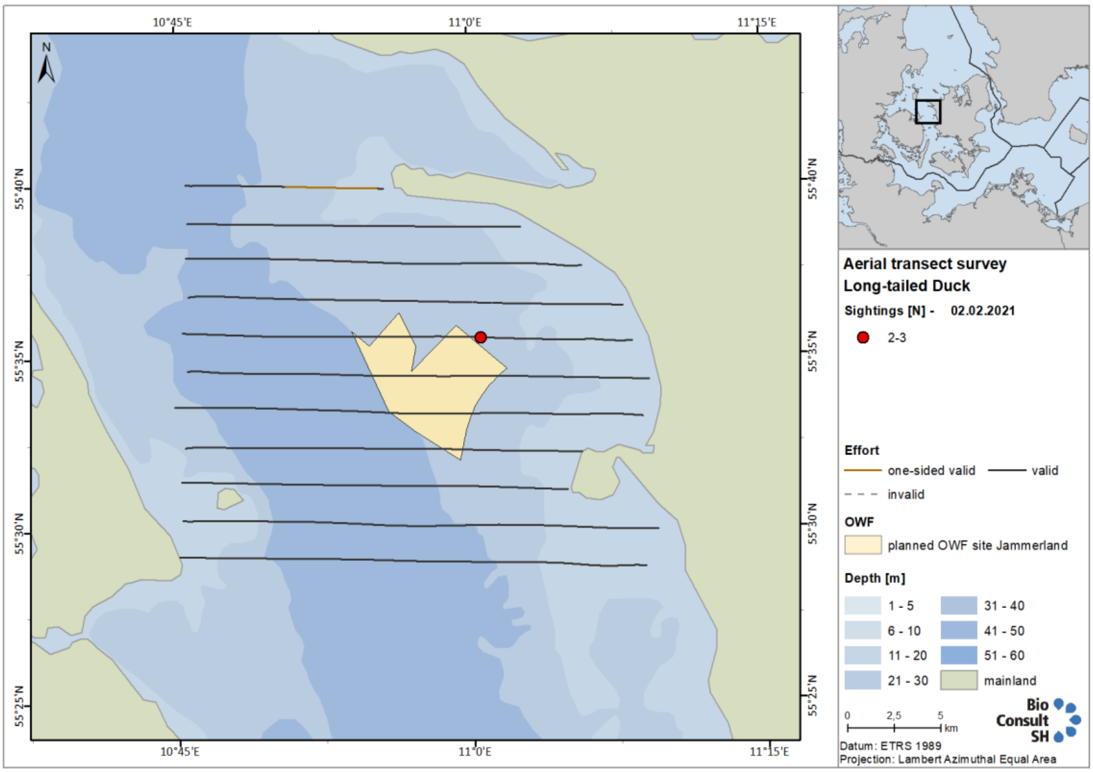

Figure A. 124 Long-tailed Duck distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

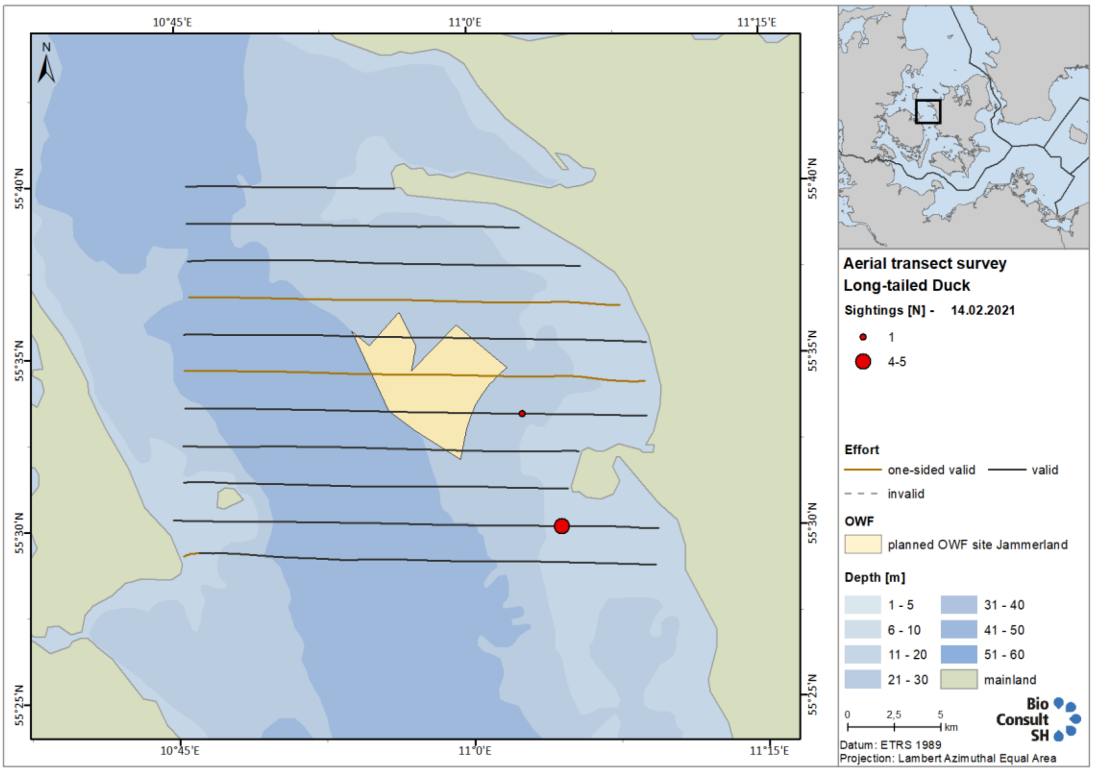

Figure A. 125 Long-tailed Duck distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

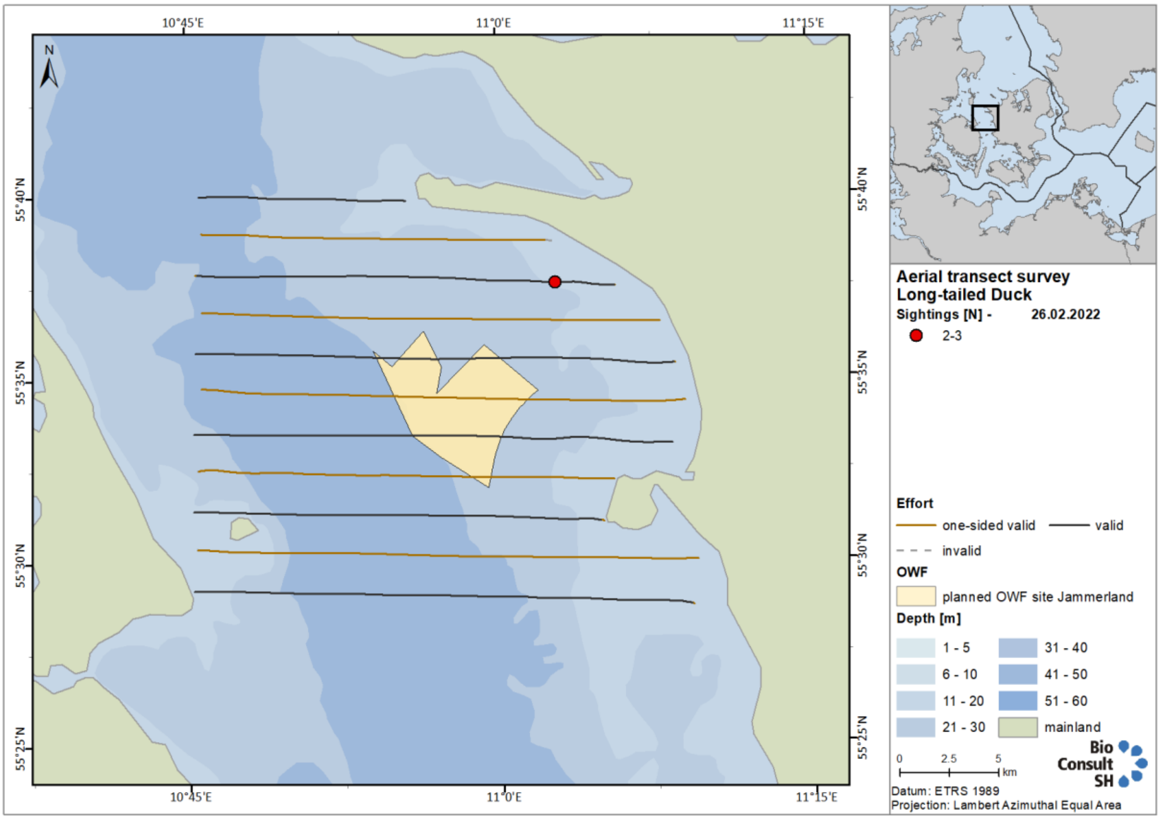

Figure A. 126 Long-tailed Duck distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

A.1.12 Common Scoter

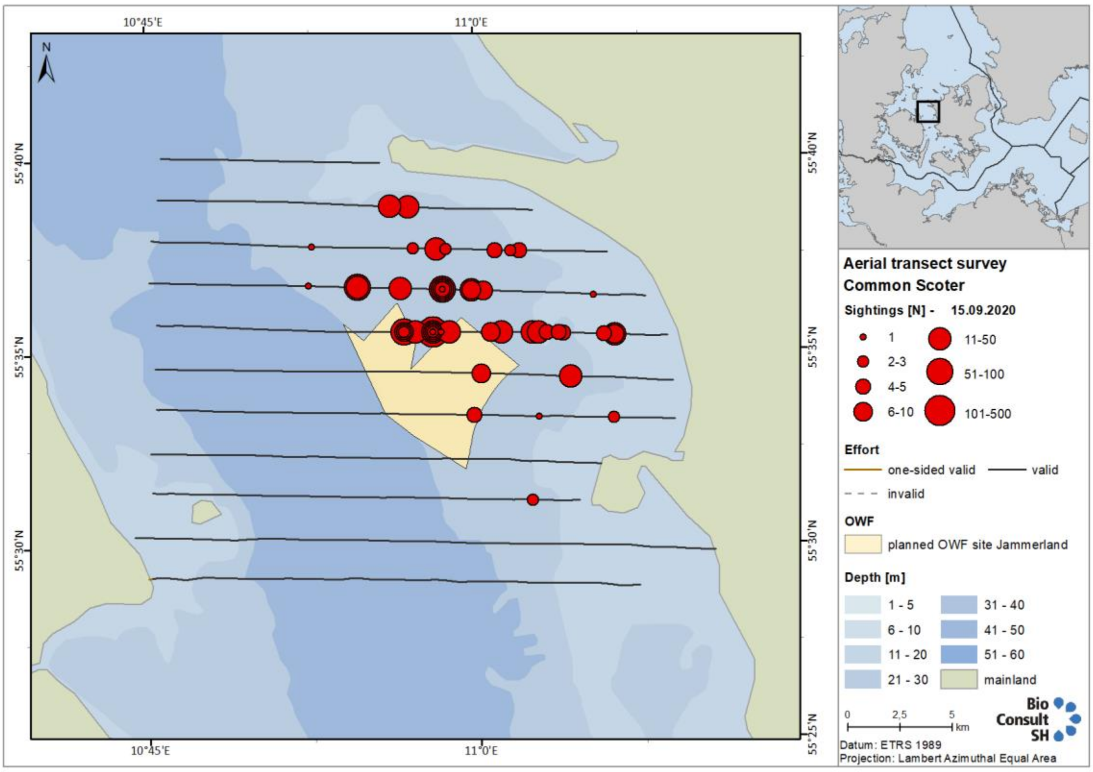

Figure A. 127 Common Scoter distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

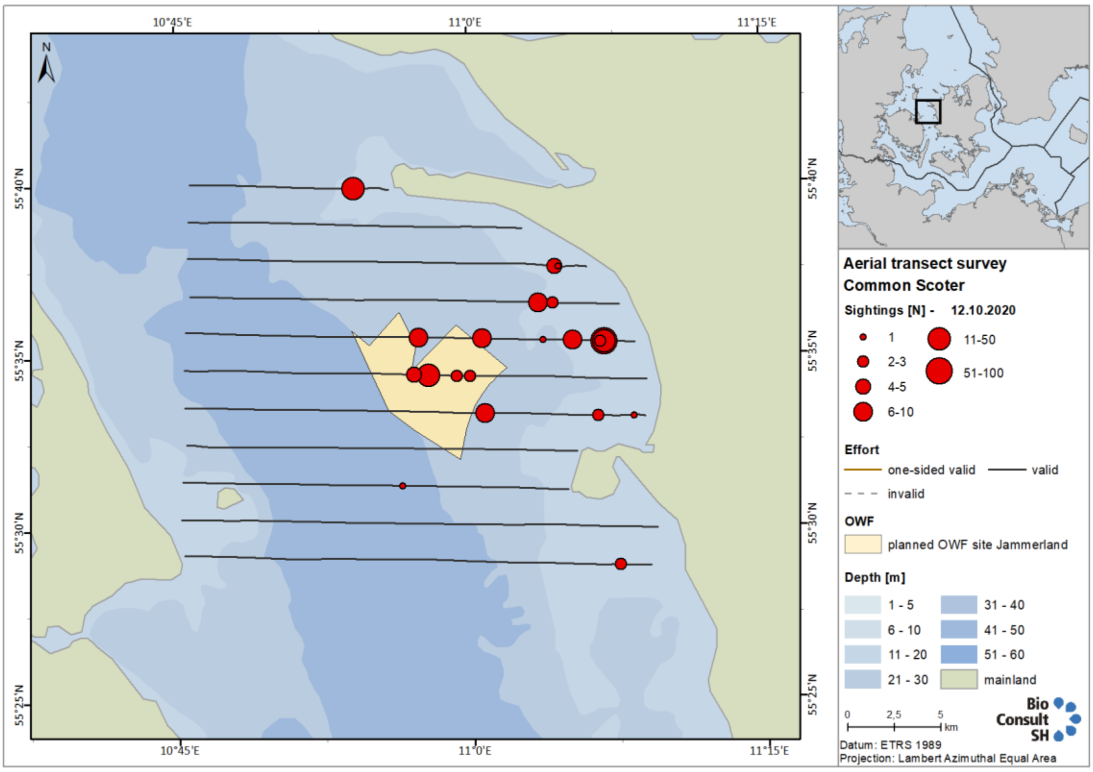

Figure A. 128 Common Scoter distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

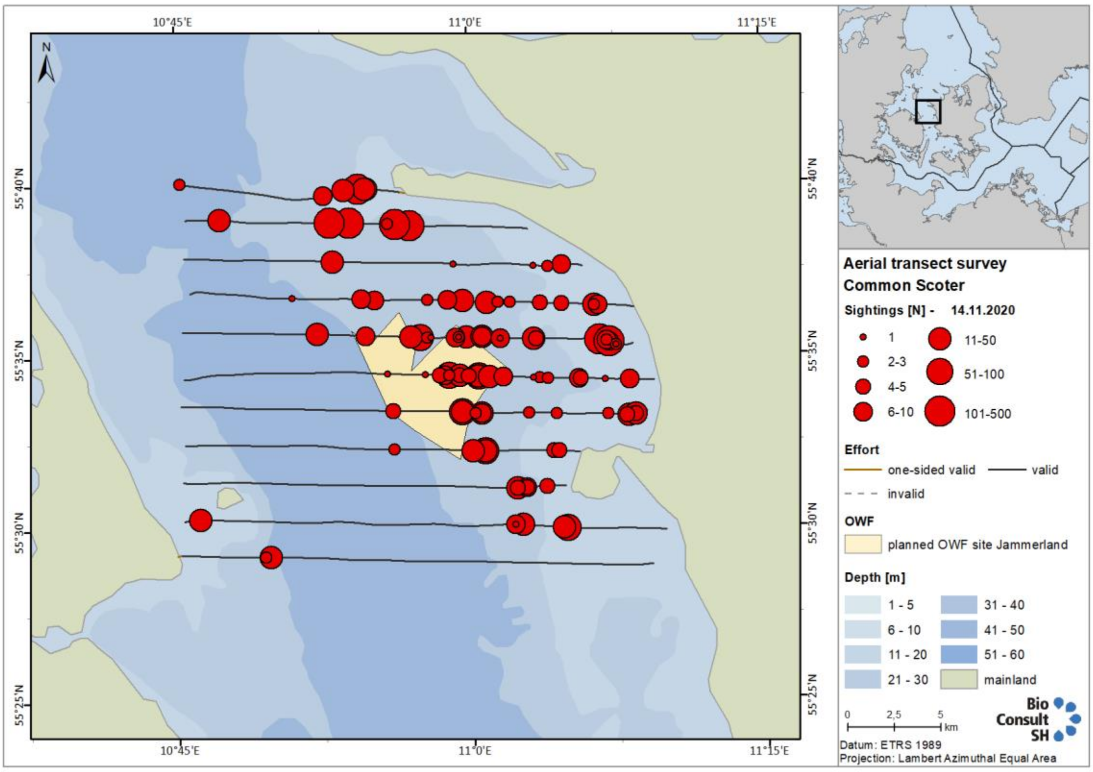

Figure A. 129 Common Scoter distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

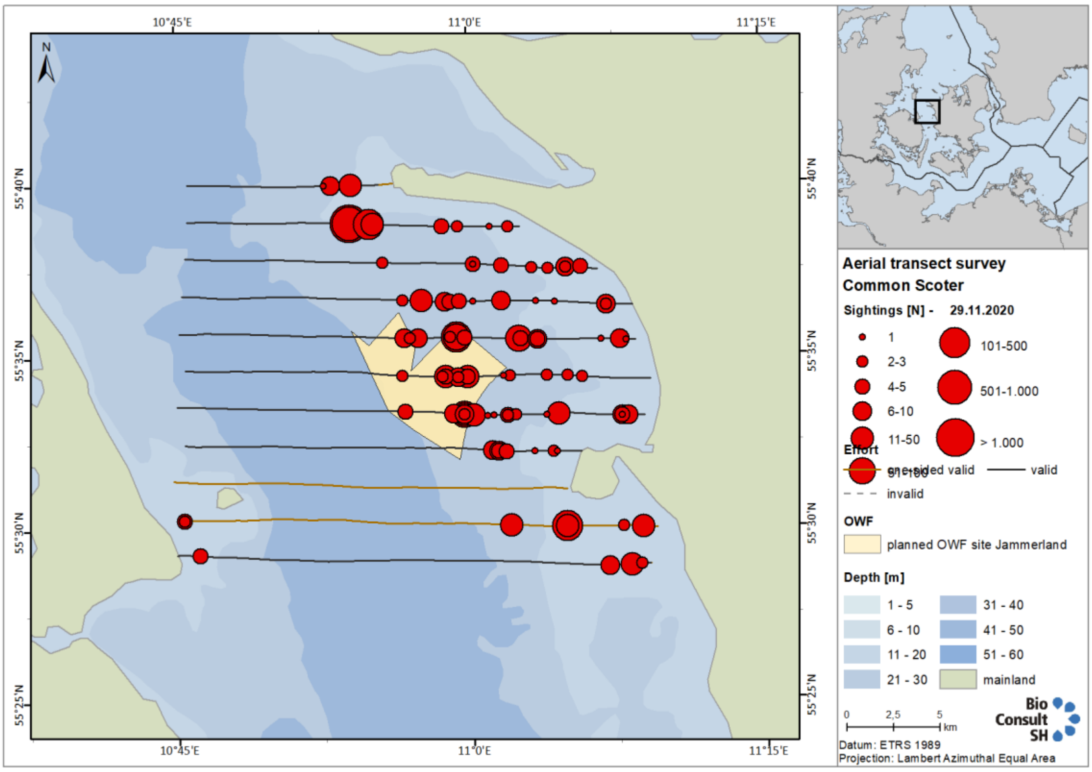

Figure A. 130 Common Scoter distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

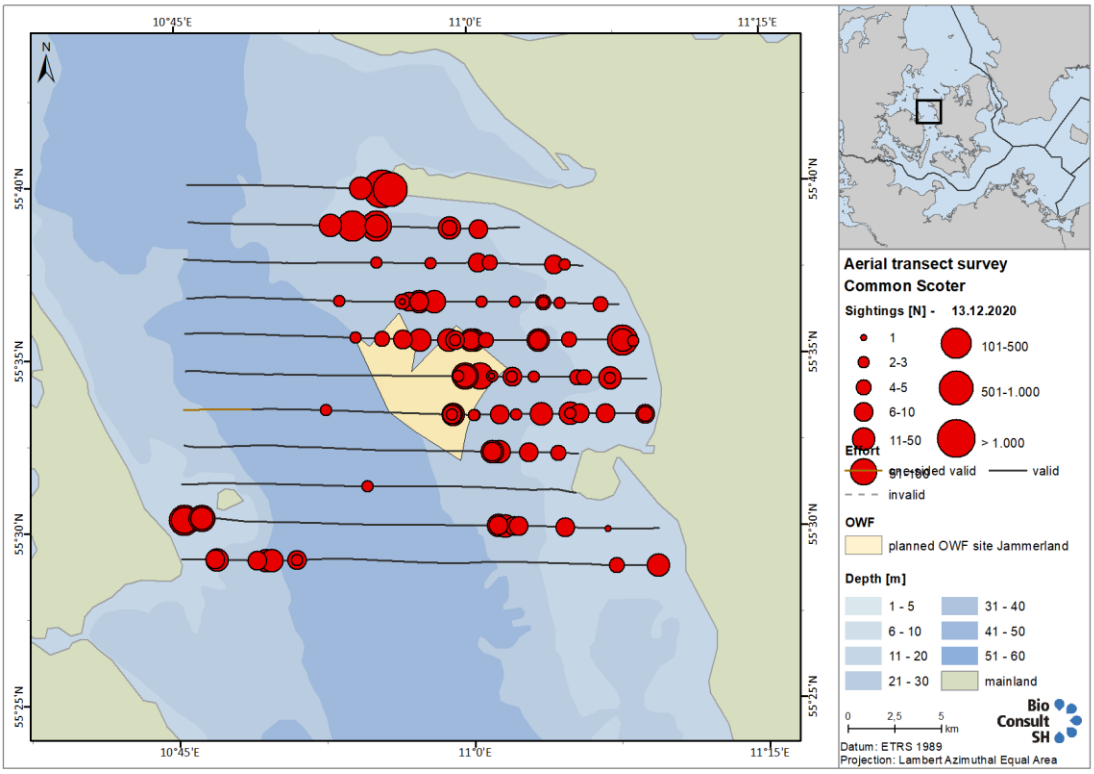

Figure A. 131 Common Scoter distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

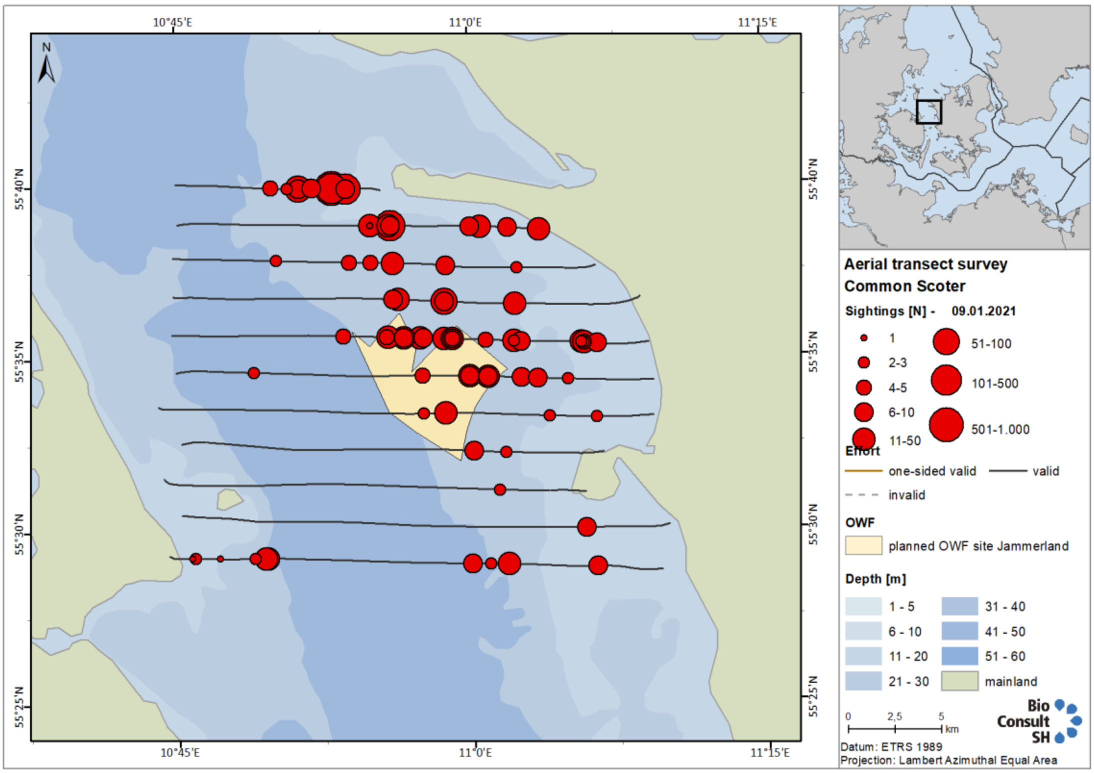

Figure A. 132 Common Scoter distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

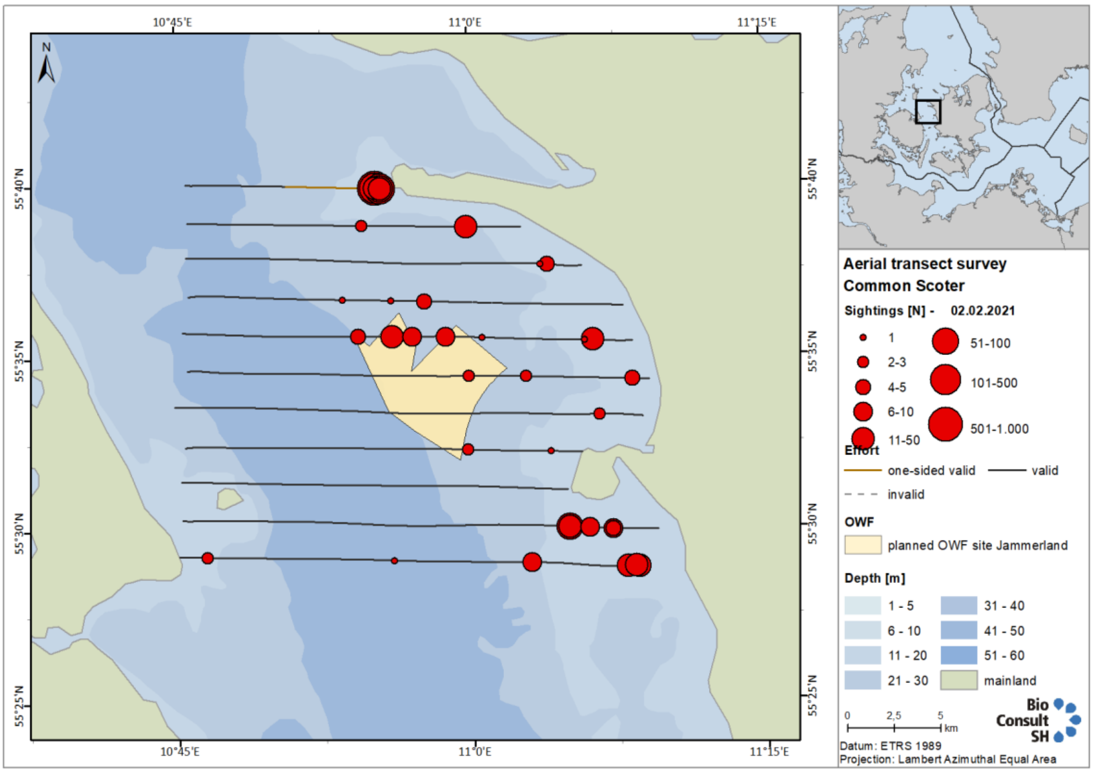

Figure A. 133 Common Scoter distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

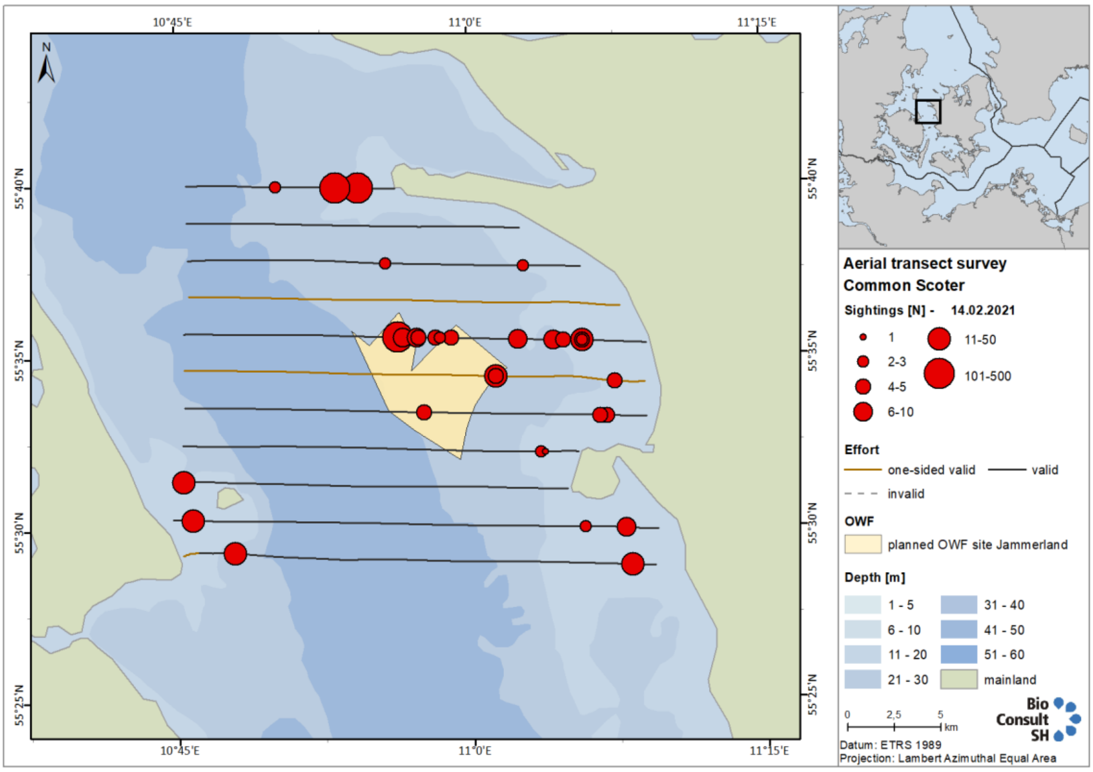

Figure A. 134 Common Scoter distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

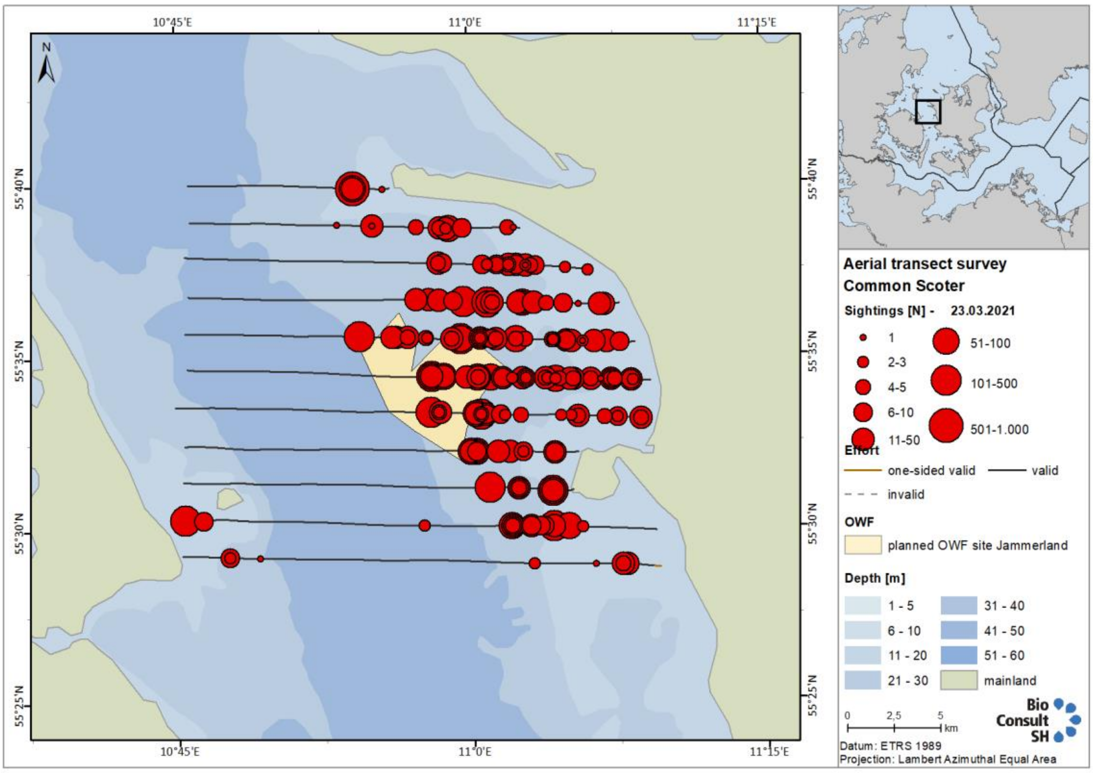

Figure A. 135 Common Scoter distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

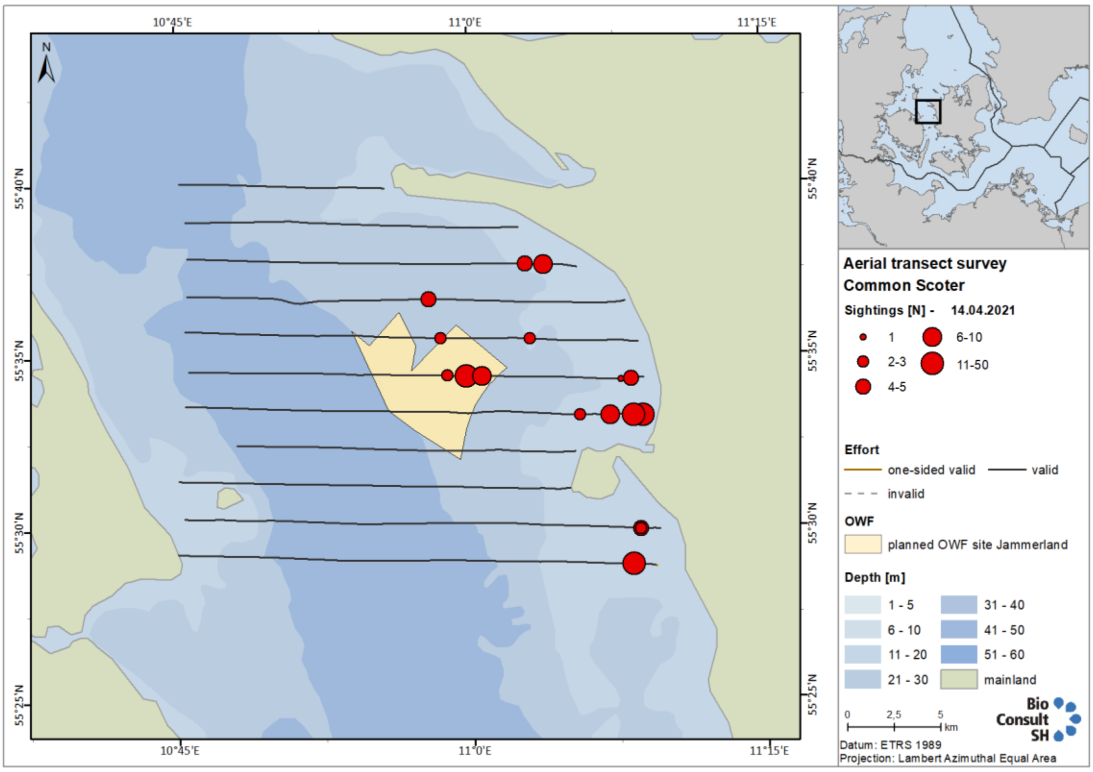

Figure A. 136 Common Scoter distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

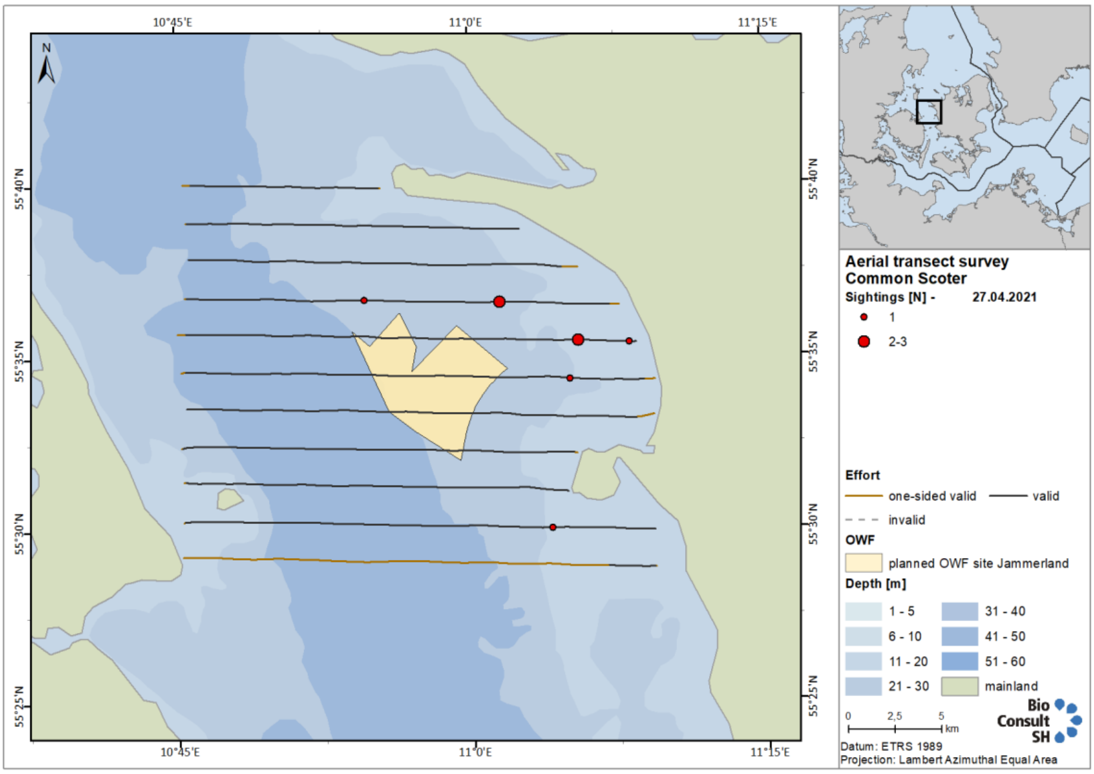

Figure A. 137 Common Scoter distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

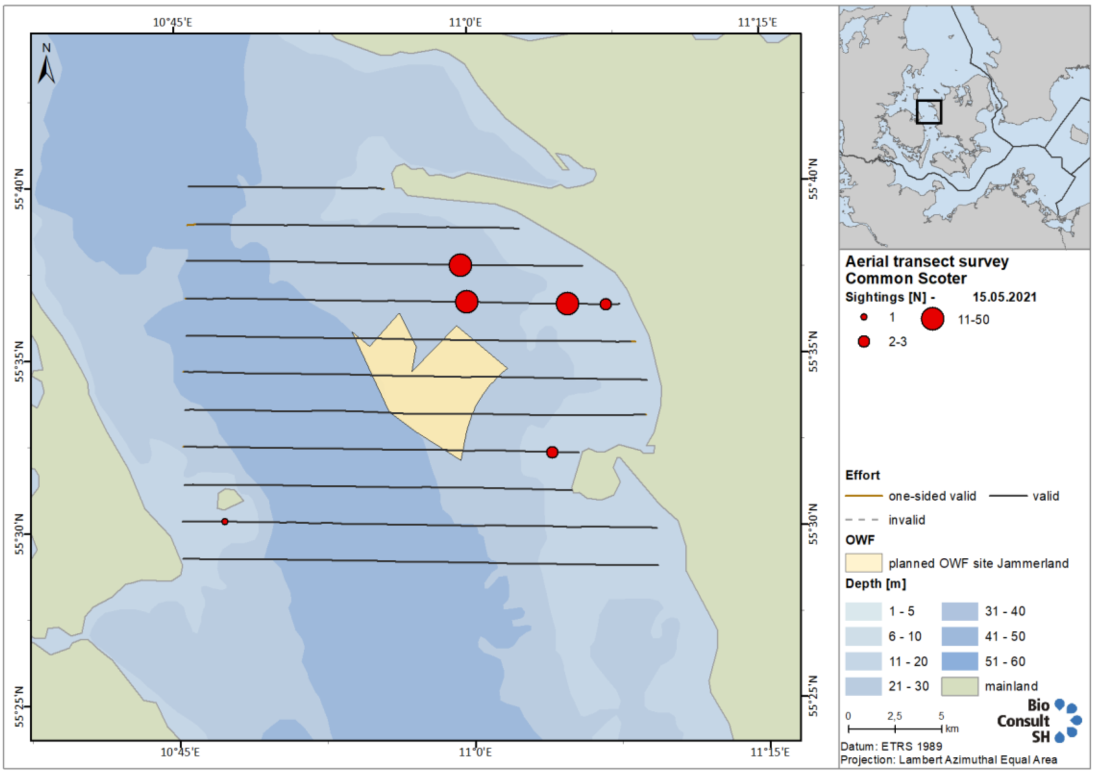

Figure A. 138 Common Scoter distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

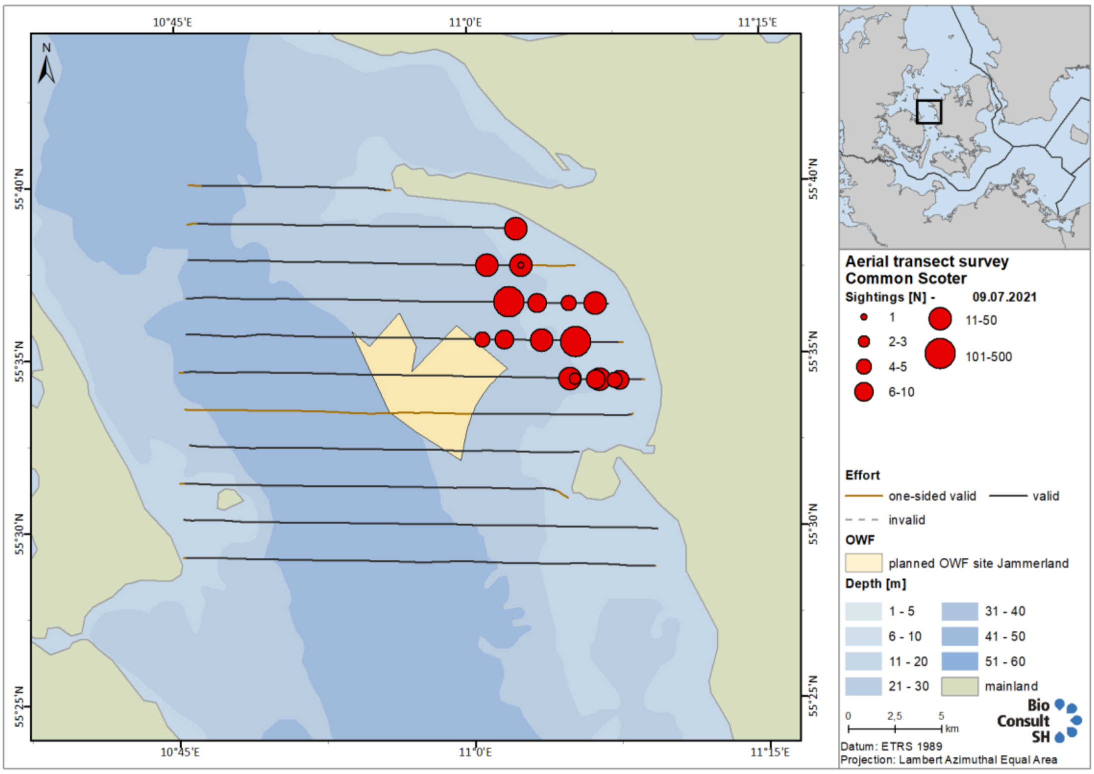

Figure A. 139 Common Scoter distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

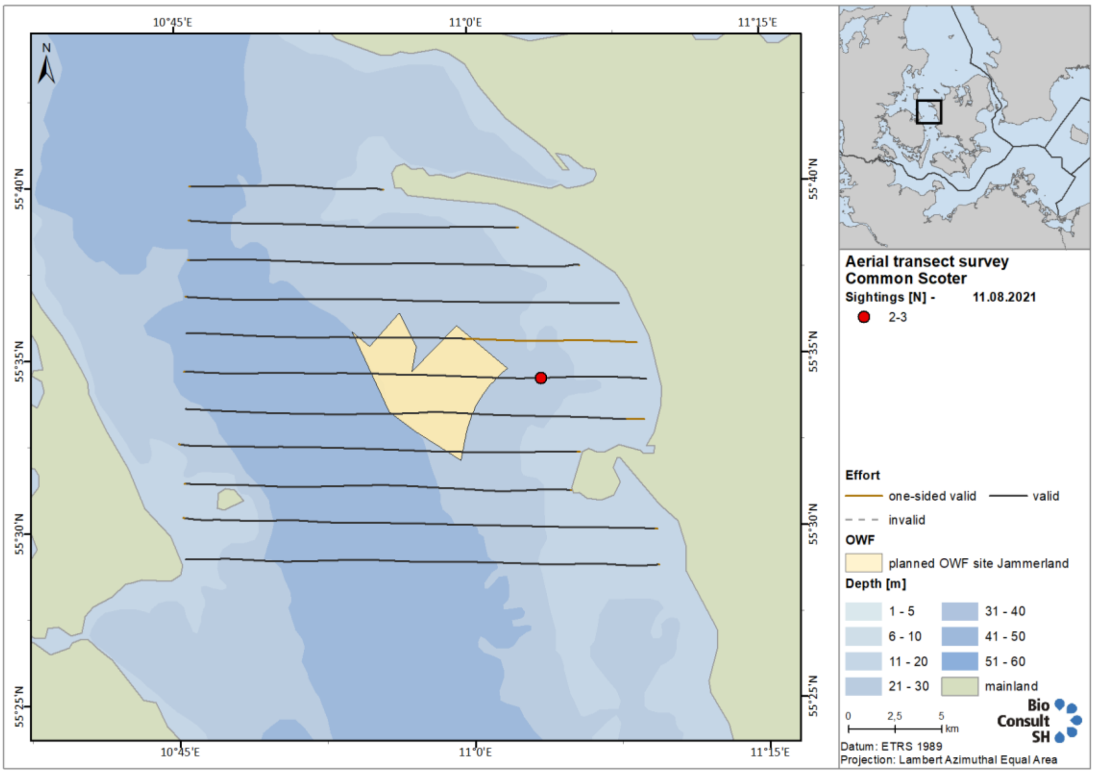

Figure A. 140 Common Scoter distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

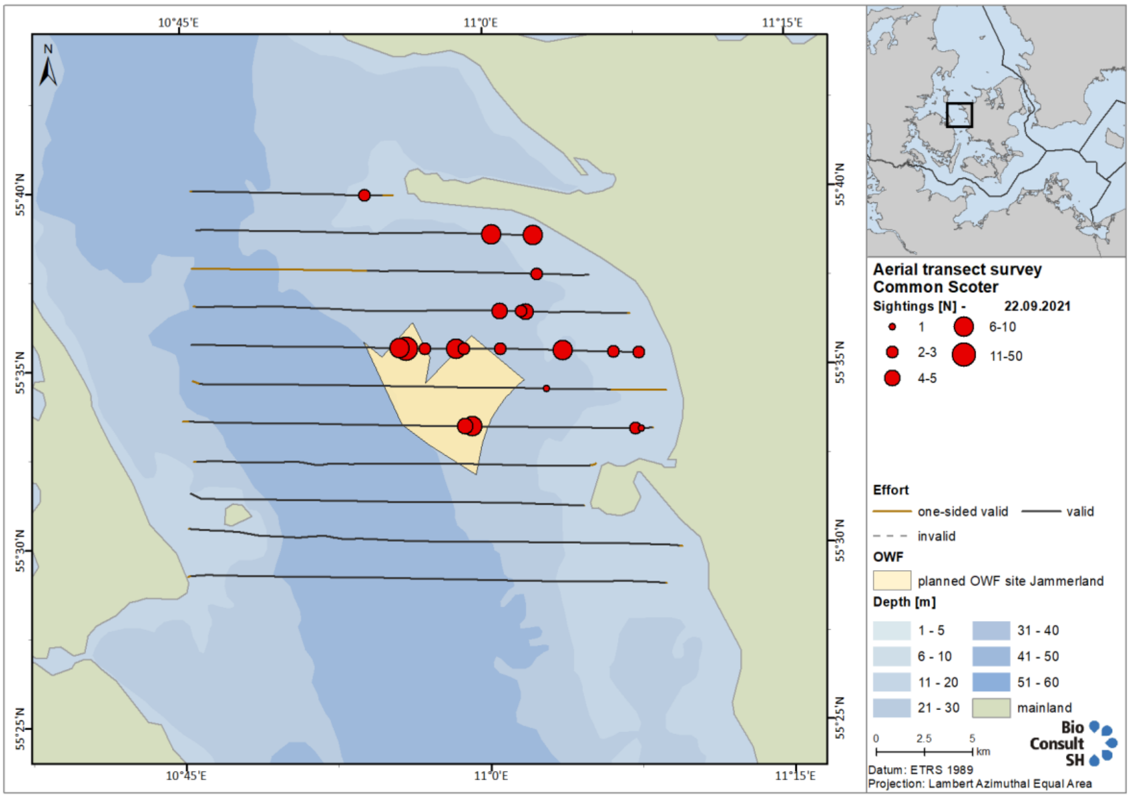

Figure A. 141 Common Scoter distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

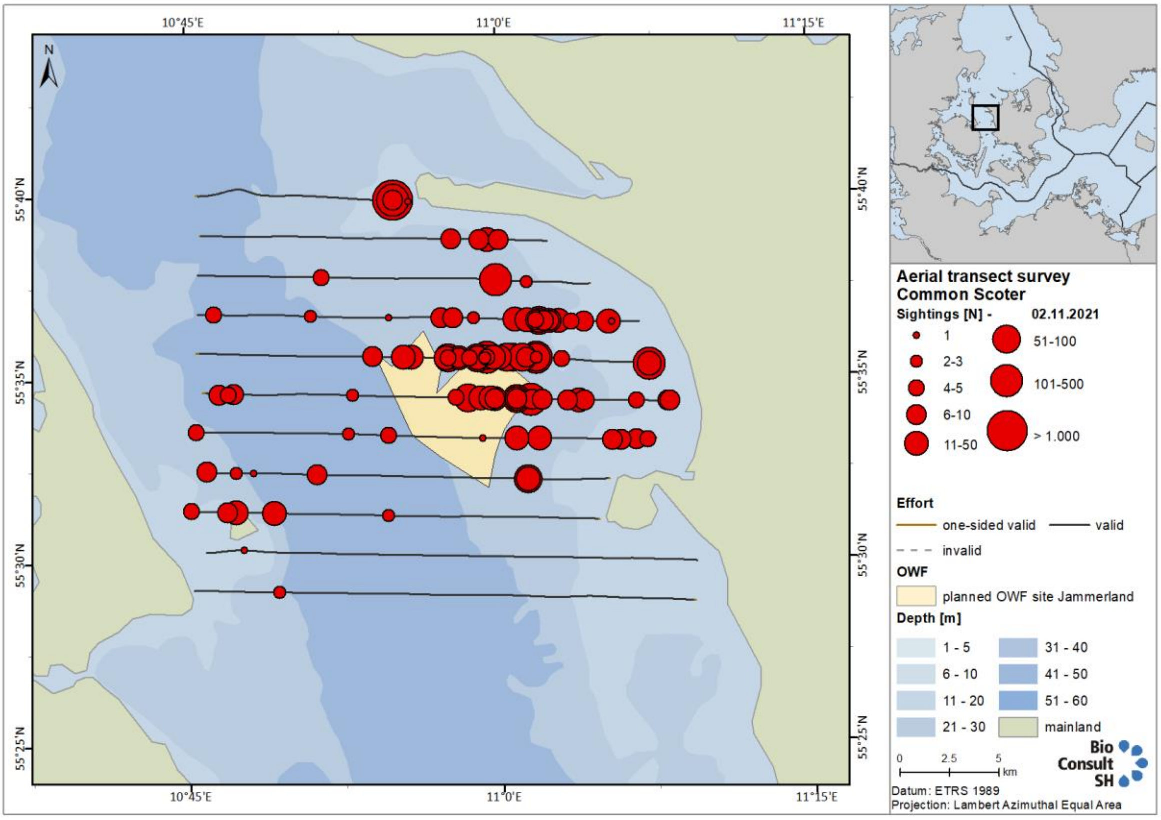

Figure A. 142 Common Scoter distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

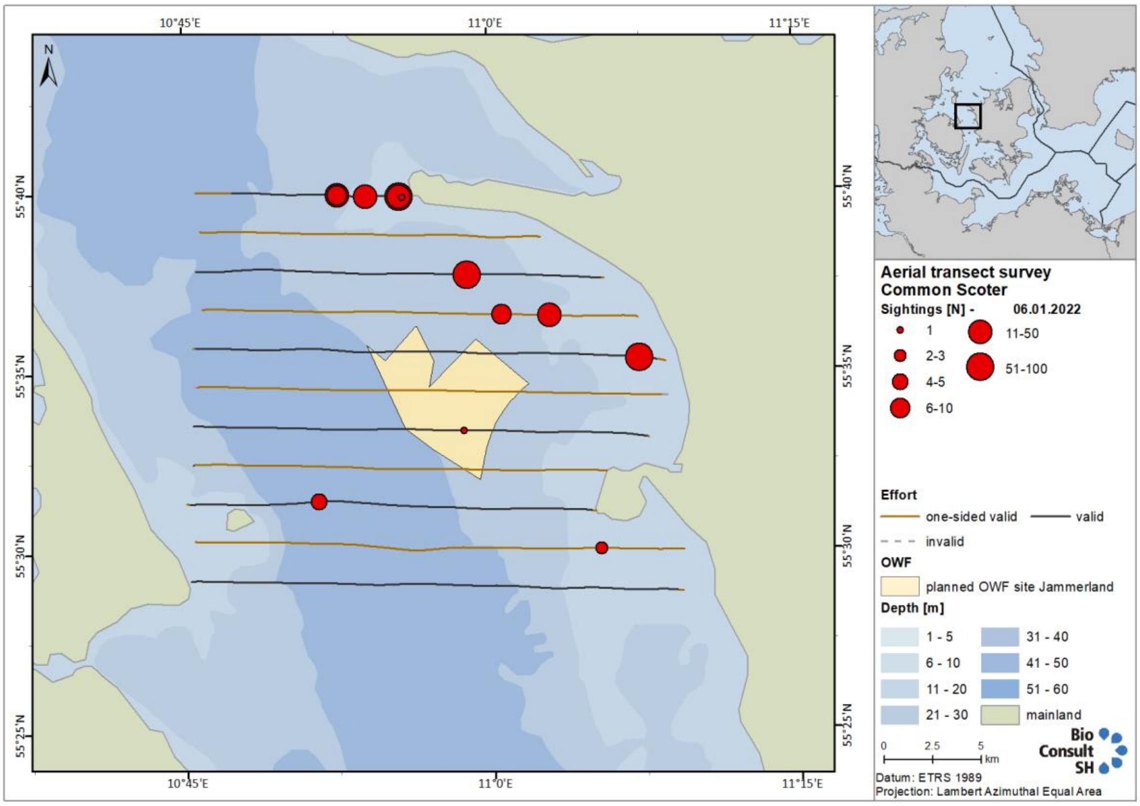

Figure A. 143 Common Scoter distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

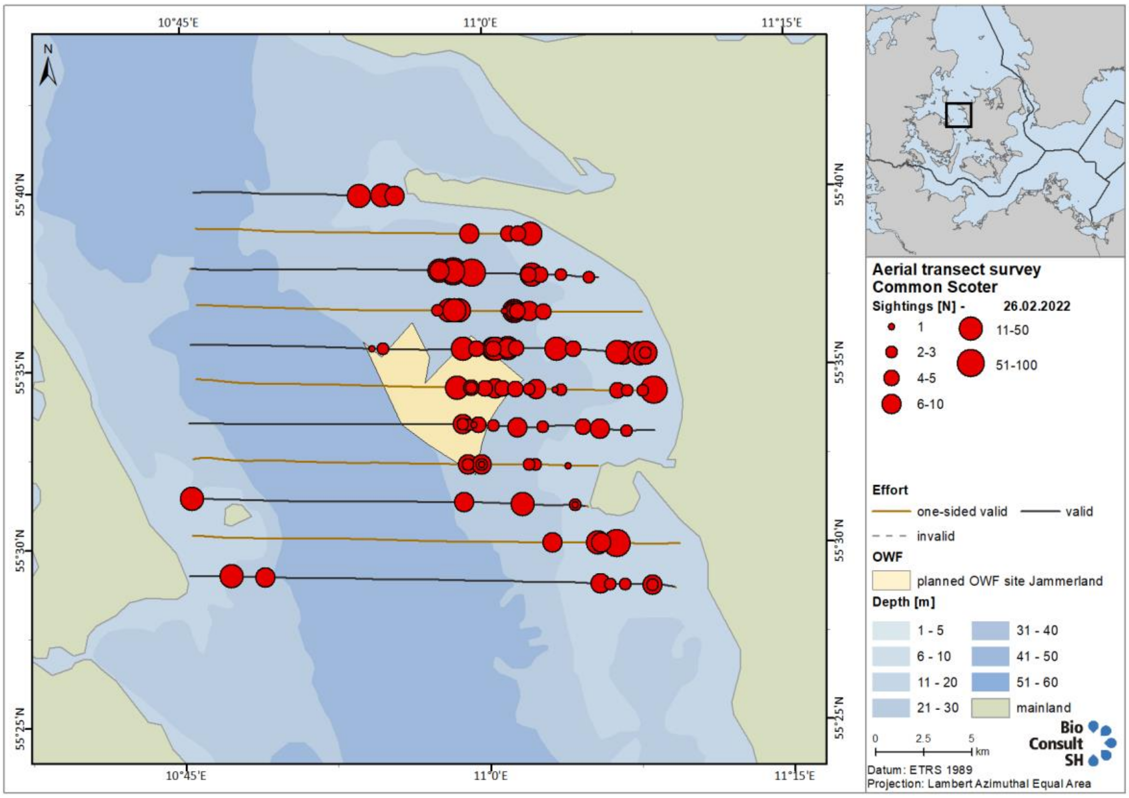

Figure A. 144 Common Scoter distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

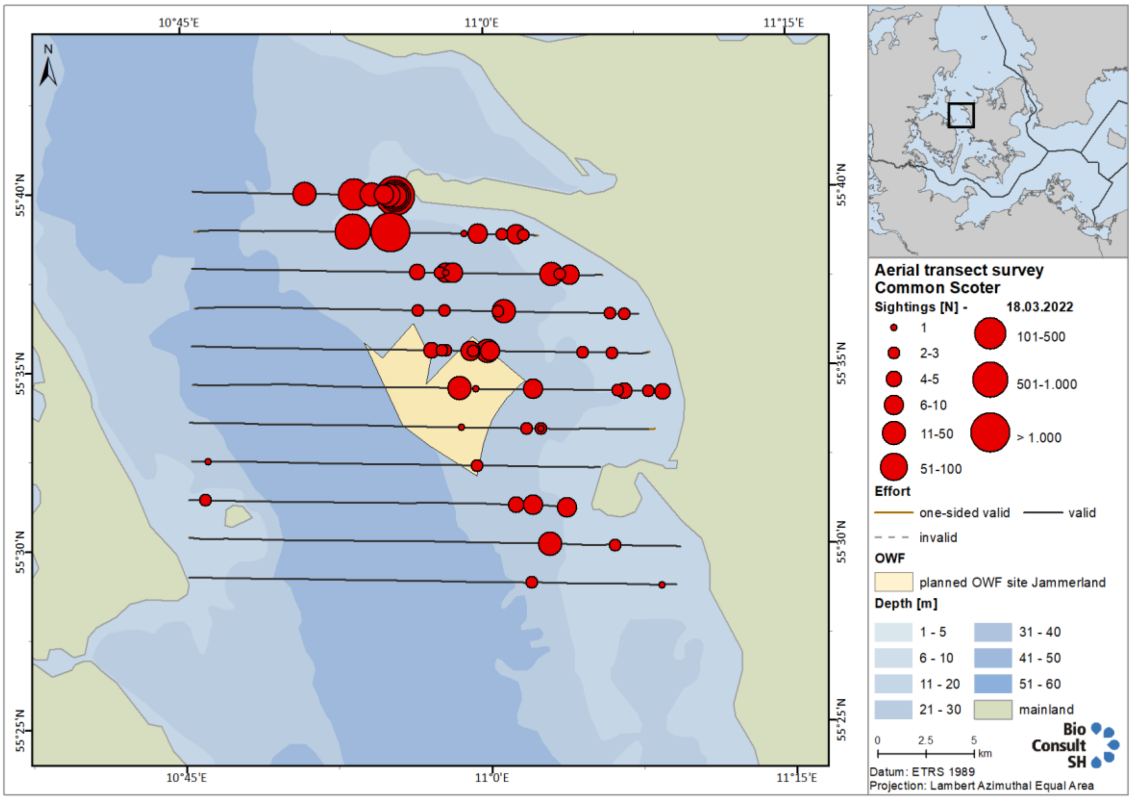

Figure A. 145 Common Scoter distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

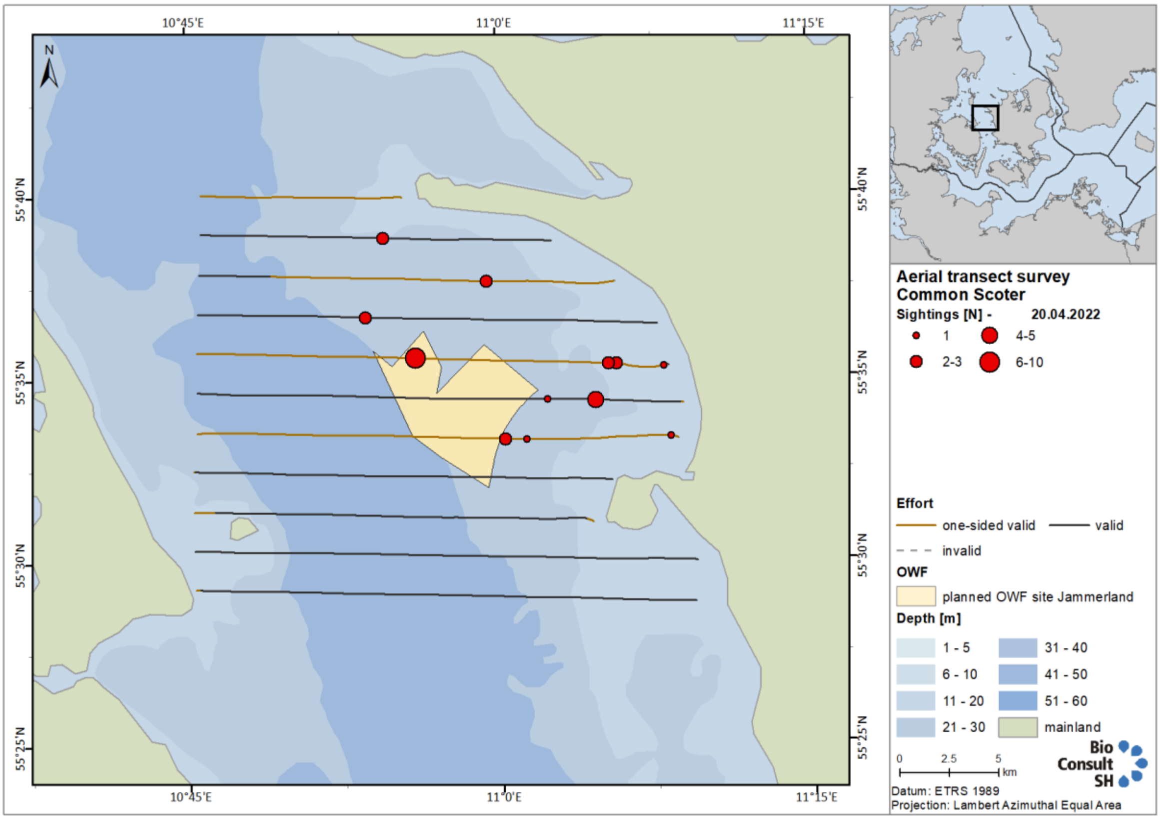

Figure A. 146 Common Scoter distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

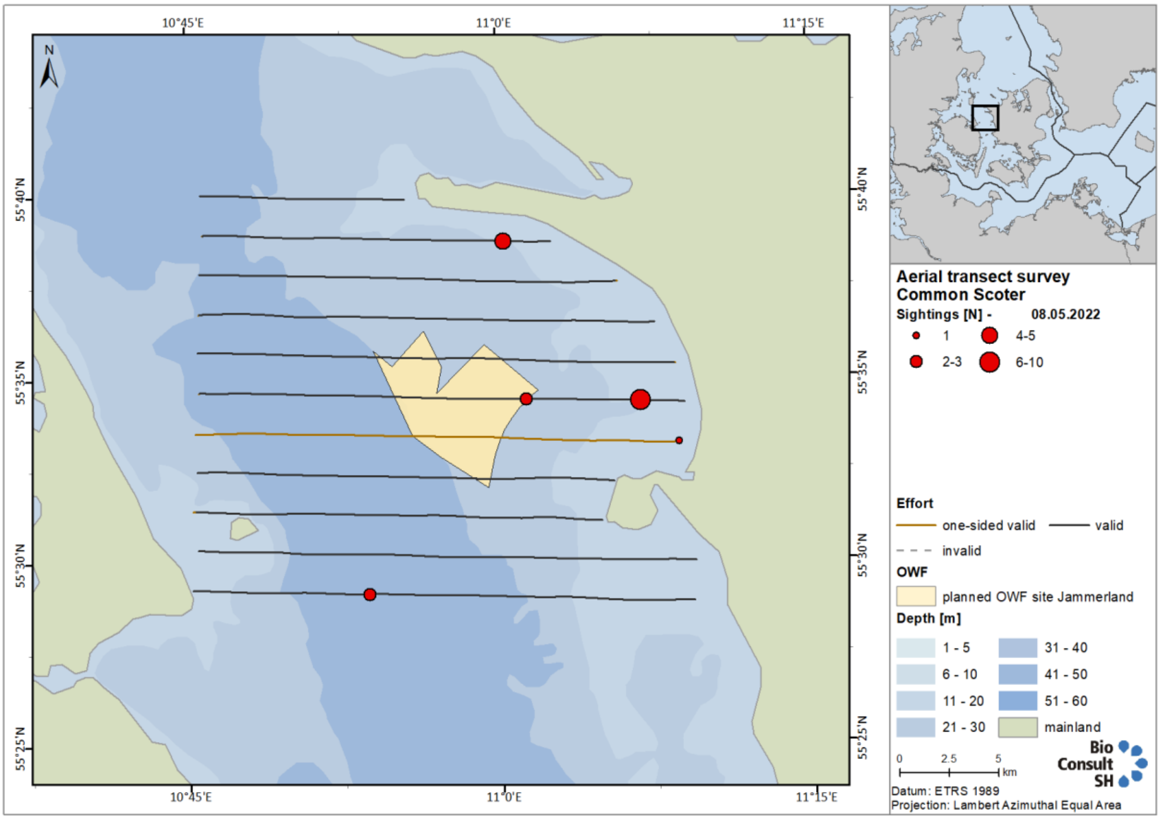

Figure A. 147 Common Scoter distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.13 Velvet Scoter

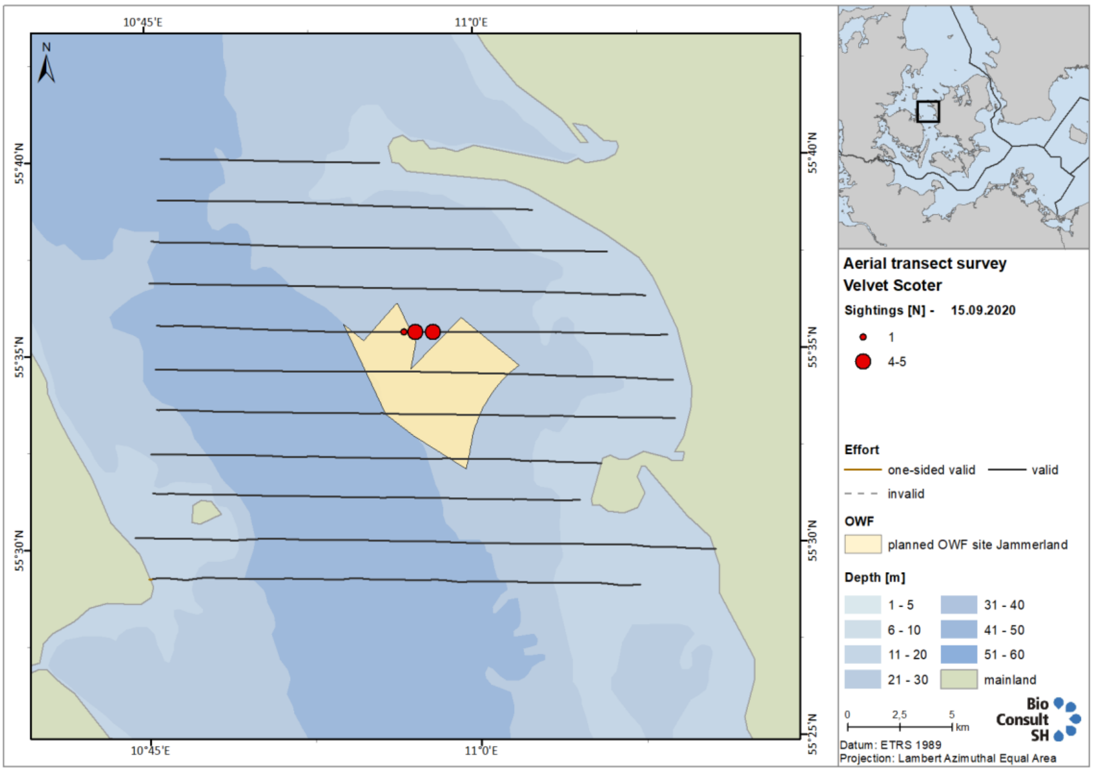

Figure A. 148 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

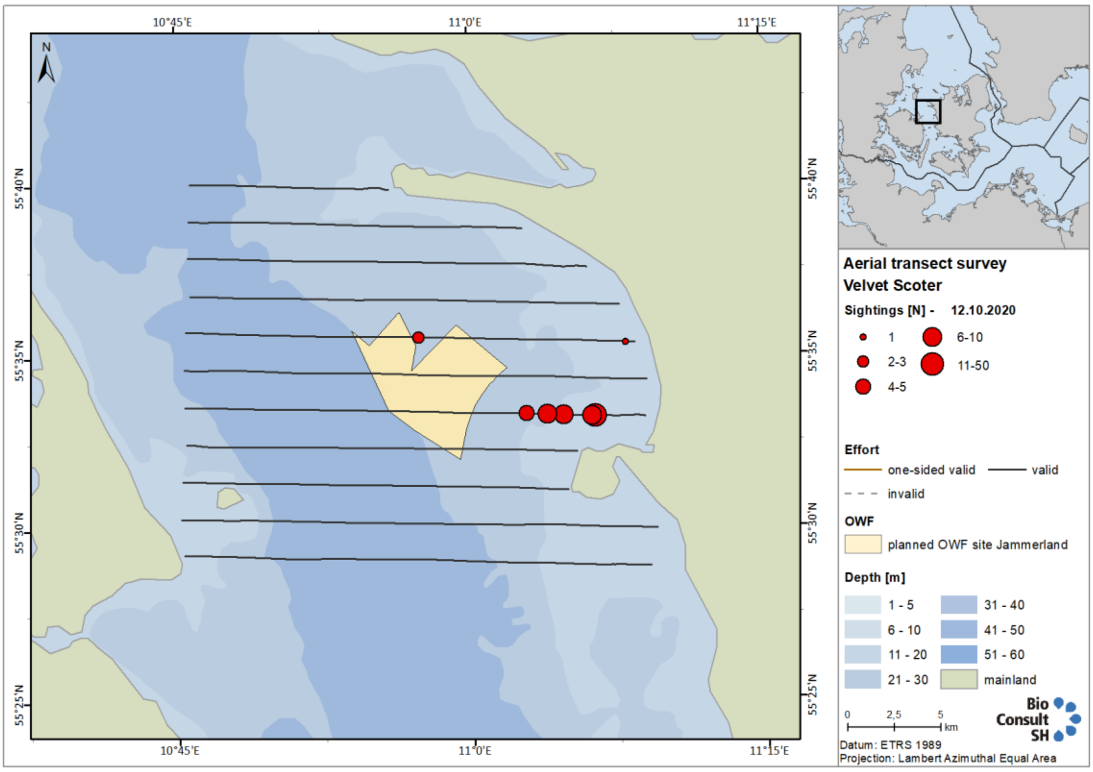

Figure A. 149 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

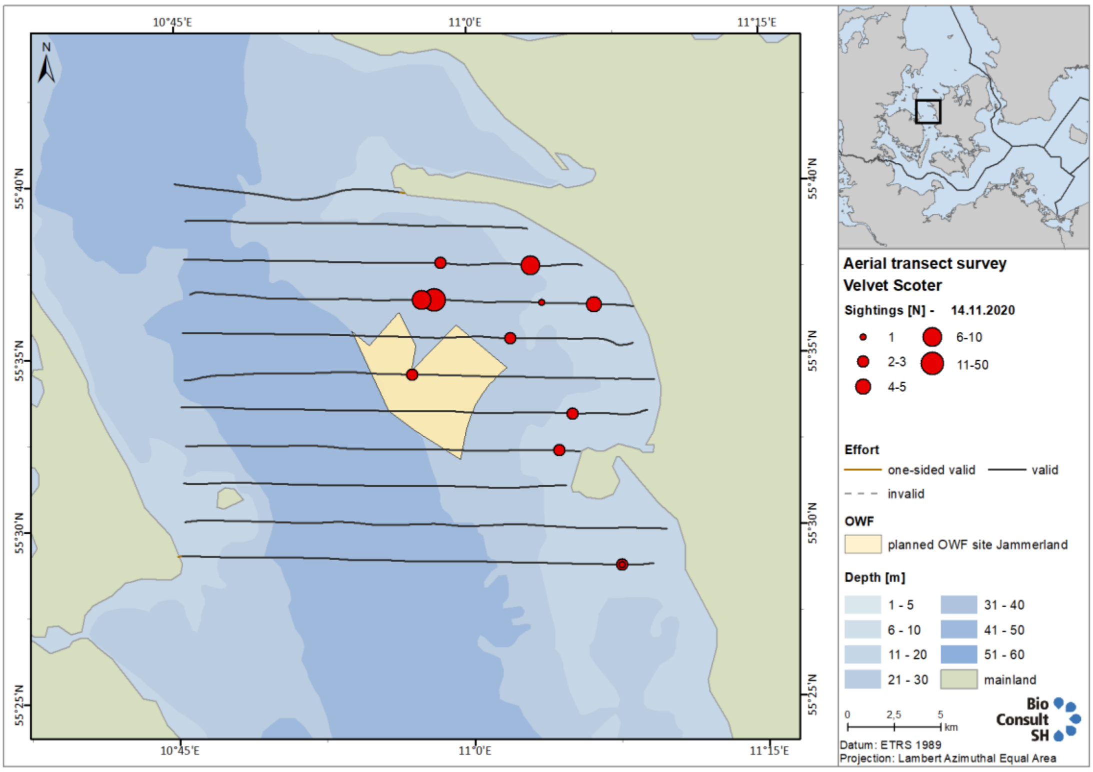

Figure A. 150 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

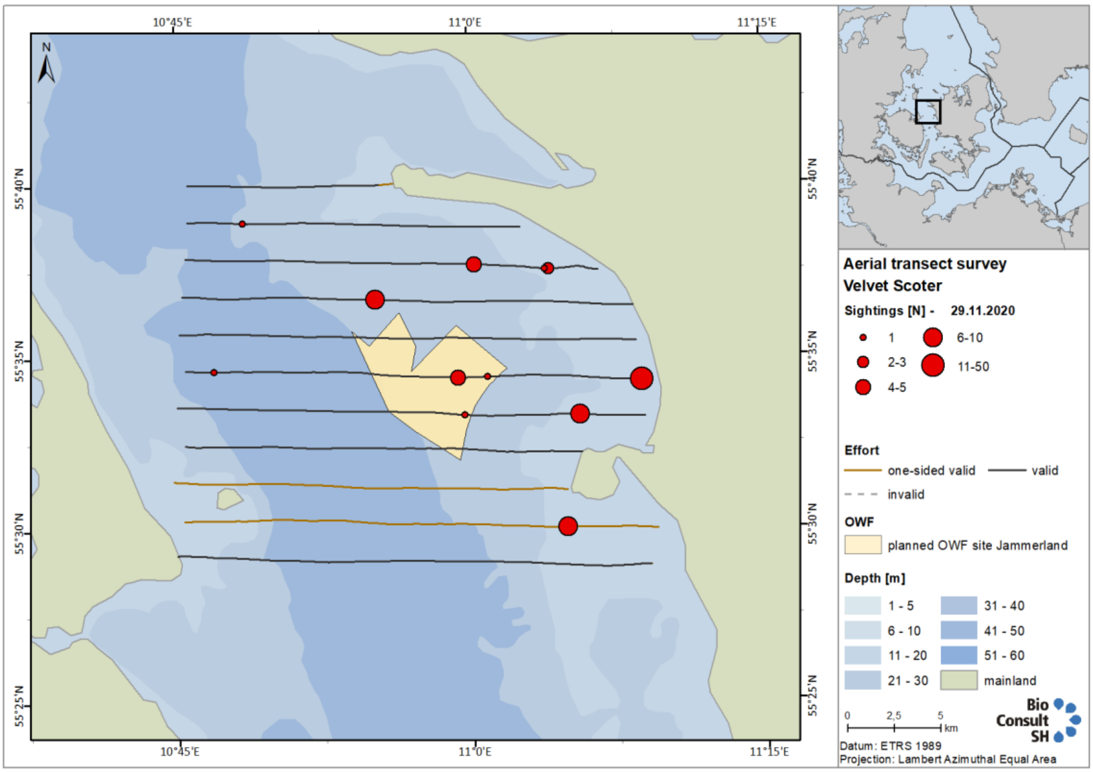

Figure A. 151 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

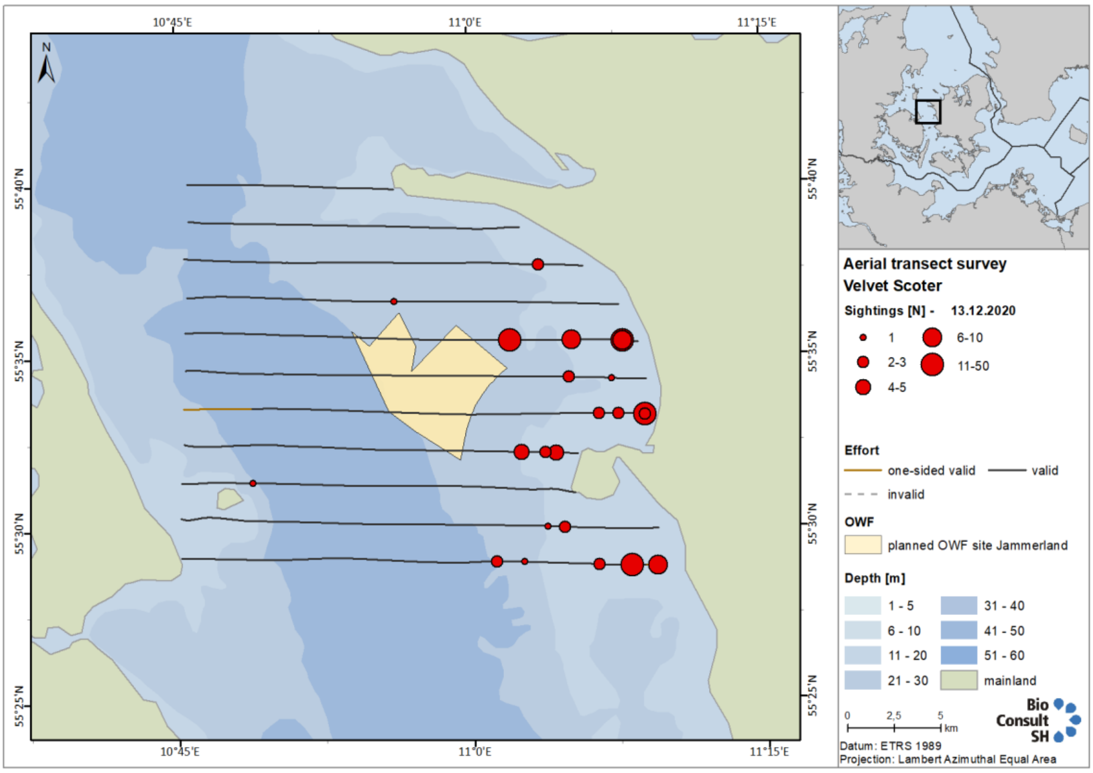

Figure A. 152 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

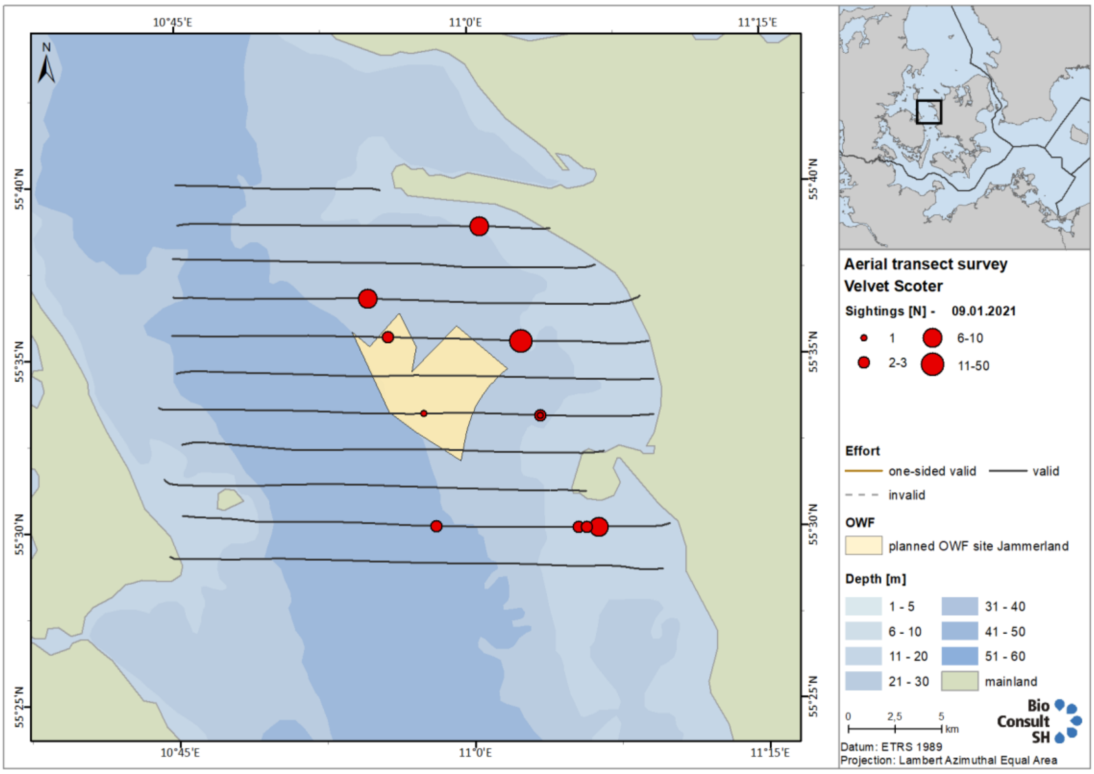

Figure A. 153 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

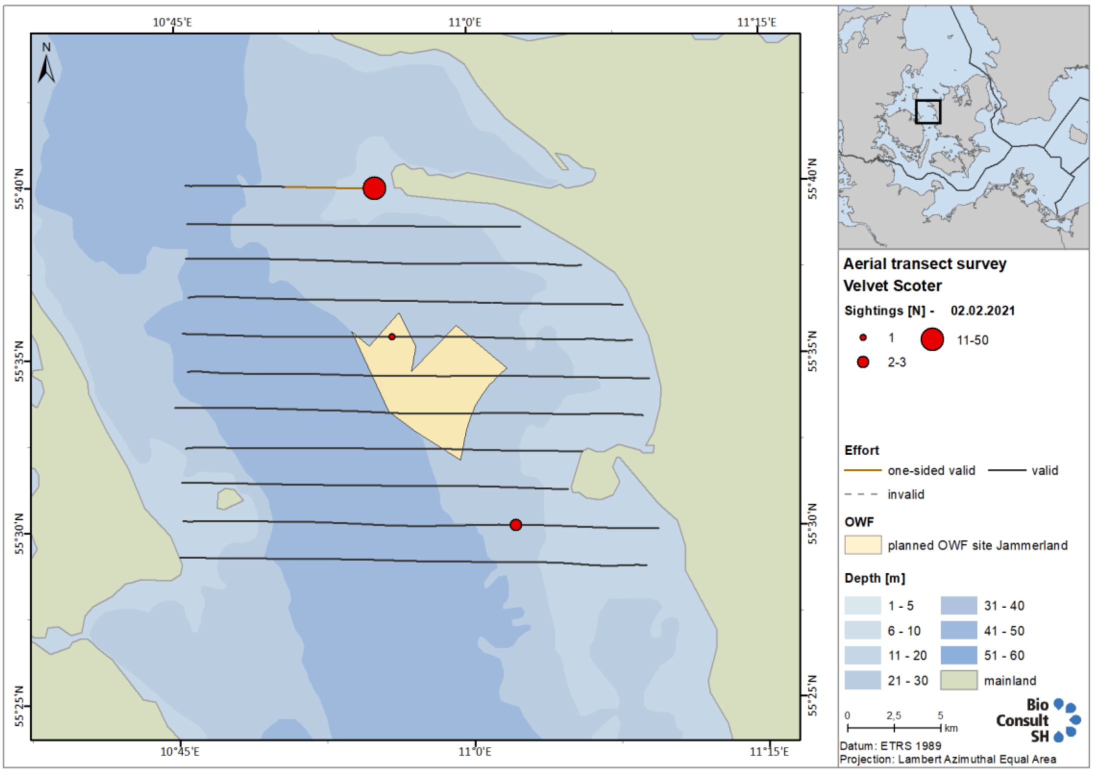

Figure A. 154 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

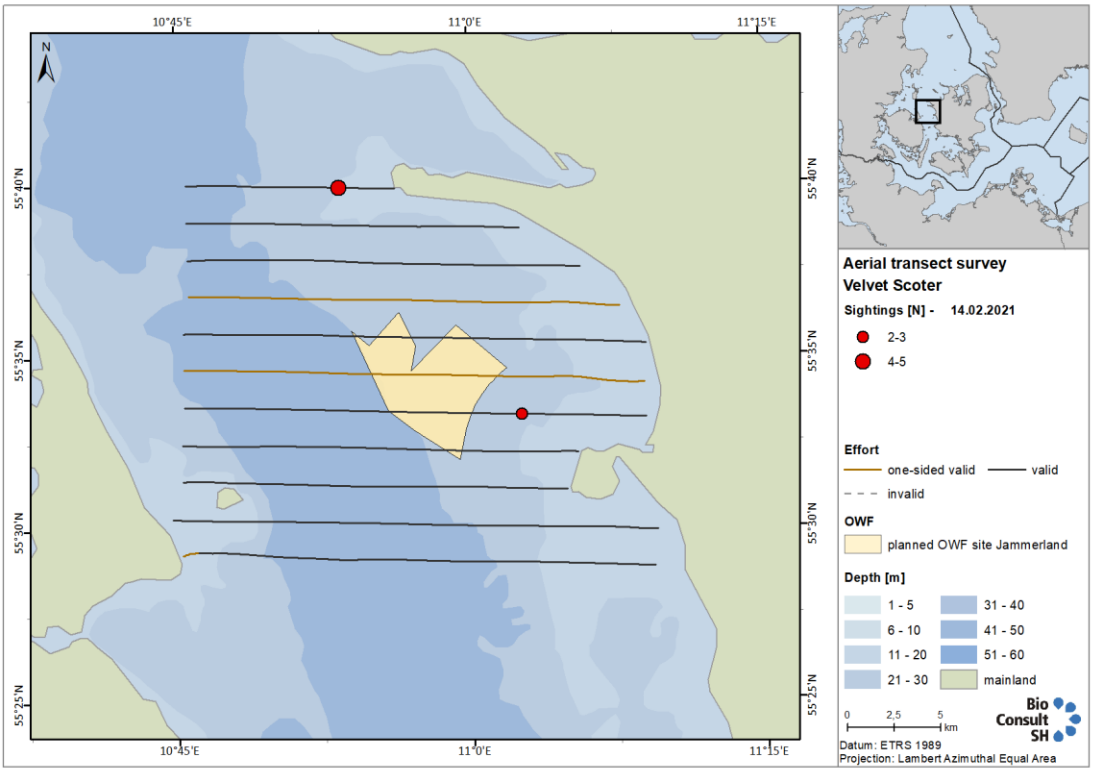

Figure A. 155 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

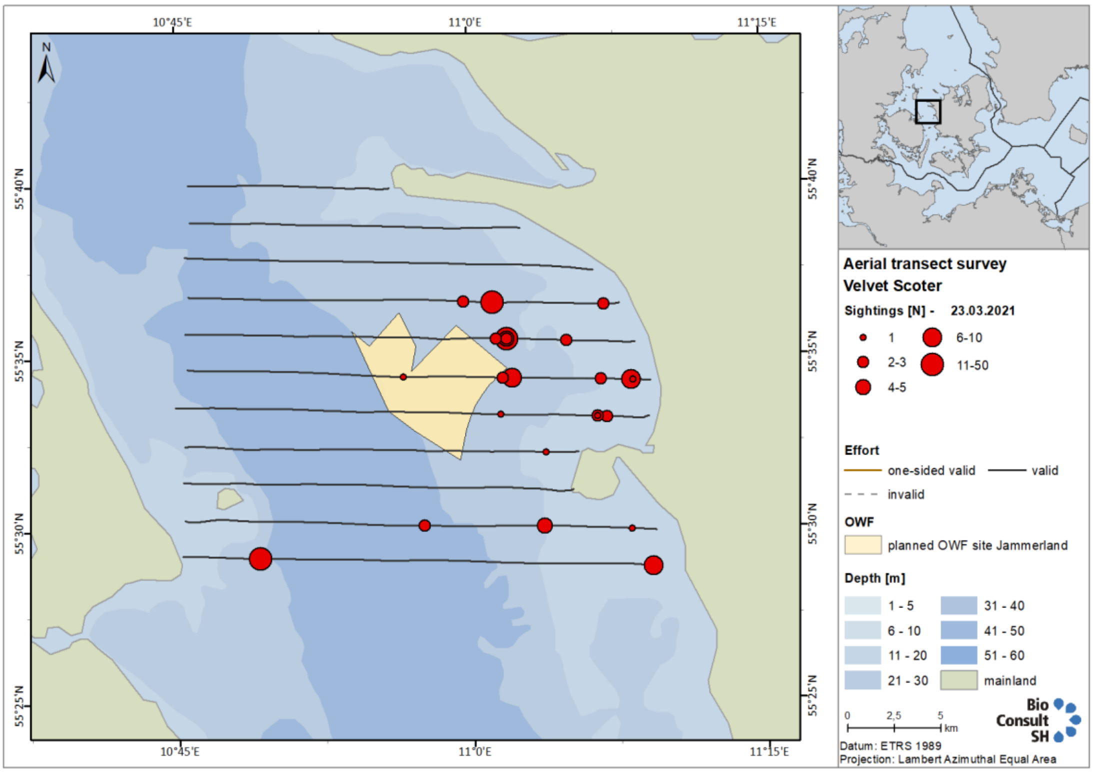

Figure A. 156 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

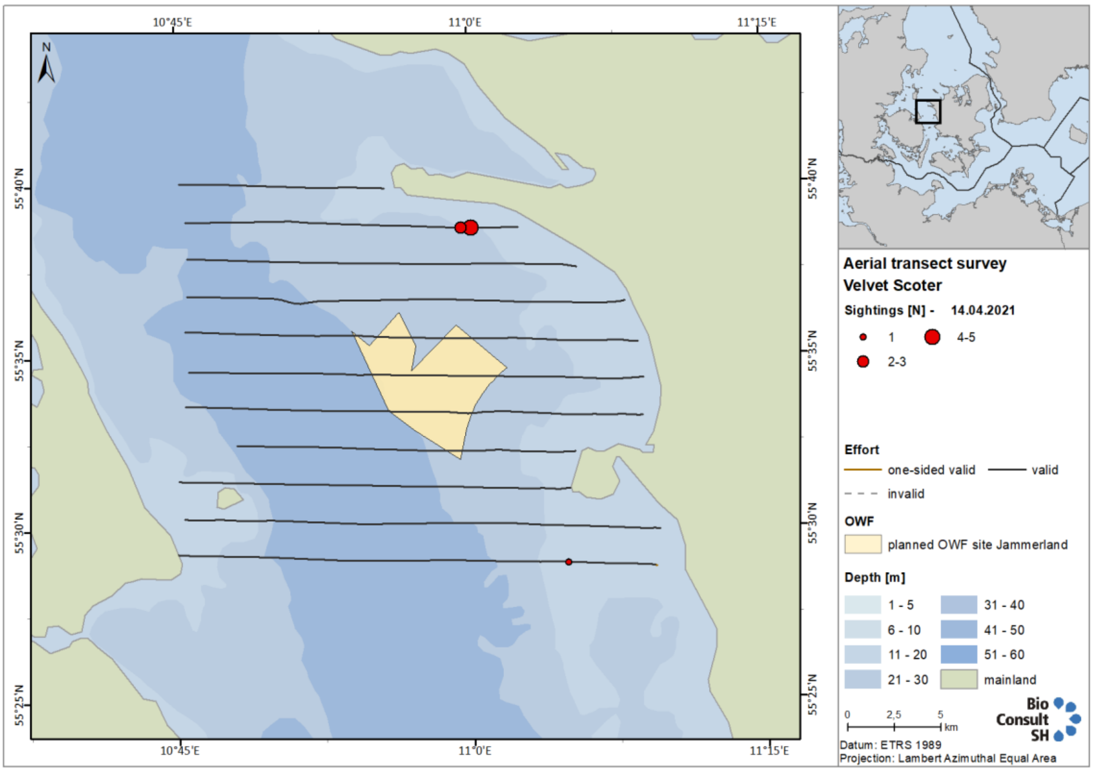

Figure A. 157 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

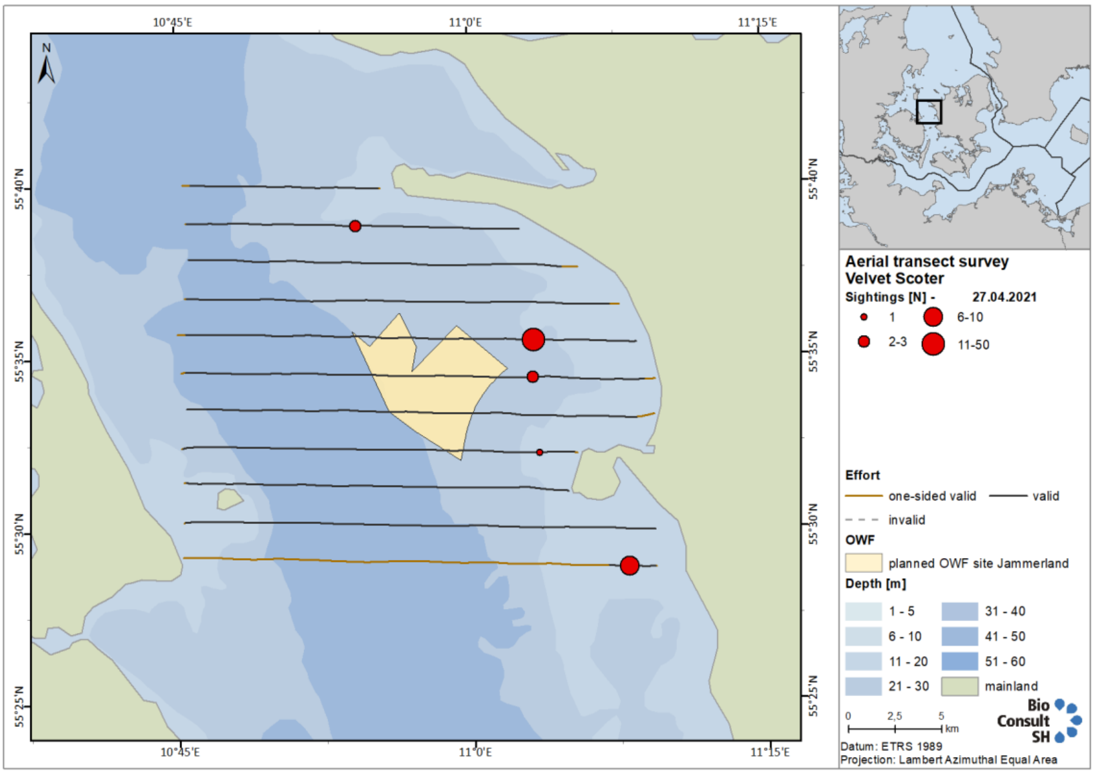

Figure A. 158 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

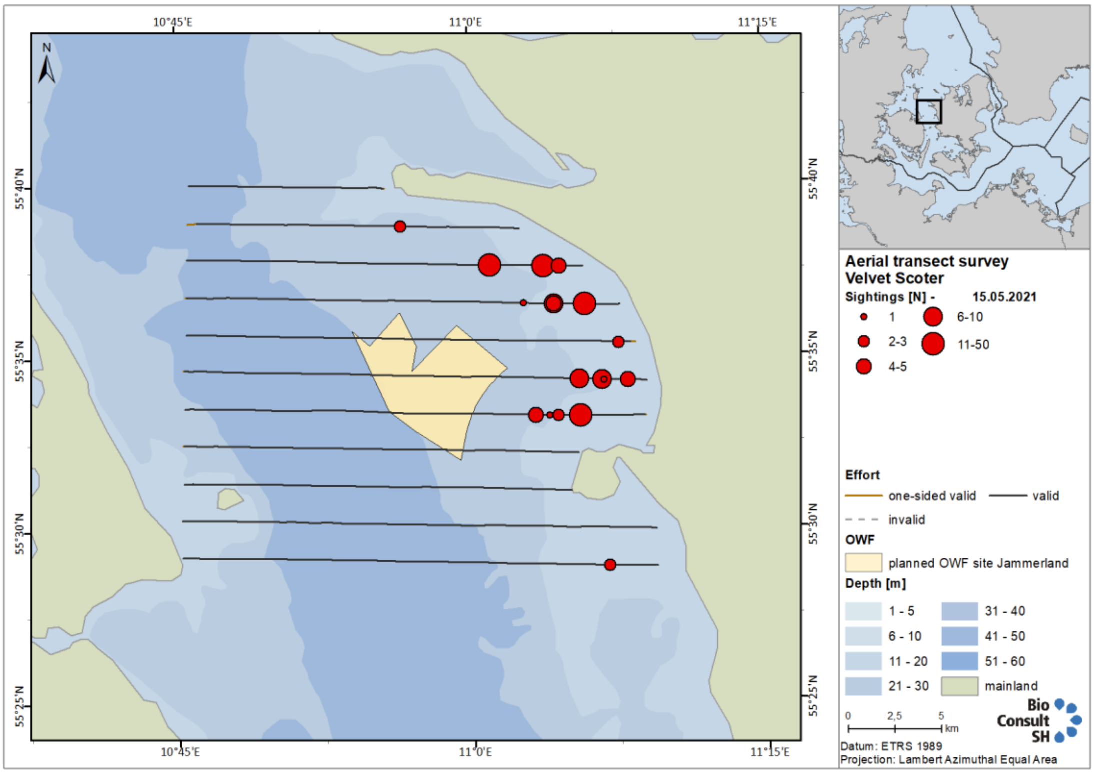

Figure A. 159 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

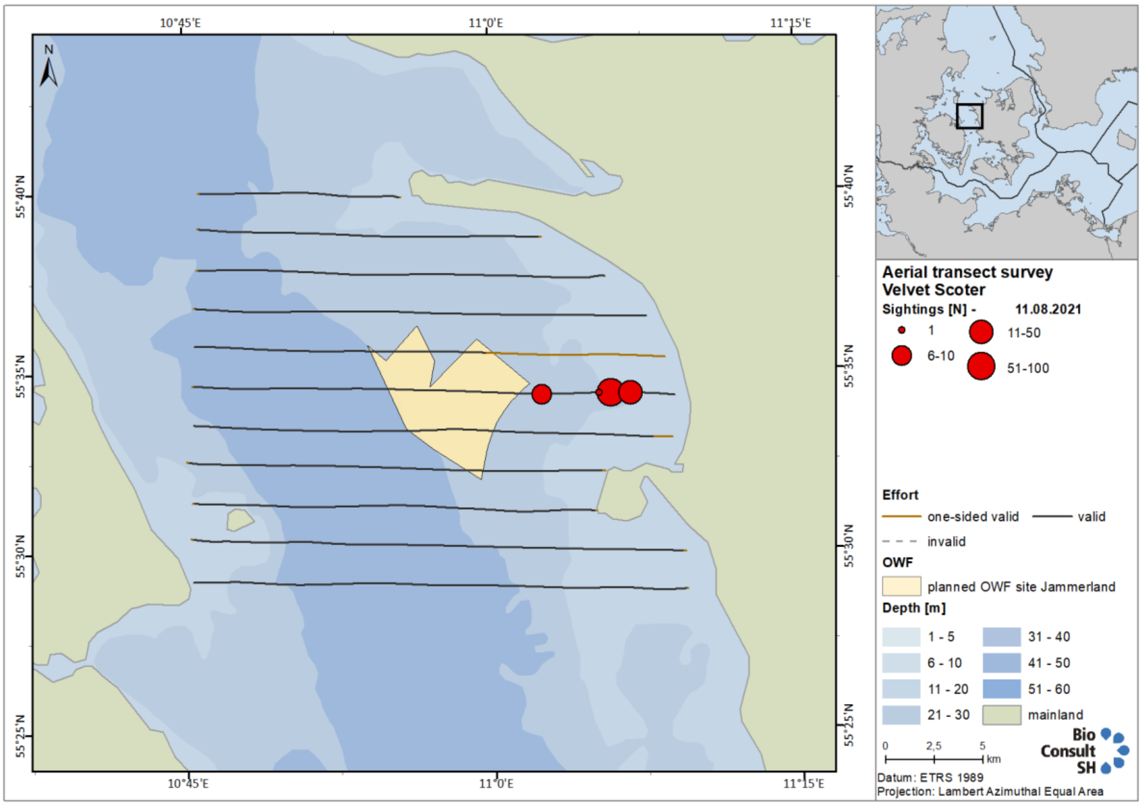

Figure A. 160 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

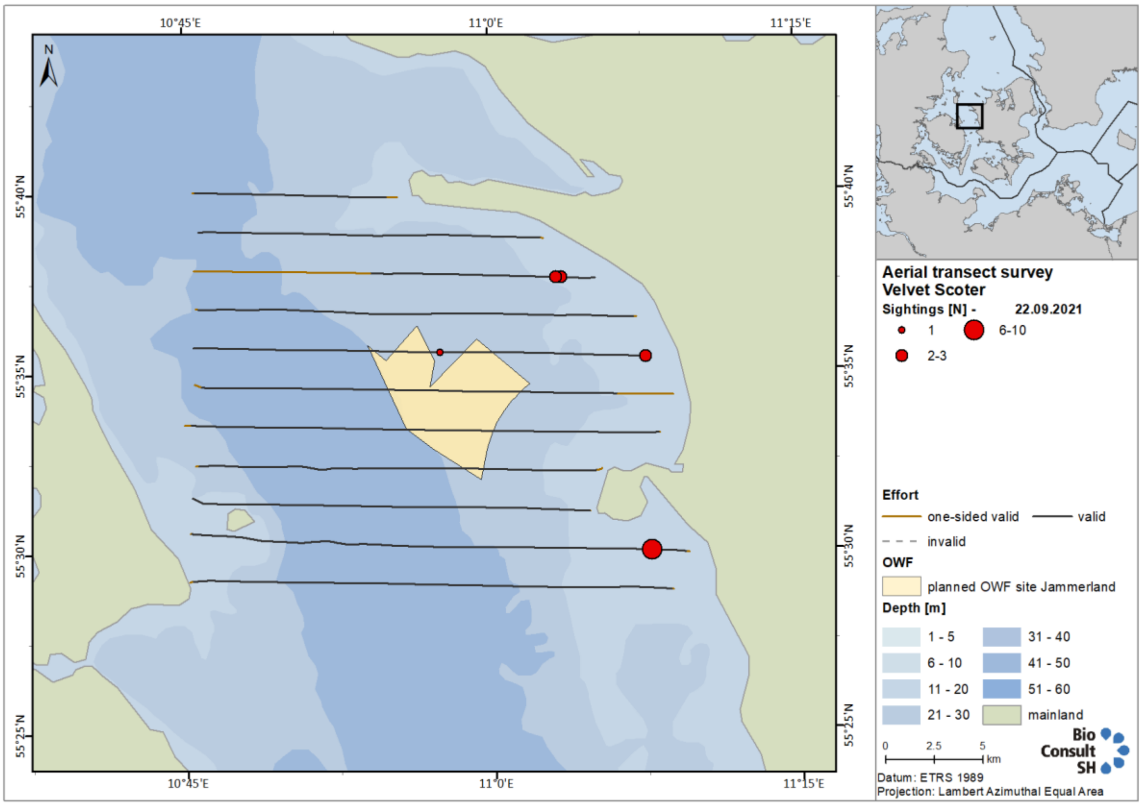

Figure A. 161 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

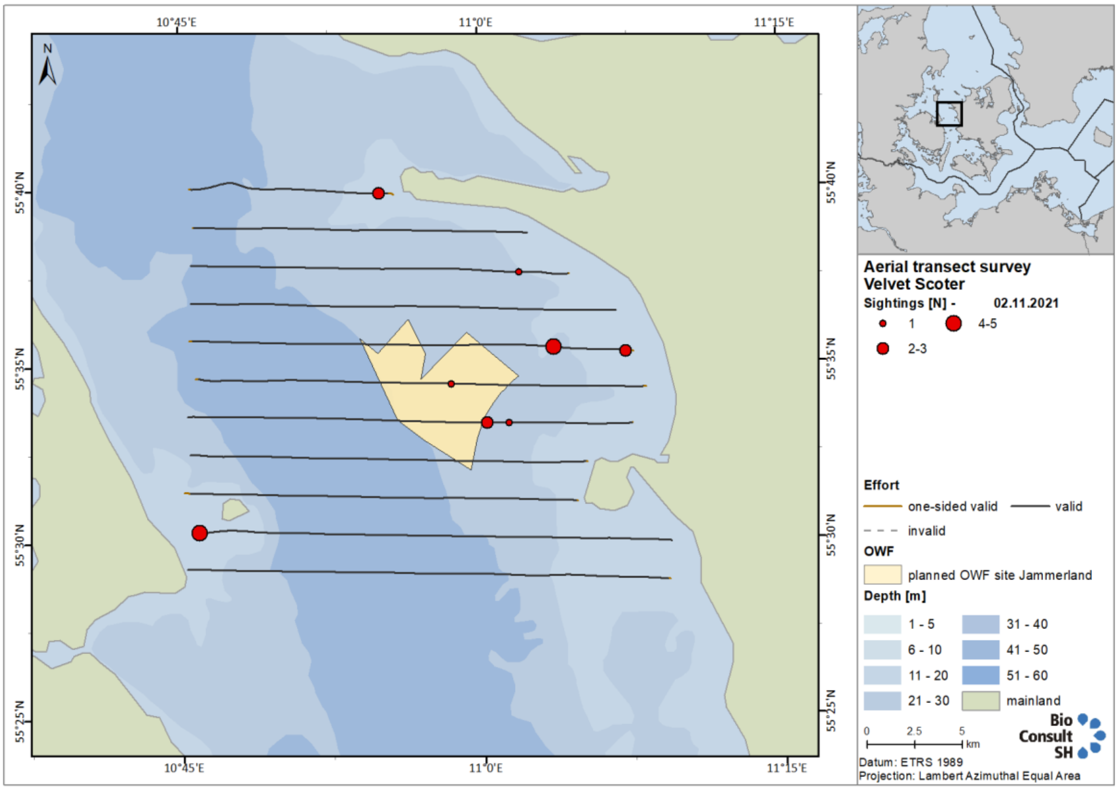

Figure A. 162 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

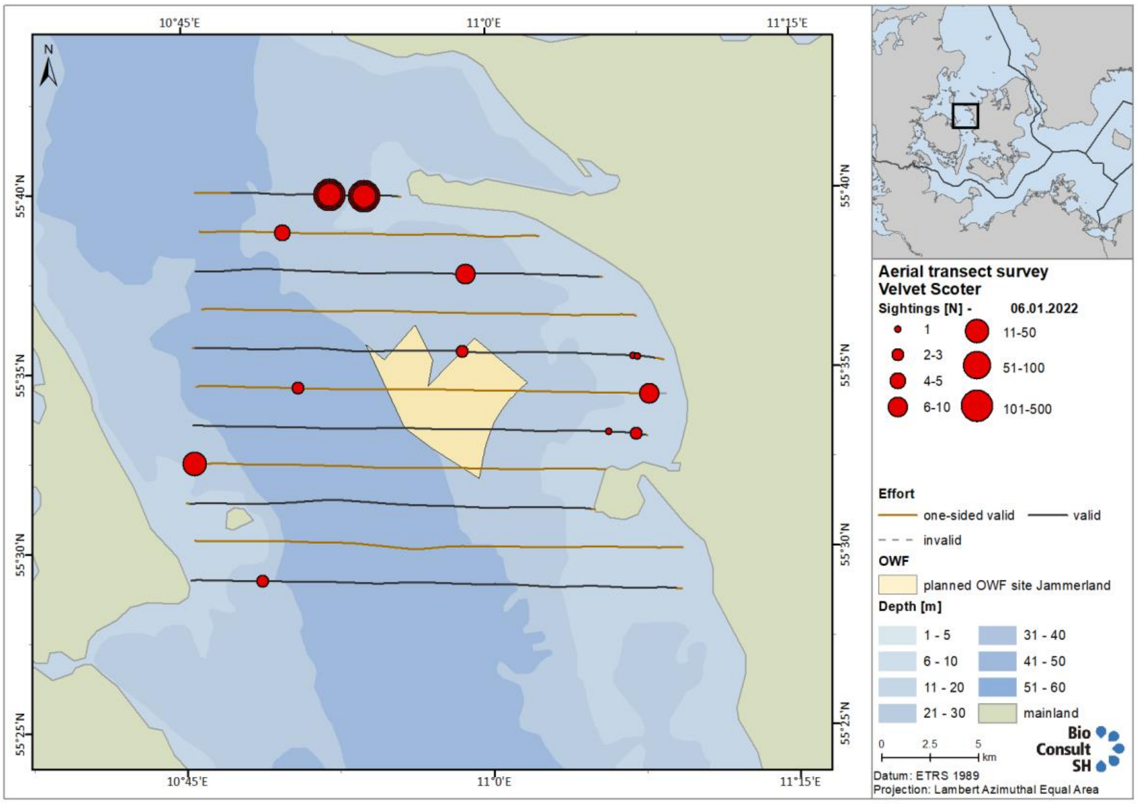

Figure A. 163 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

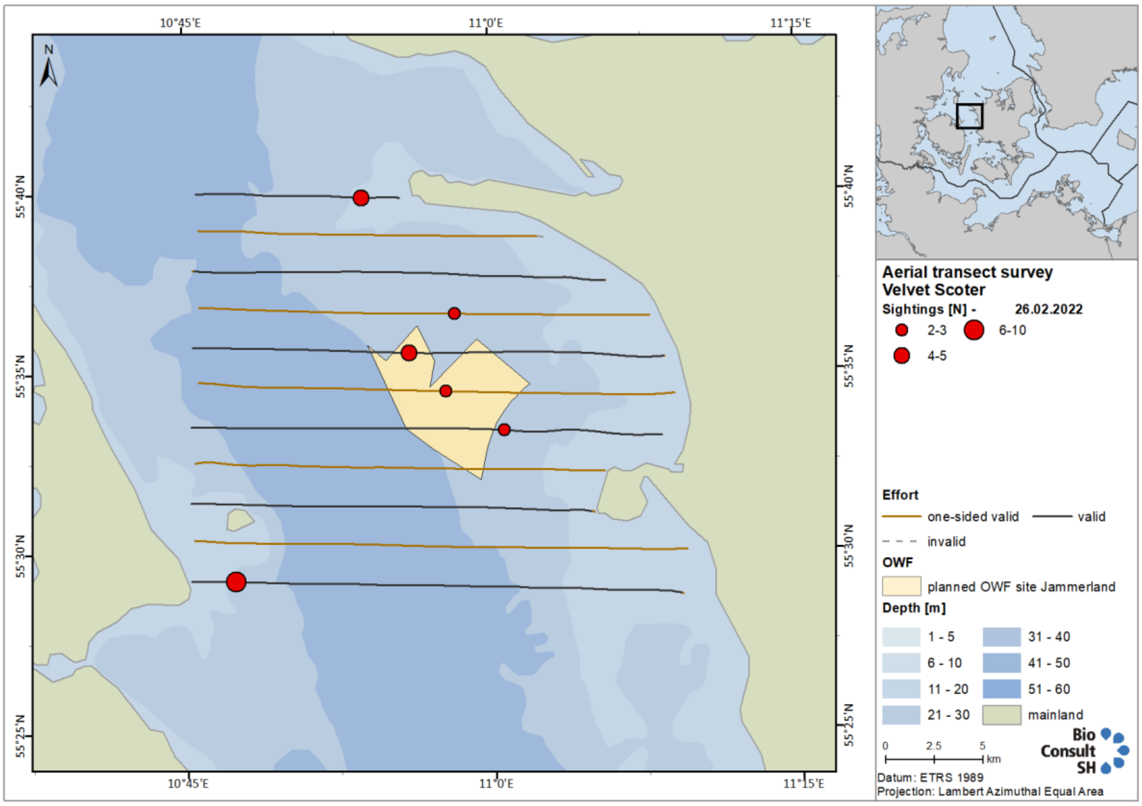

Figure A. 164 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

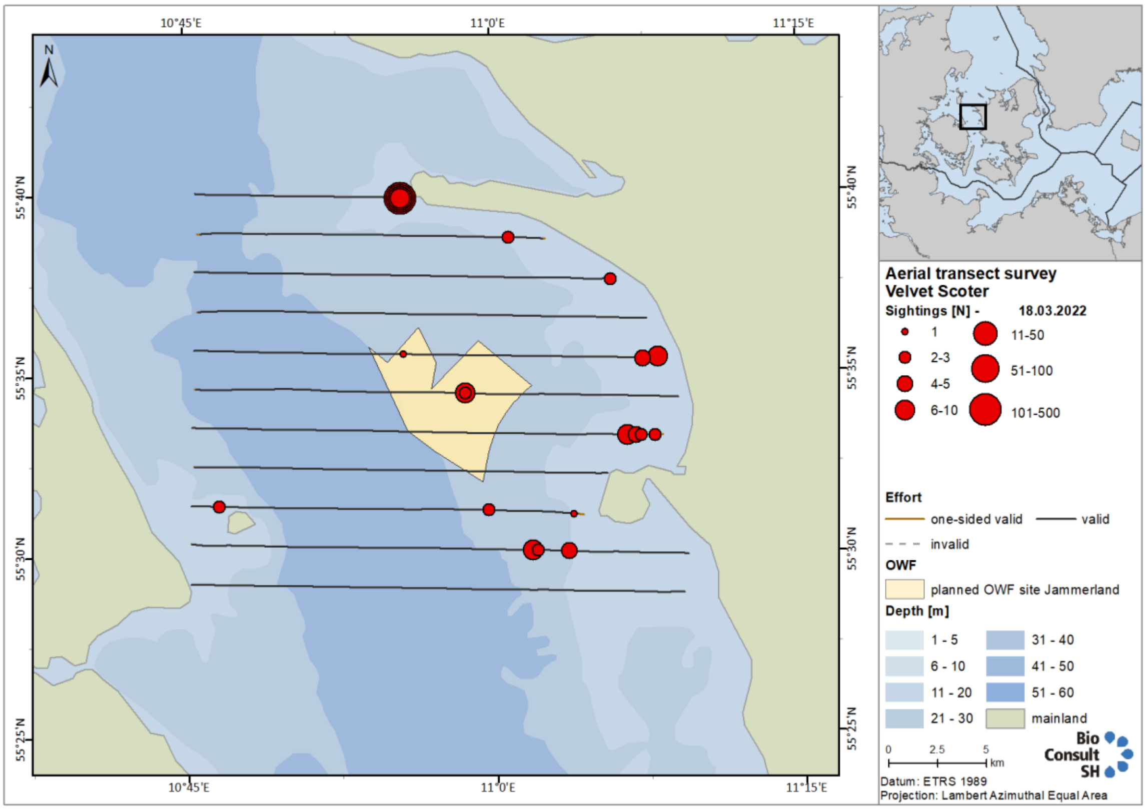

Figure A. 165 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

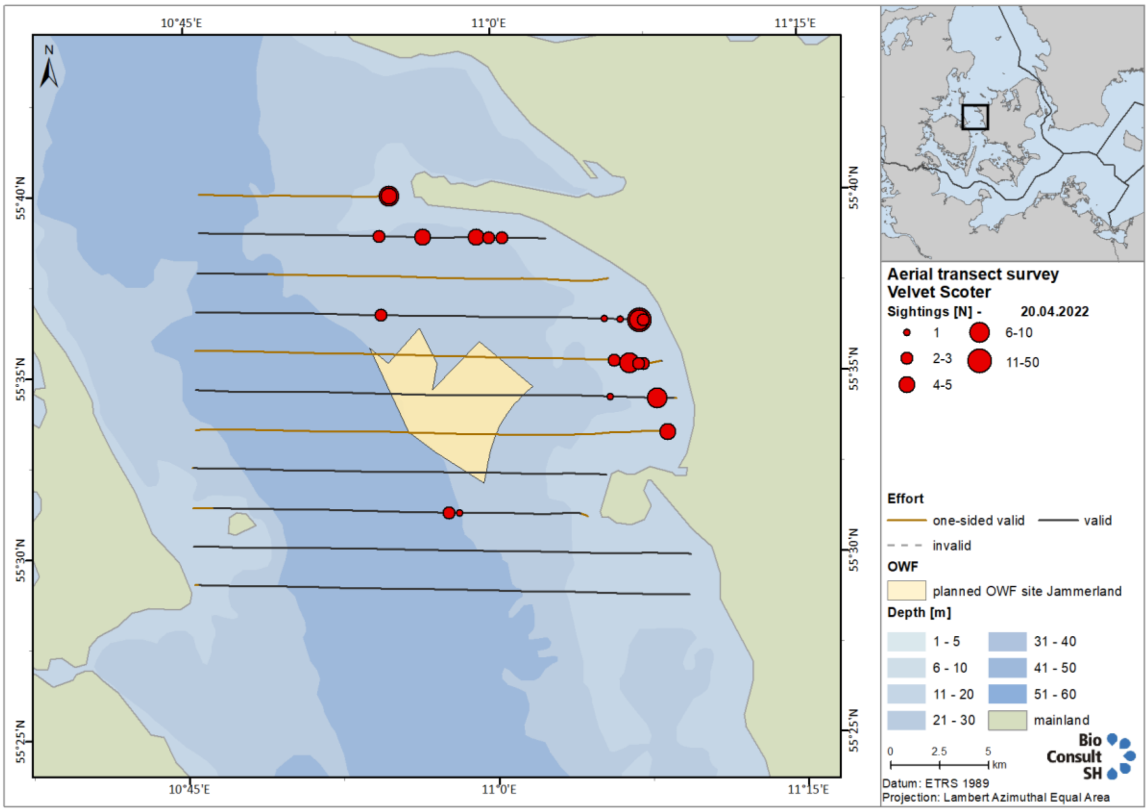

Figure A. 166 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

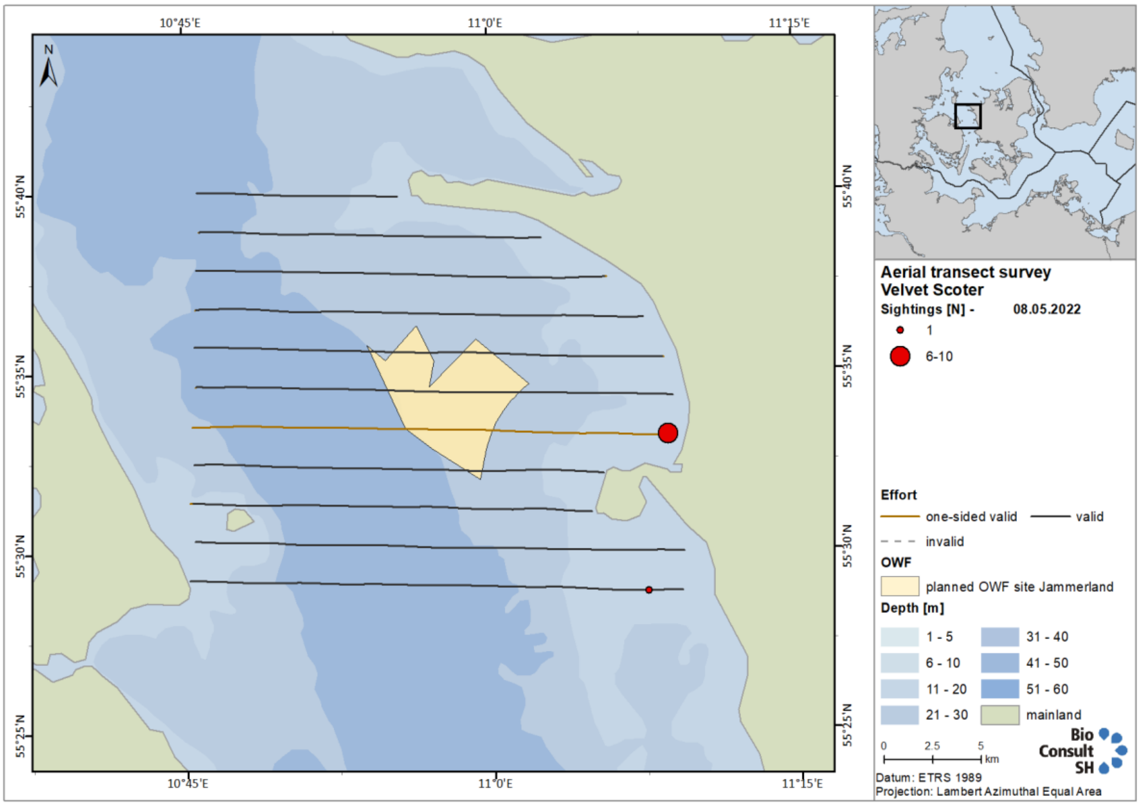

Figure A. 167 Velvet Scoter distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.14 Common Goldeneye

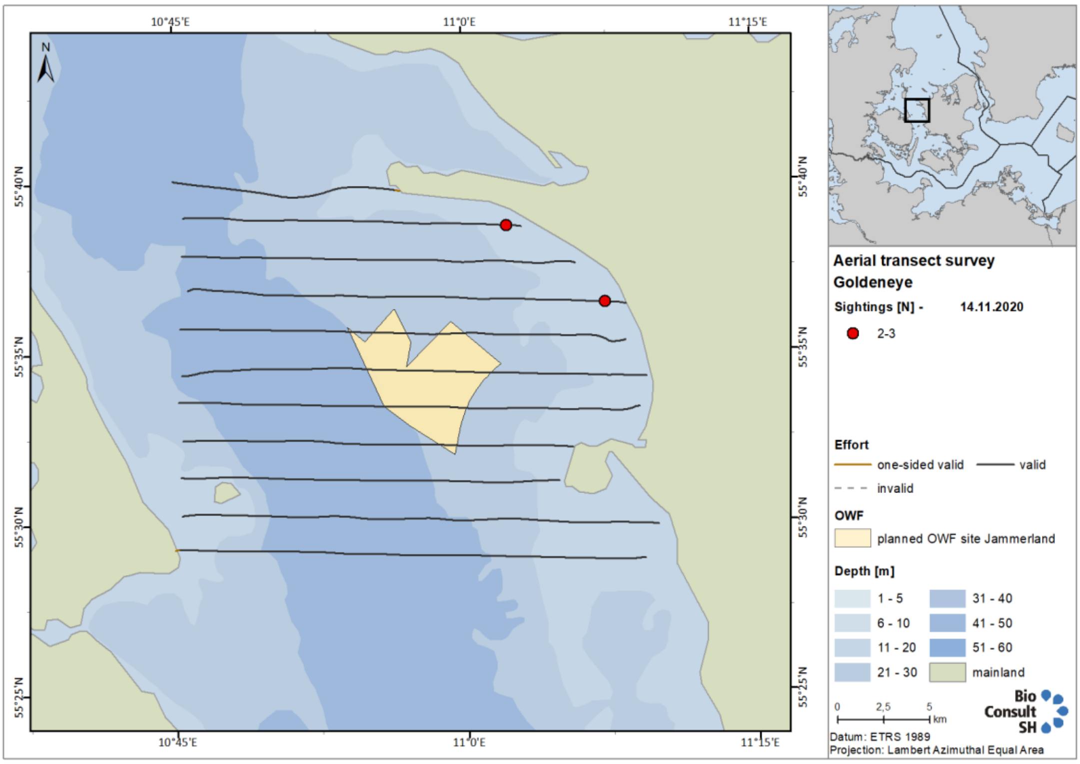

Figure A. 168 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

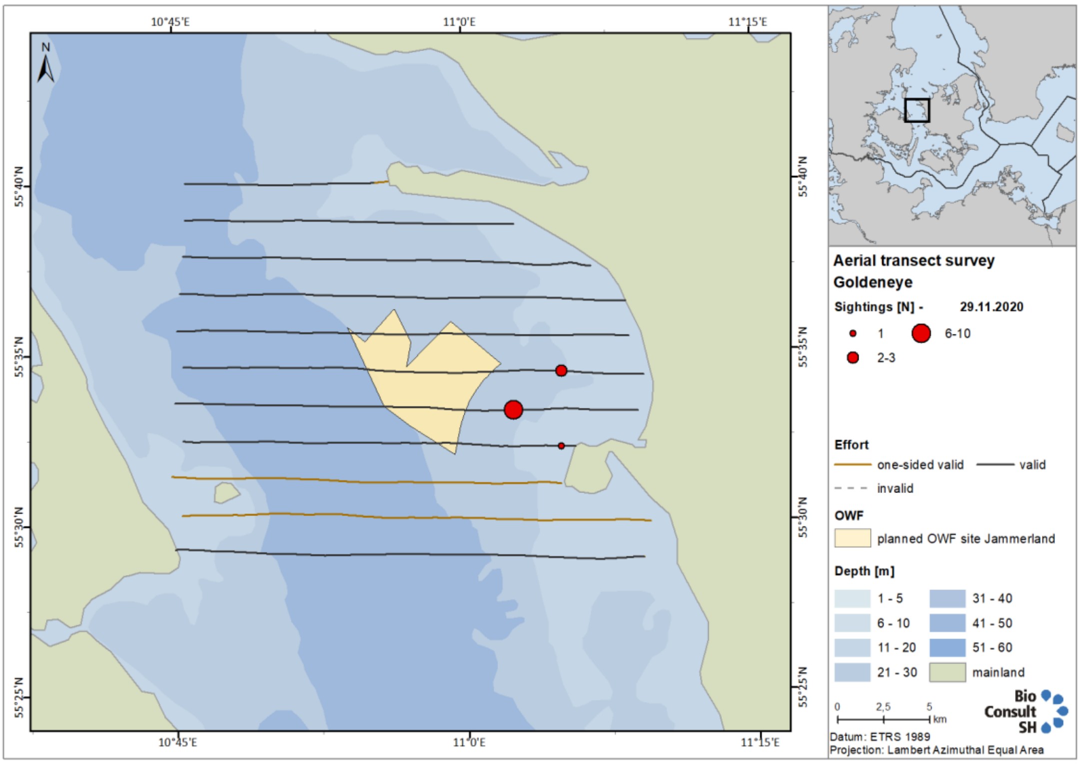

Figure A. 169 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

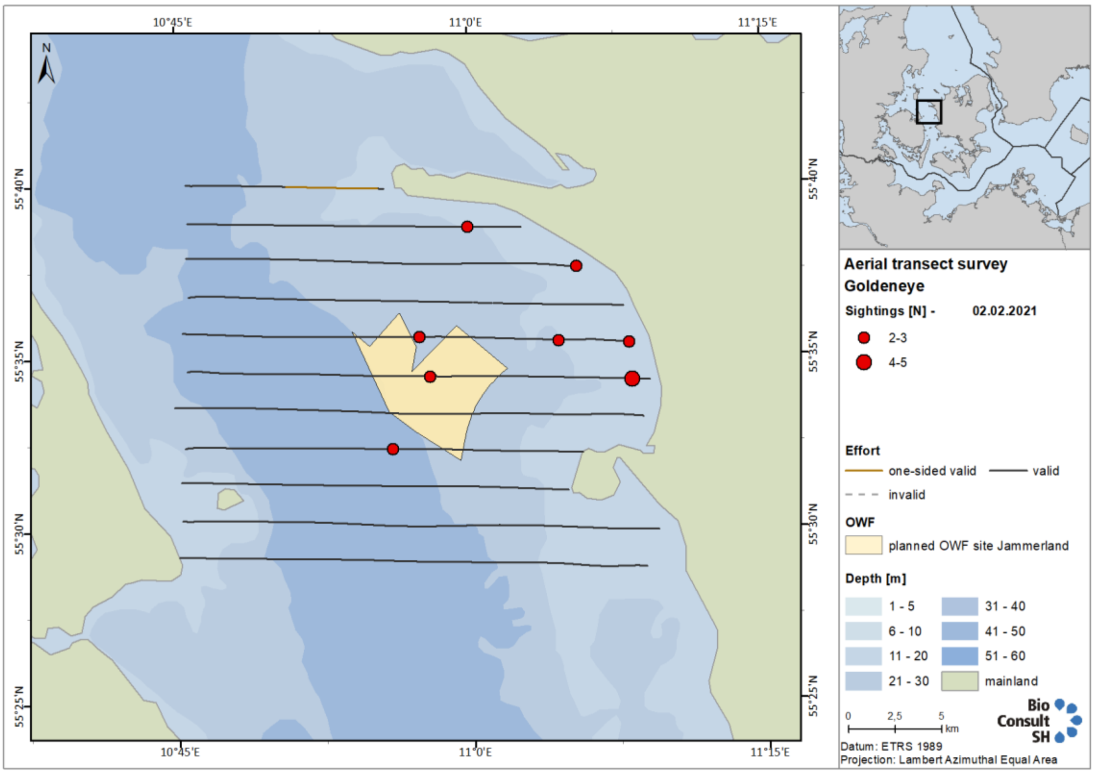

Figure A. 170 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

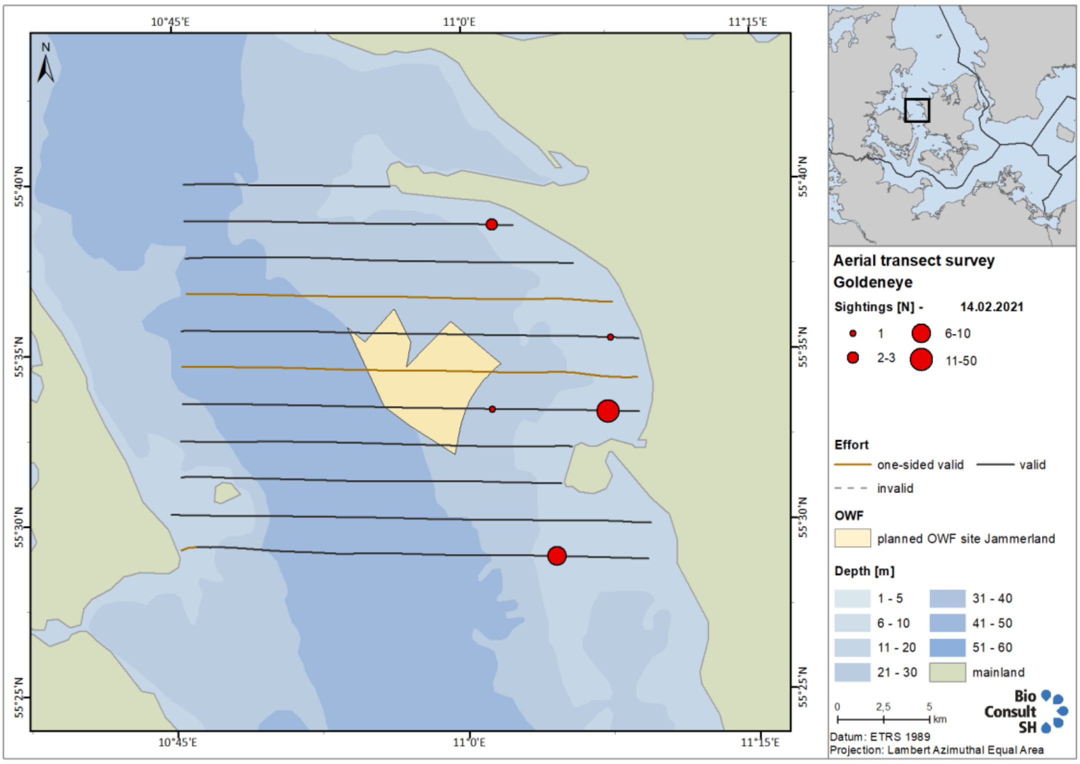

Figure A. 171 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

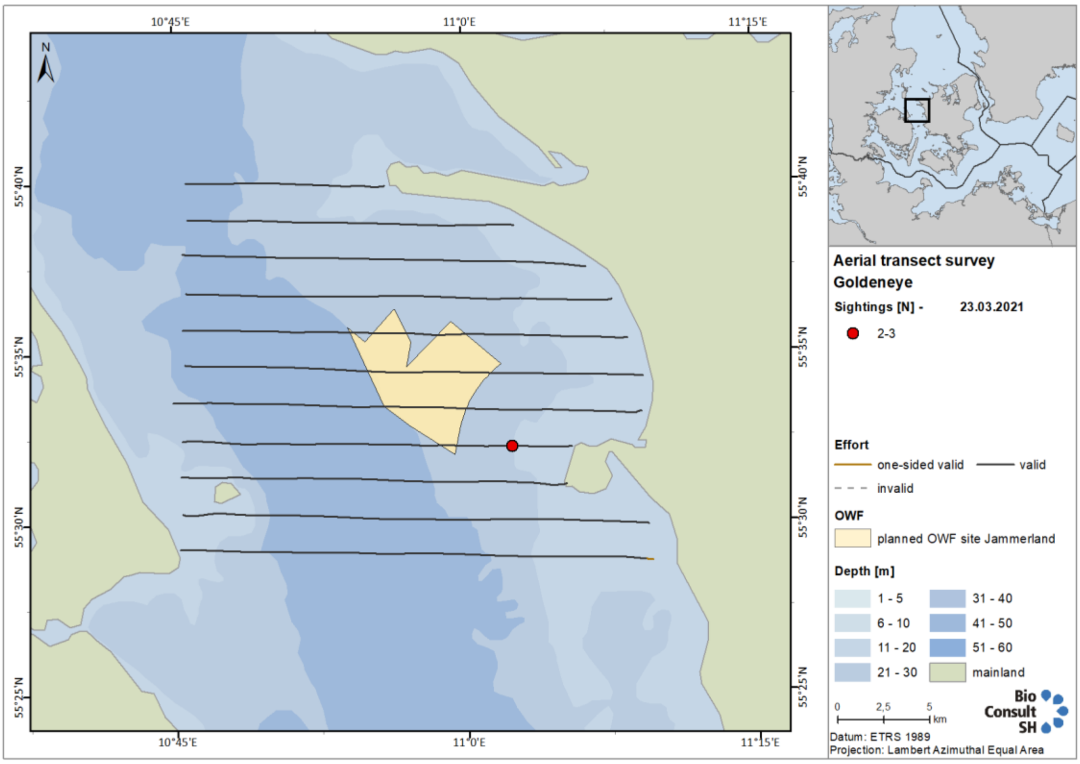

Figure A. 172 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

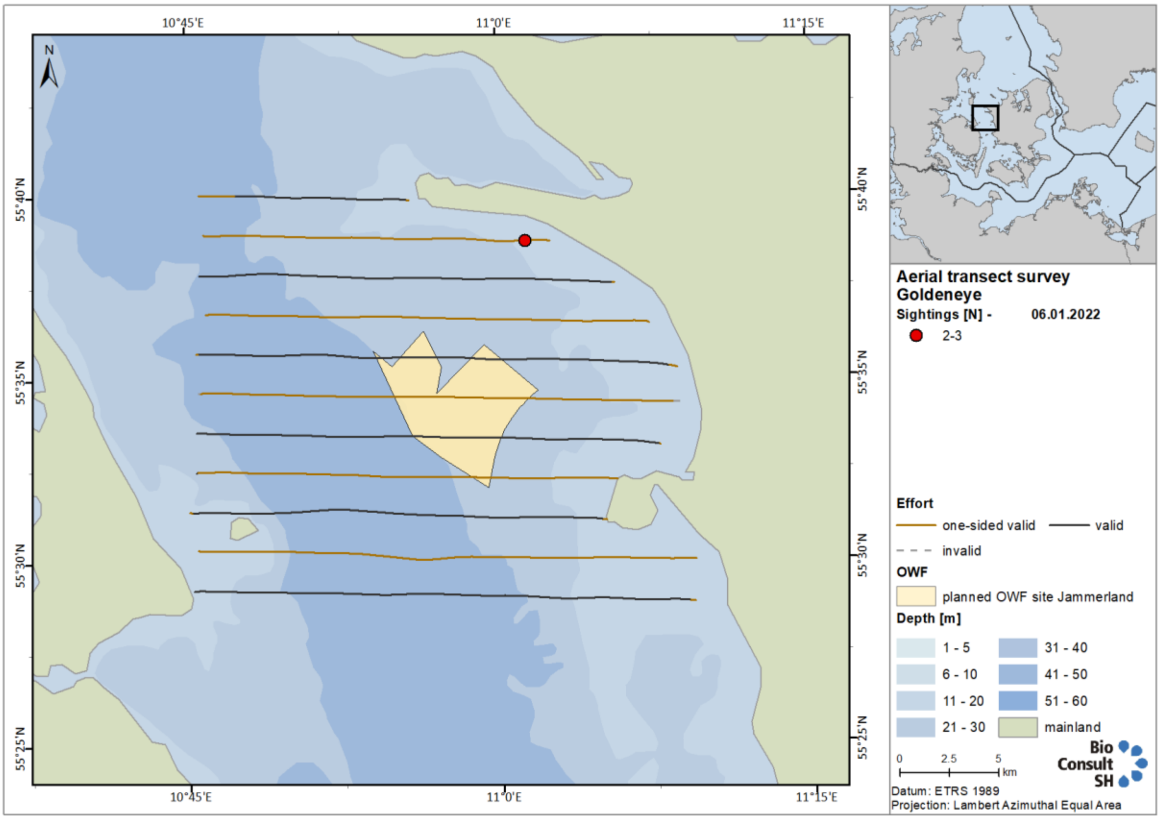

Figure A. 173 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

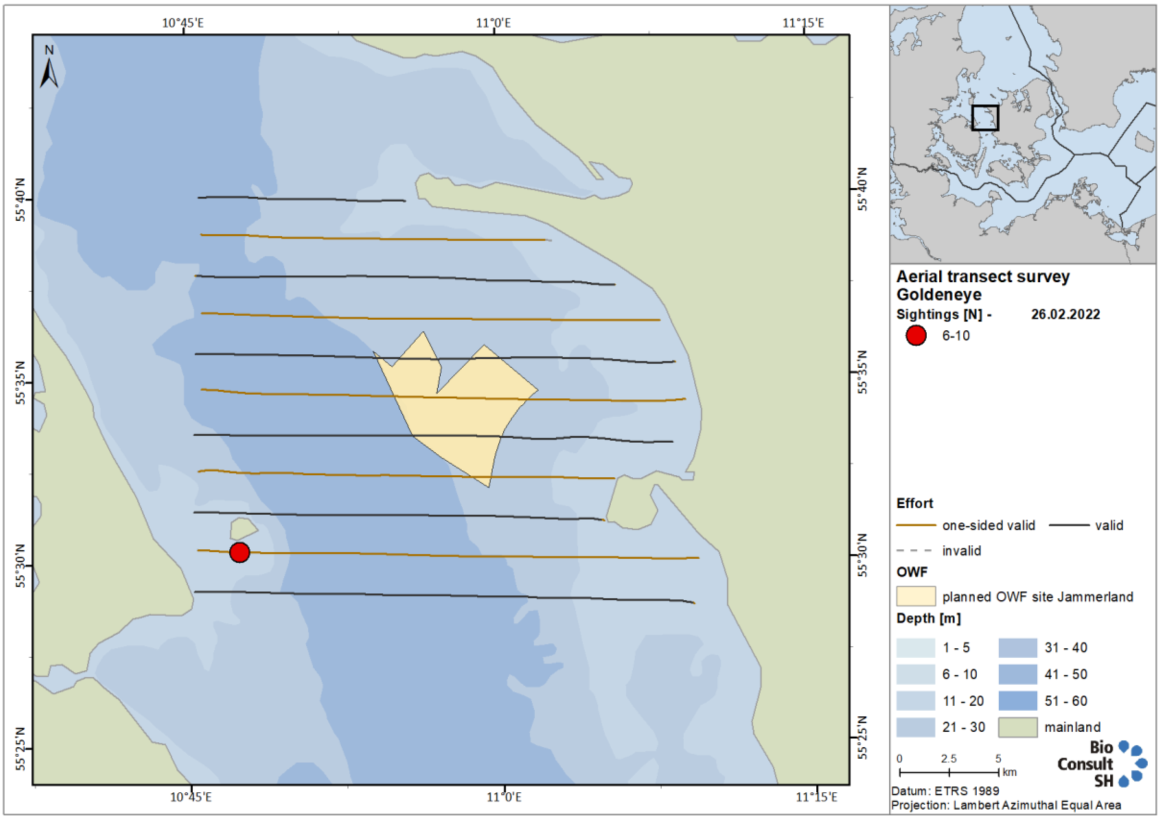

Figure A. 174 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

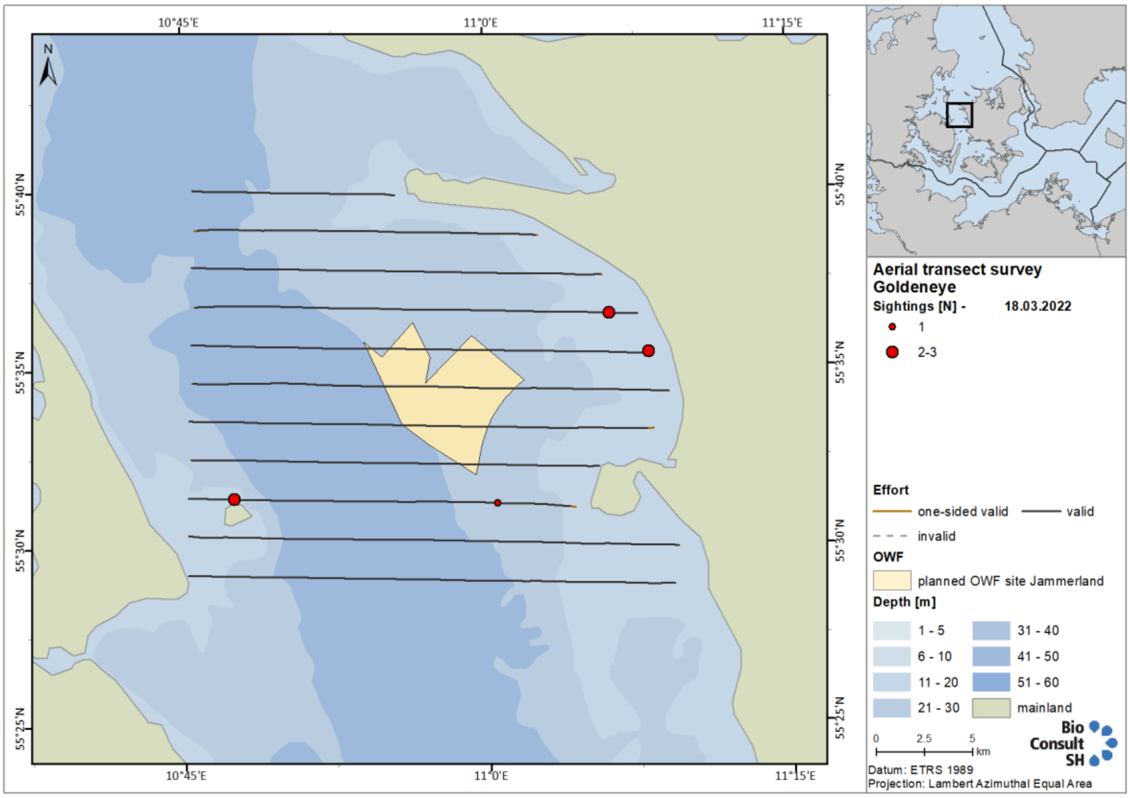

Figure A. 175 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

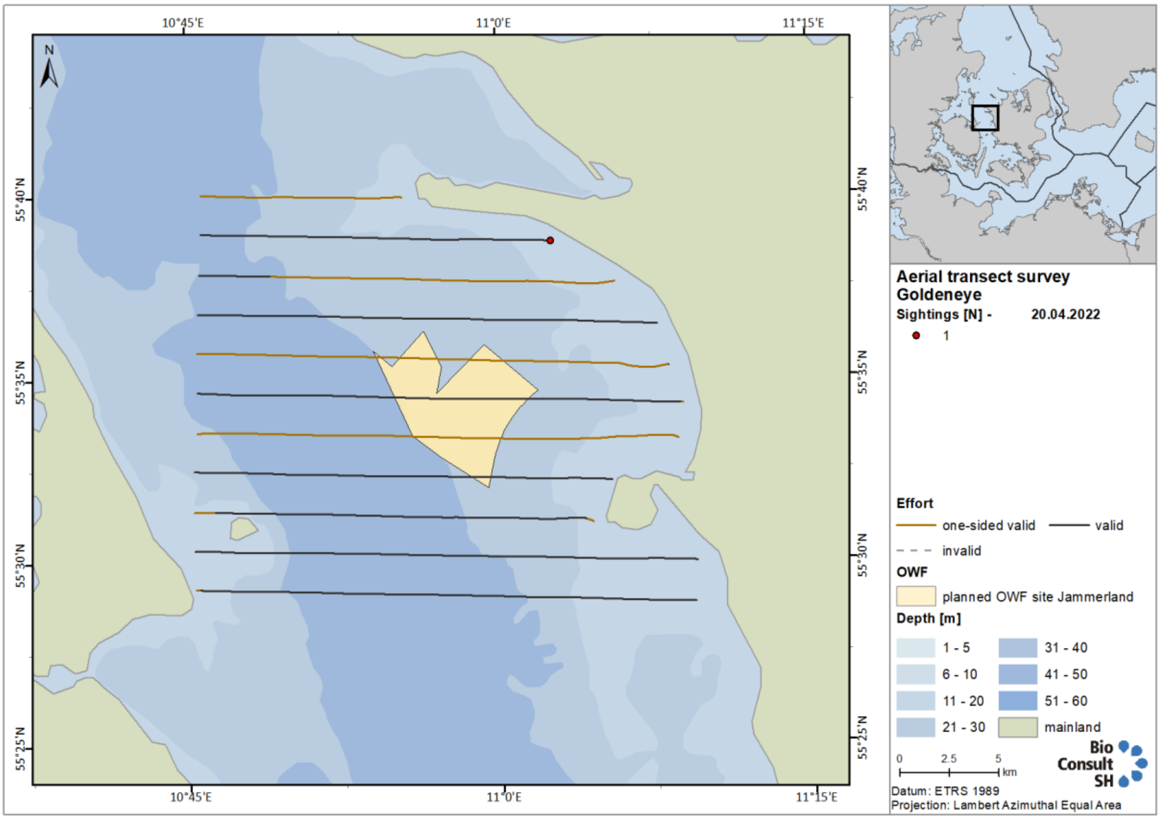

Figure A. 176 Common Goldeneye distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

A.1.15 Red-breasted Merganser

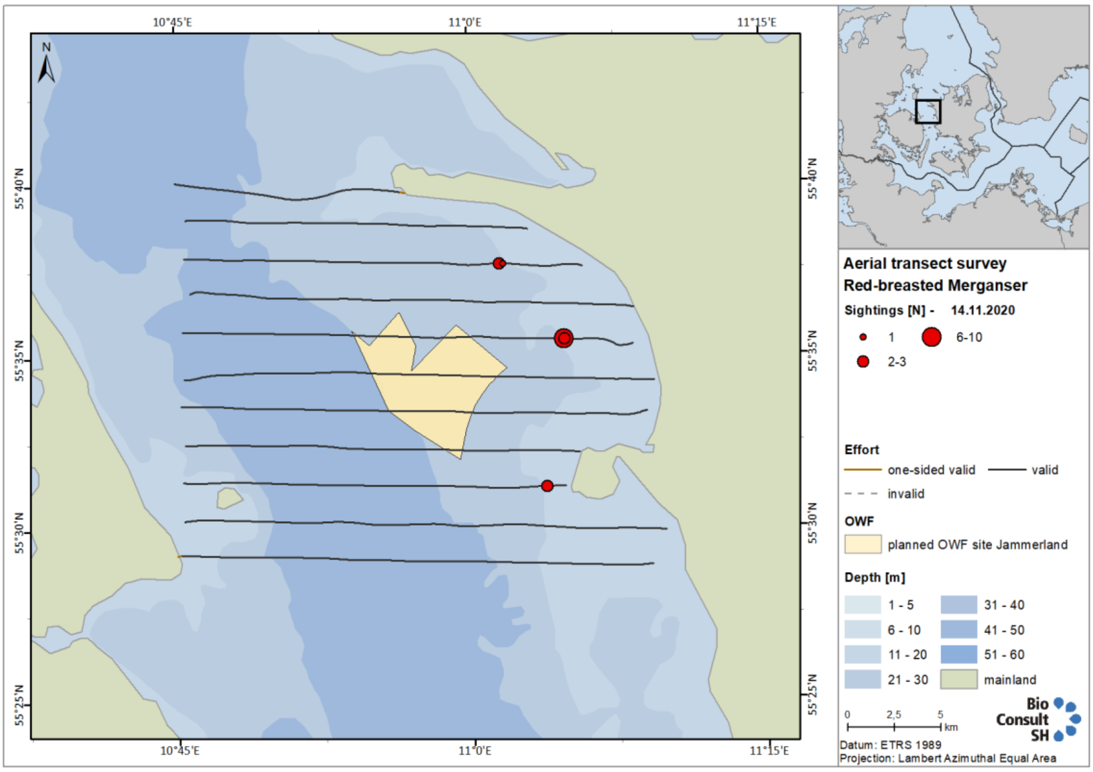

Figure A. 177 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 14th November 2020

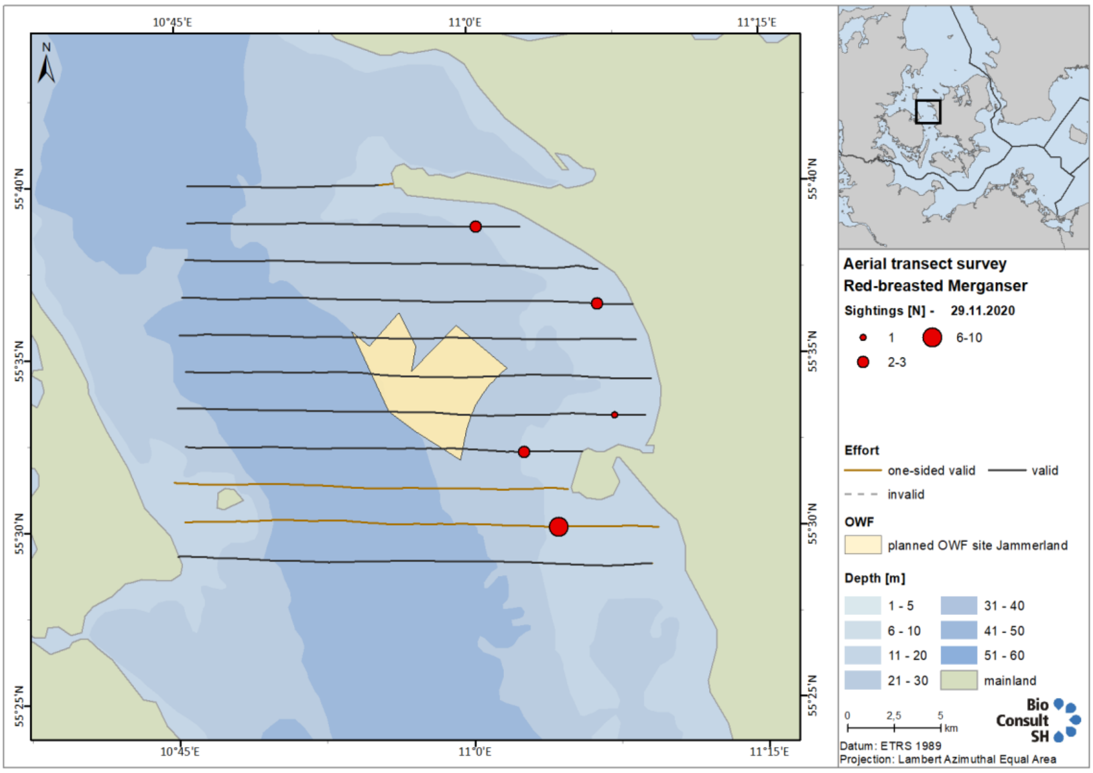

Figure A. 178 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 29th November 2020

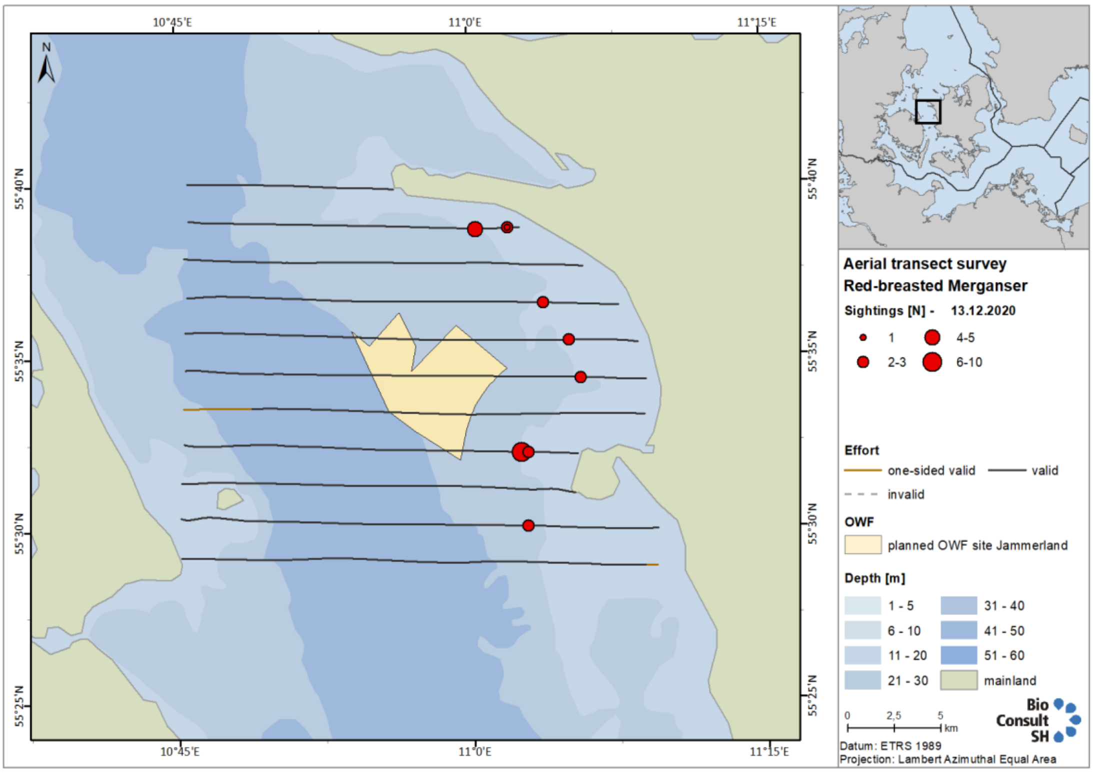

Figure A. 179 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 13th December 2020

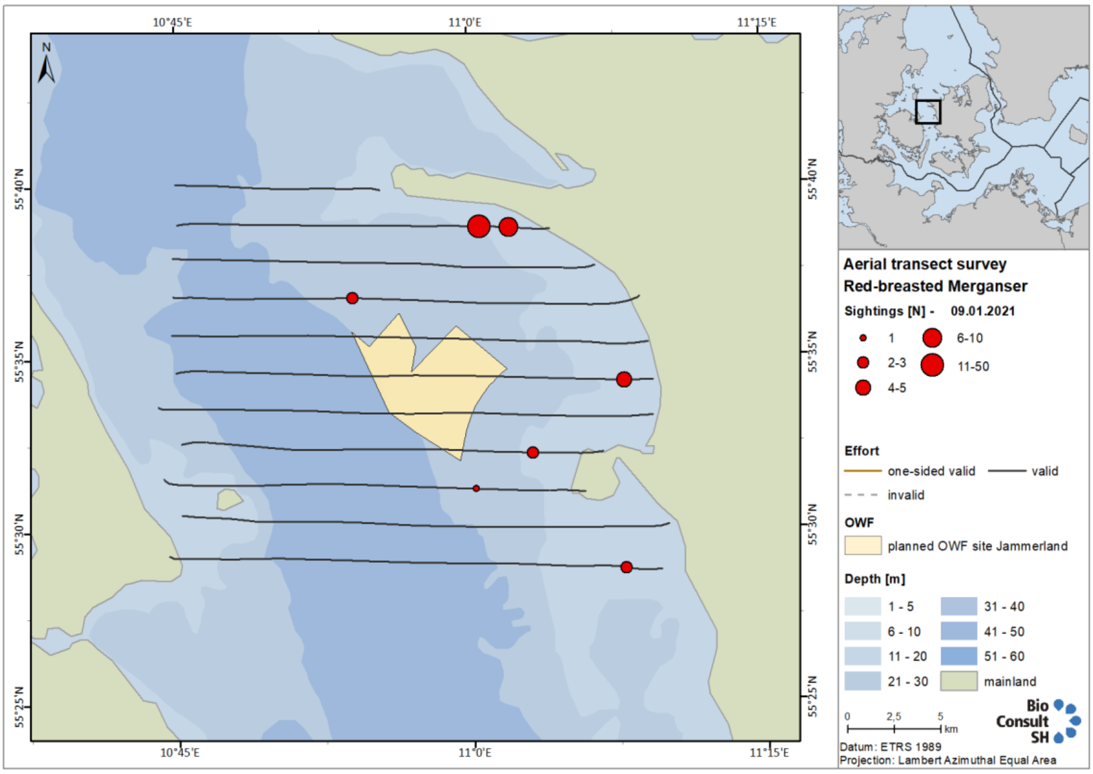

Figure A. 180 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

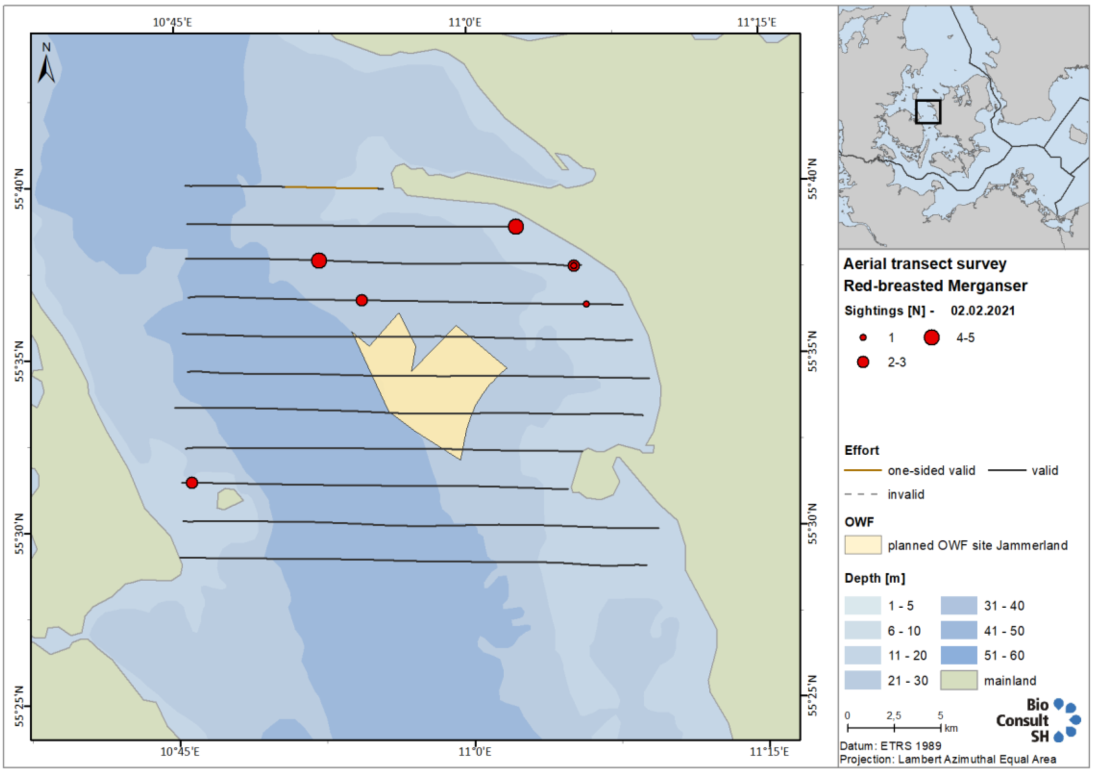

Figure A. 181 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

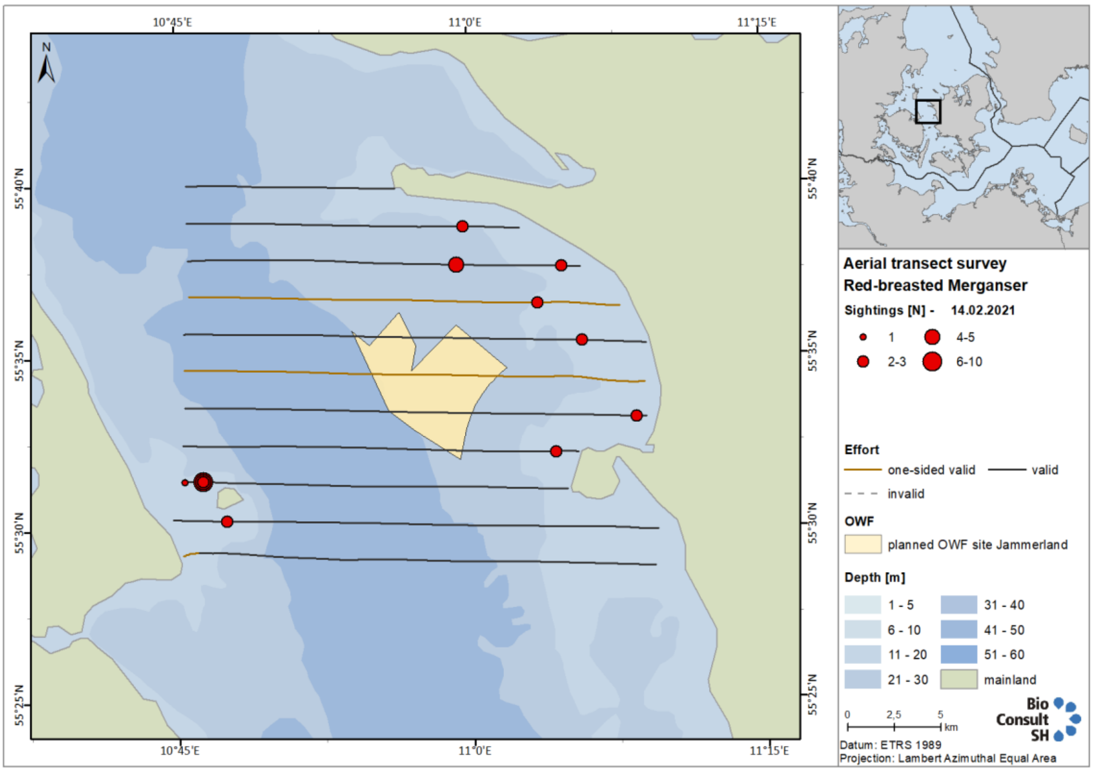

Figure A. 182 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

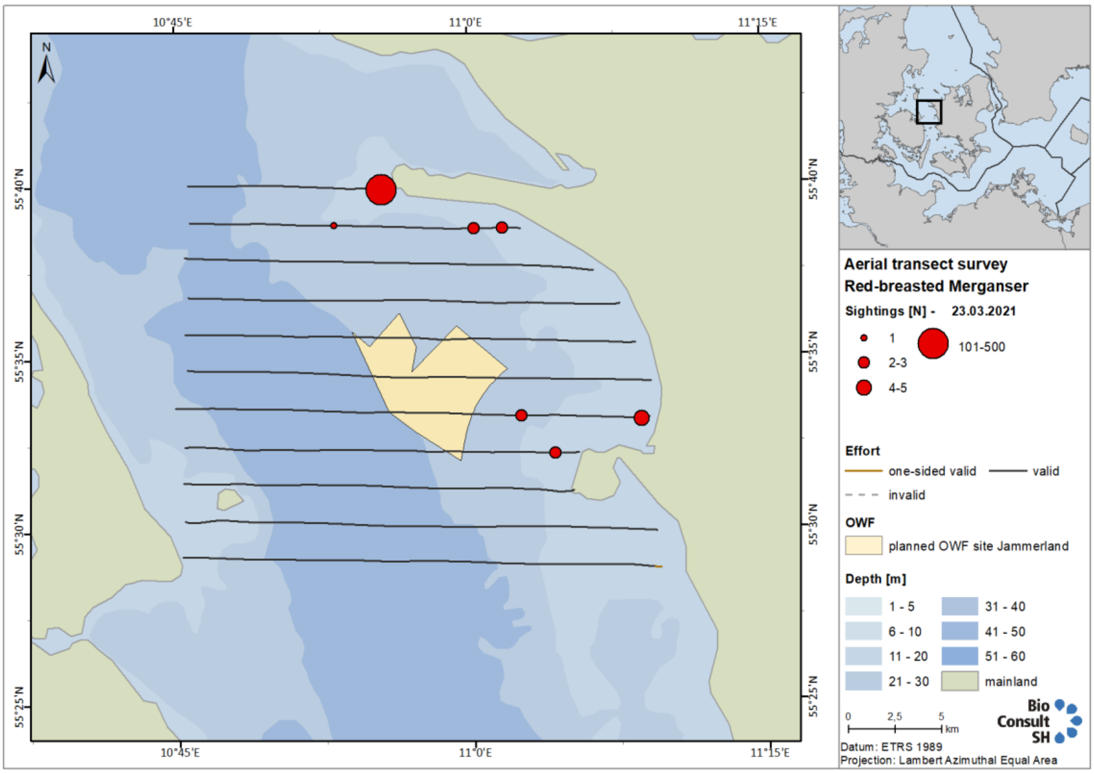

Figure A. 183 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

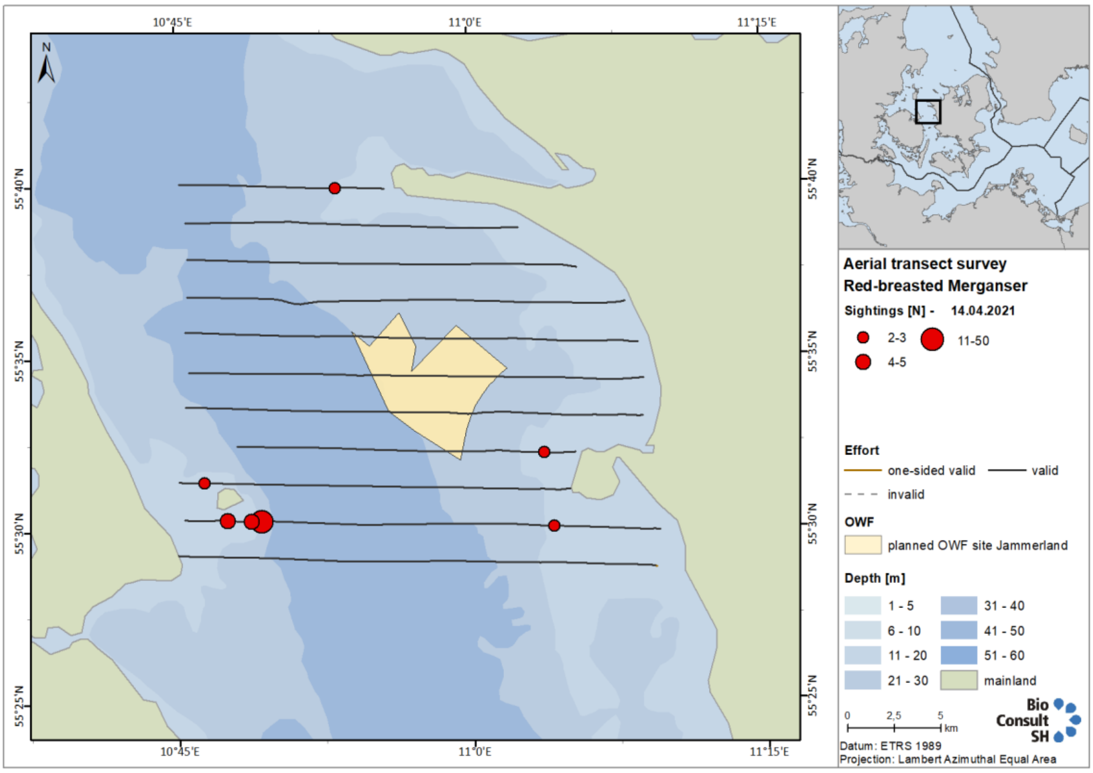

Figure A. 184 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

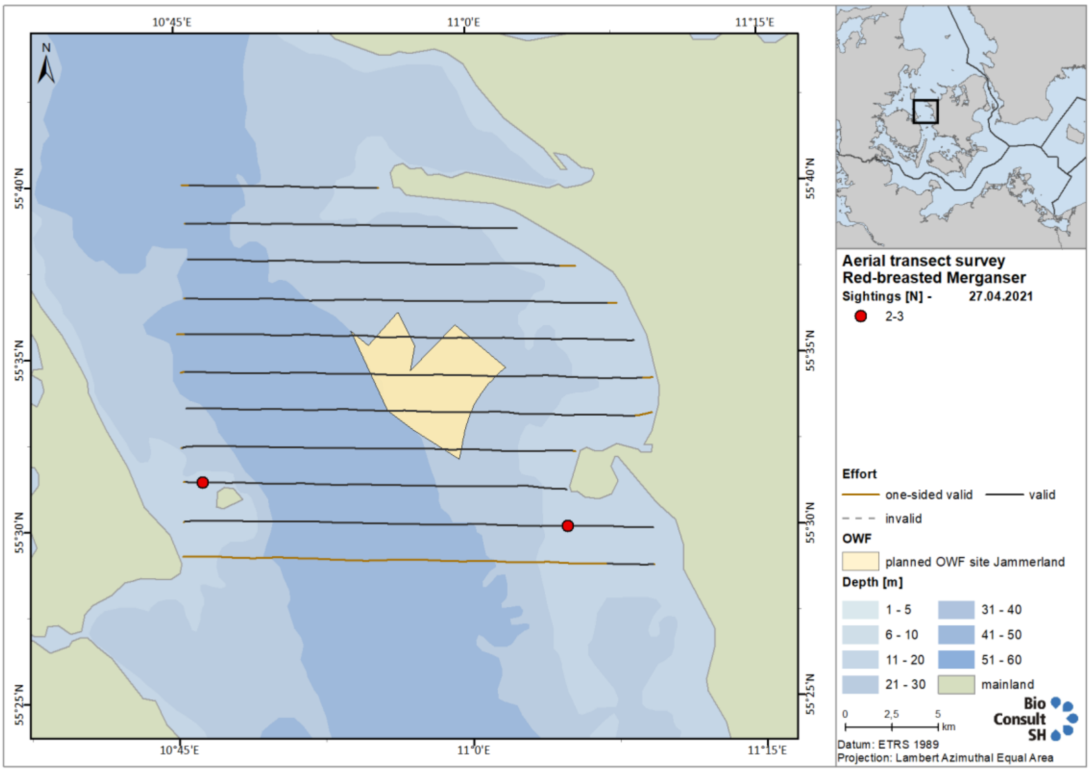

Figure A. 185 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 24th April 2021.

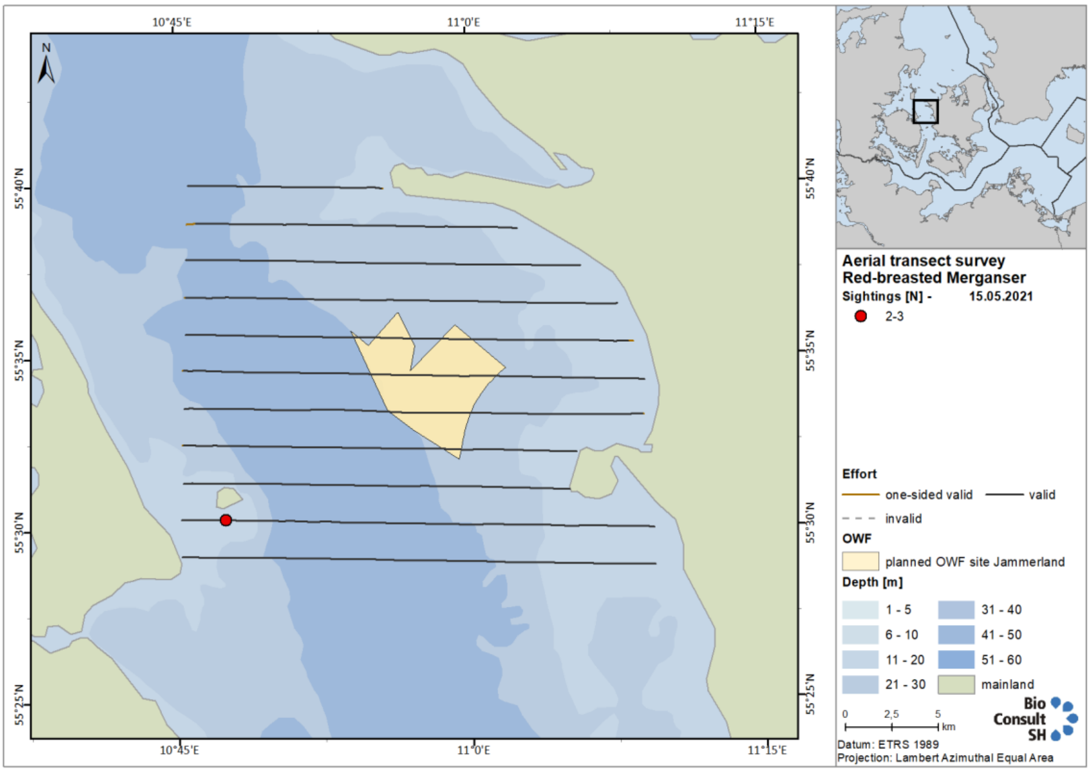

Figure A. 186 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

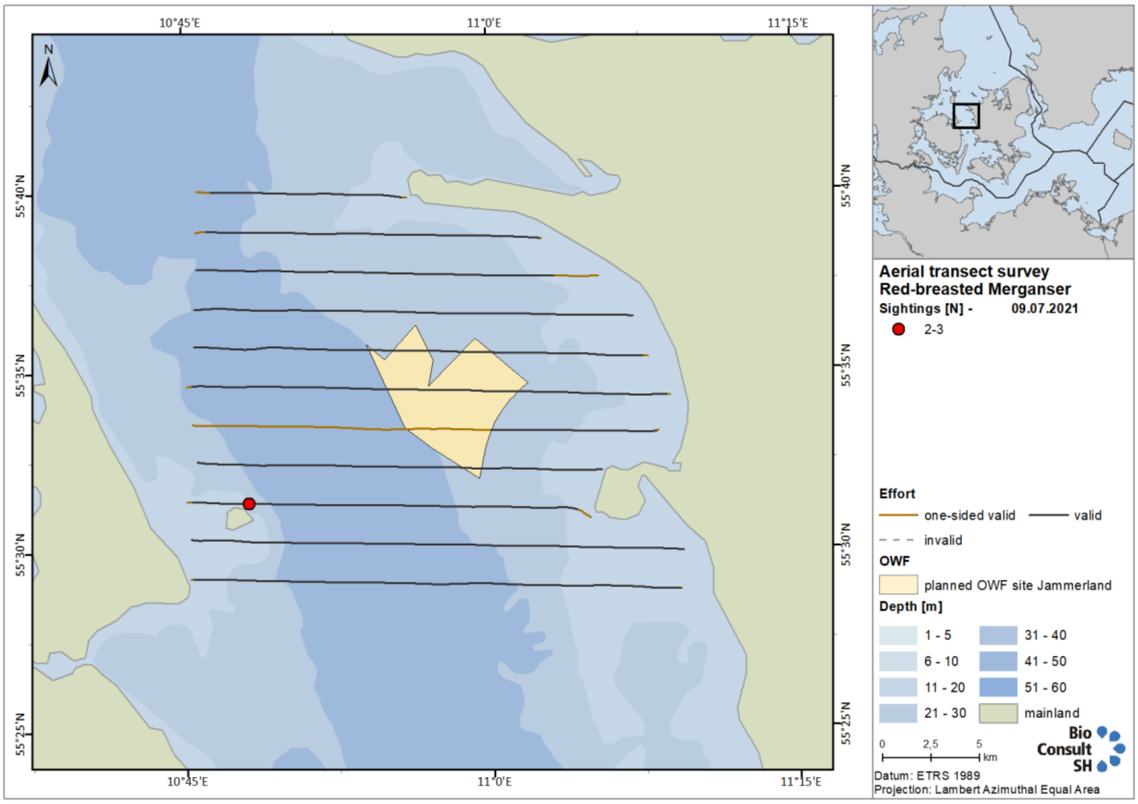

Figure A. 187 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

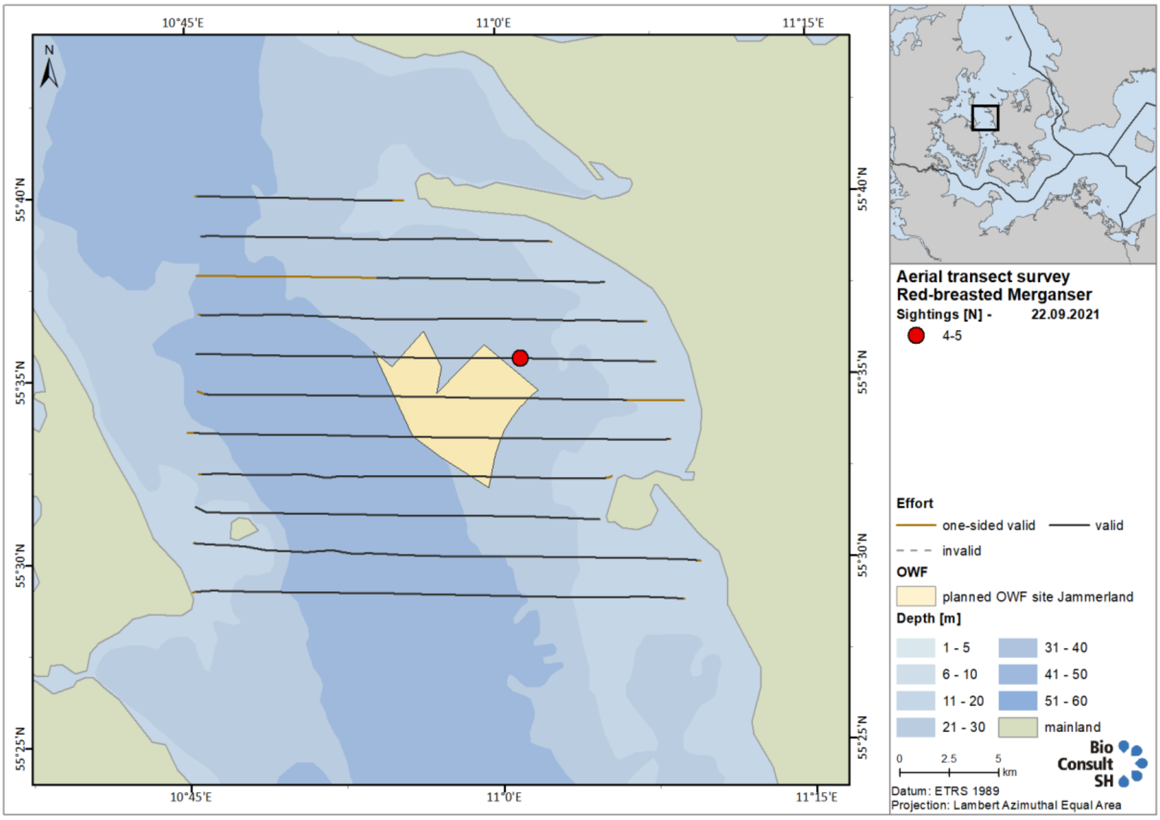

Figure A. 188 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

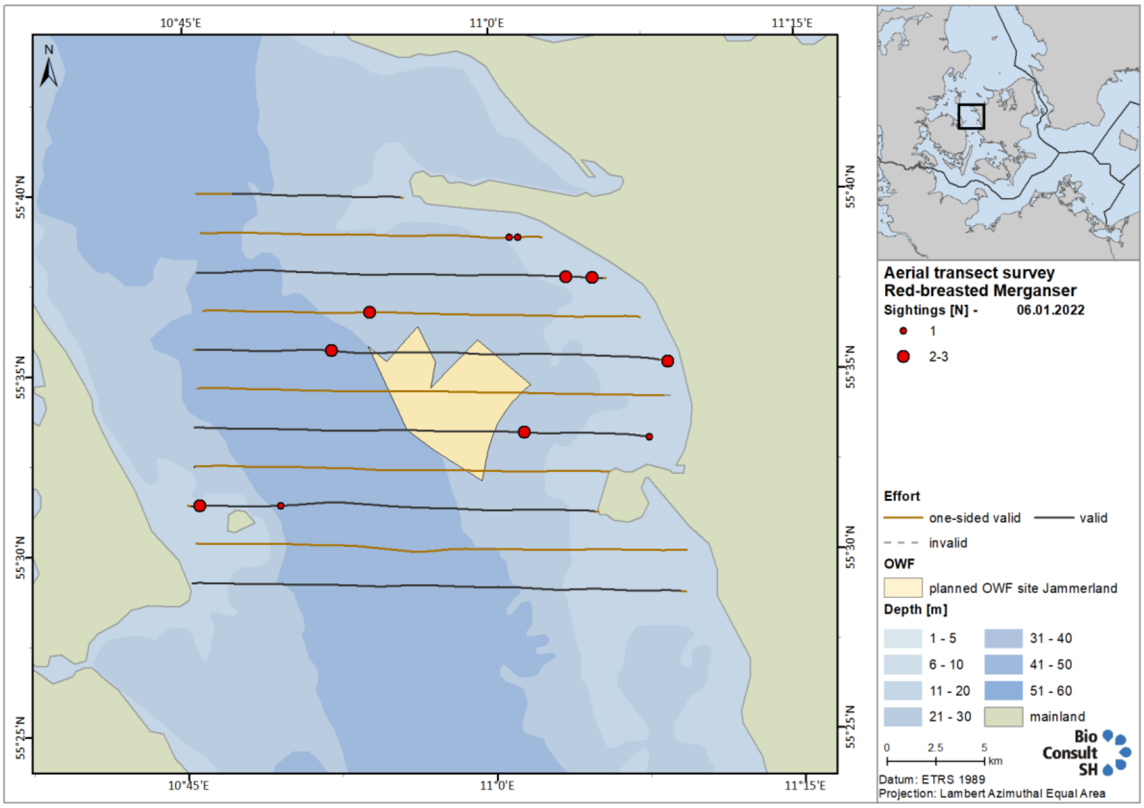

Figure A. 189 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

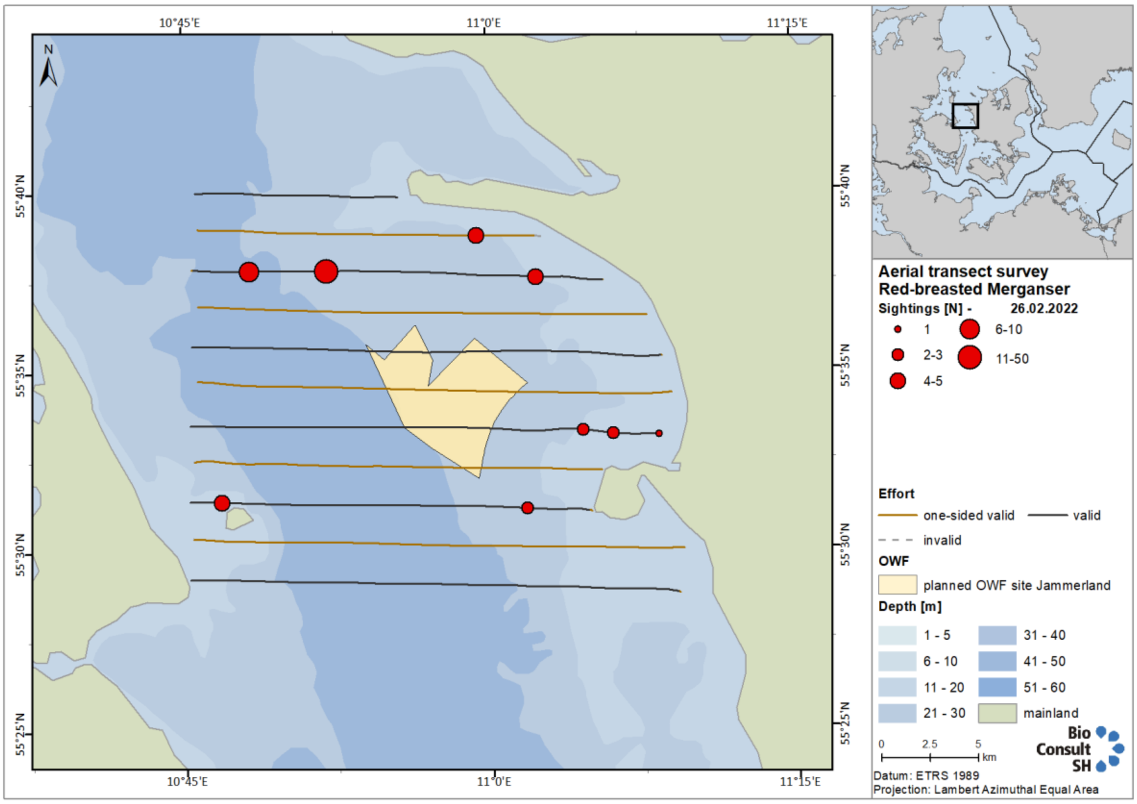

Figure A. 190 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

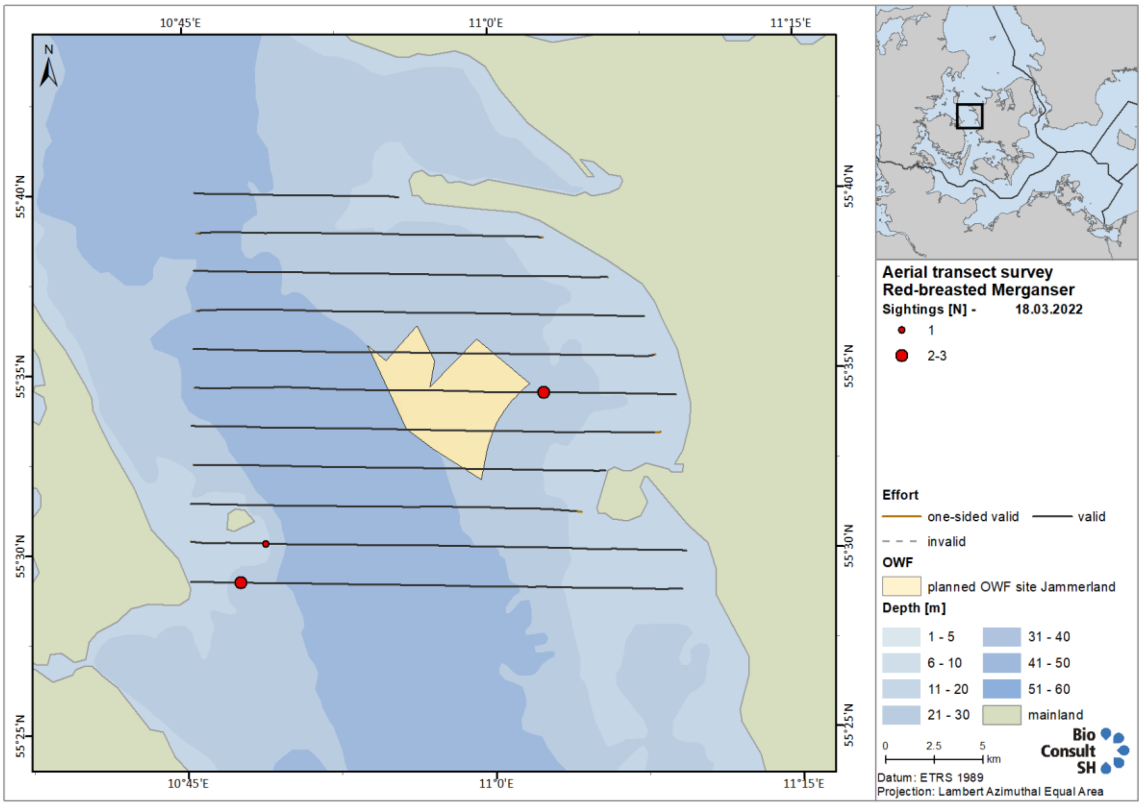

Figure A. 191 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

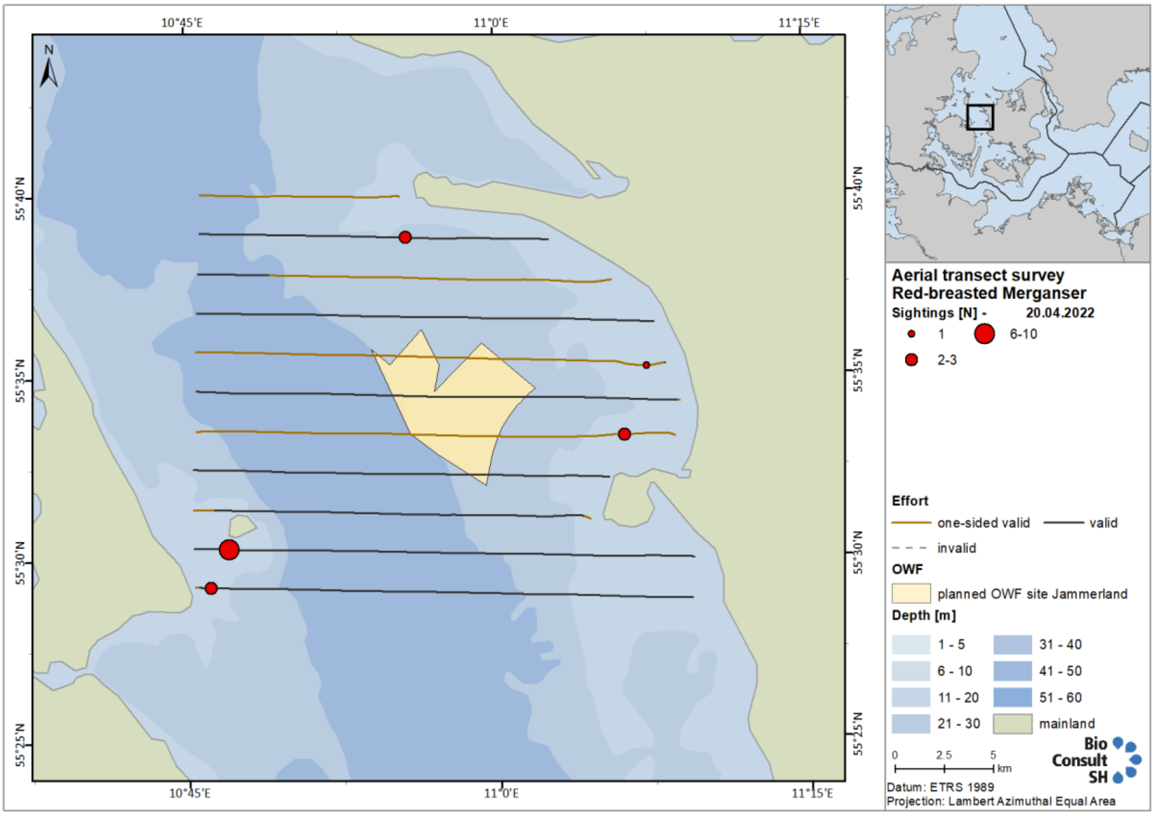

Figure A. 192 Red-breasted Merganser distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

A.1.16 Dunlin

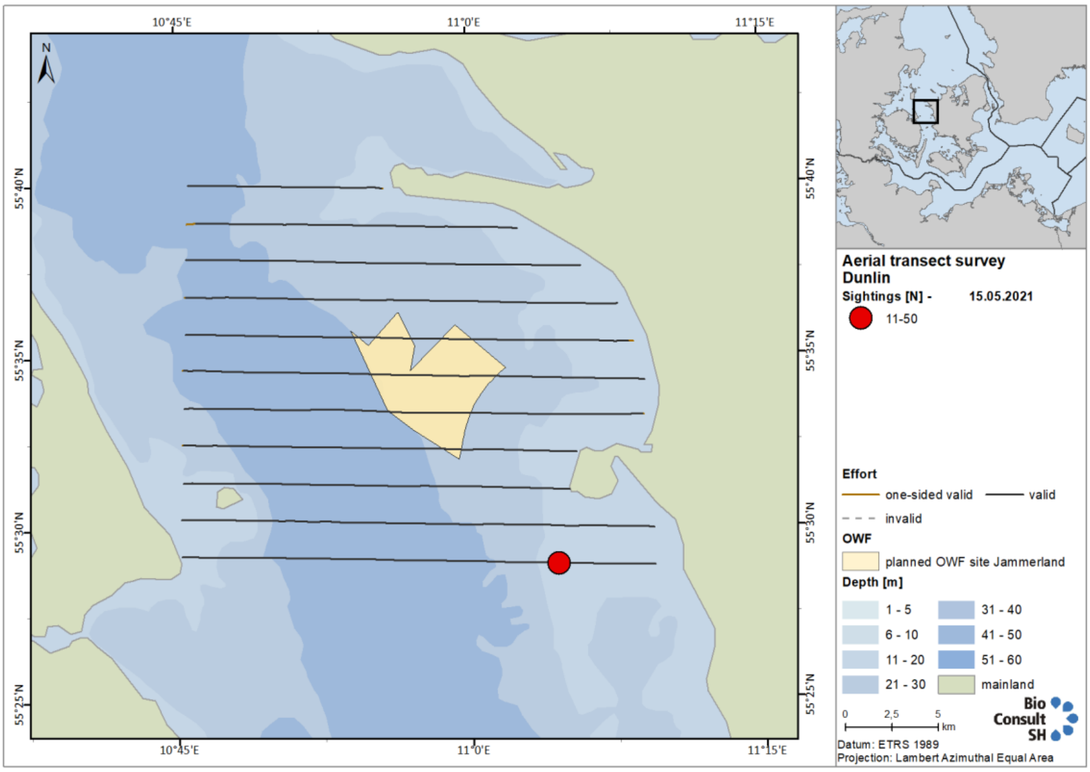

Figure A. 193 Dunlin distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

A.1.17 Black-headed Gull

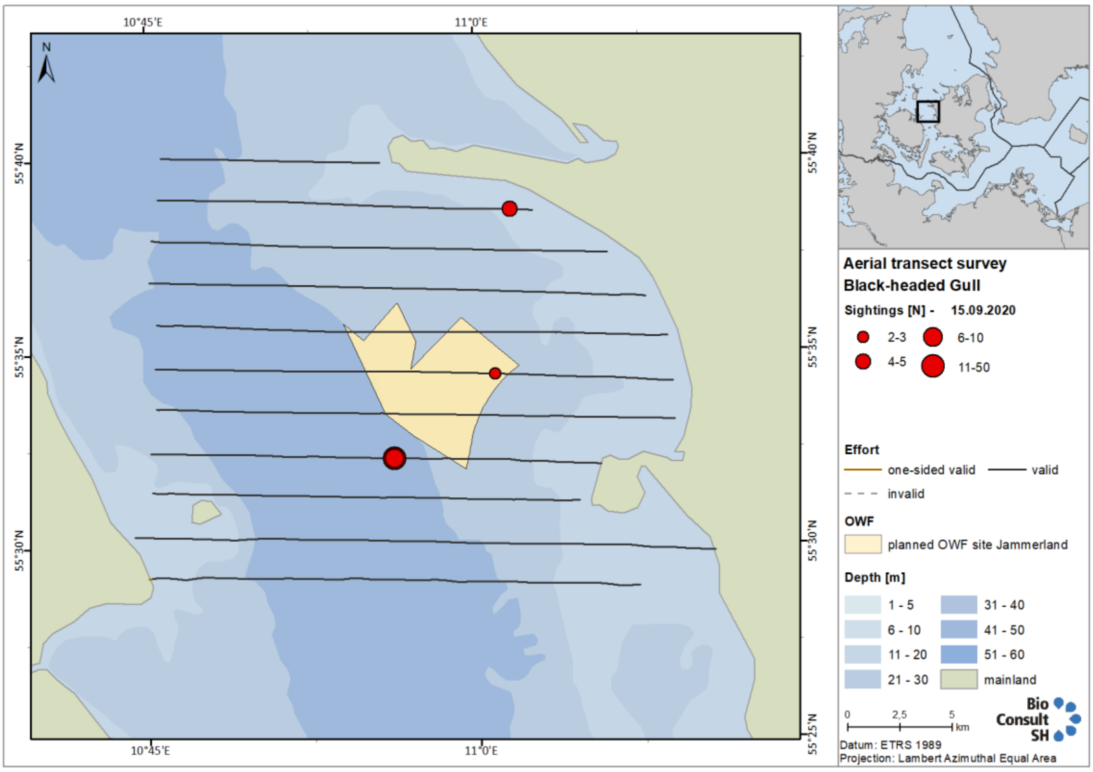

Figure A. 194 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

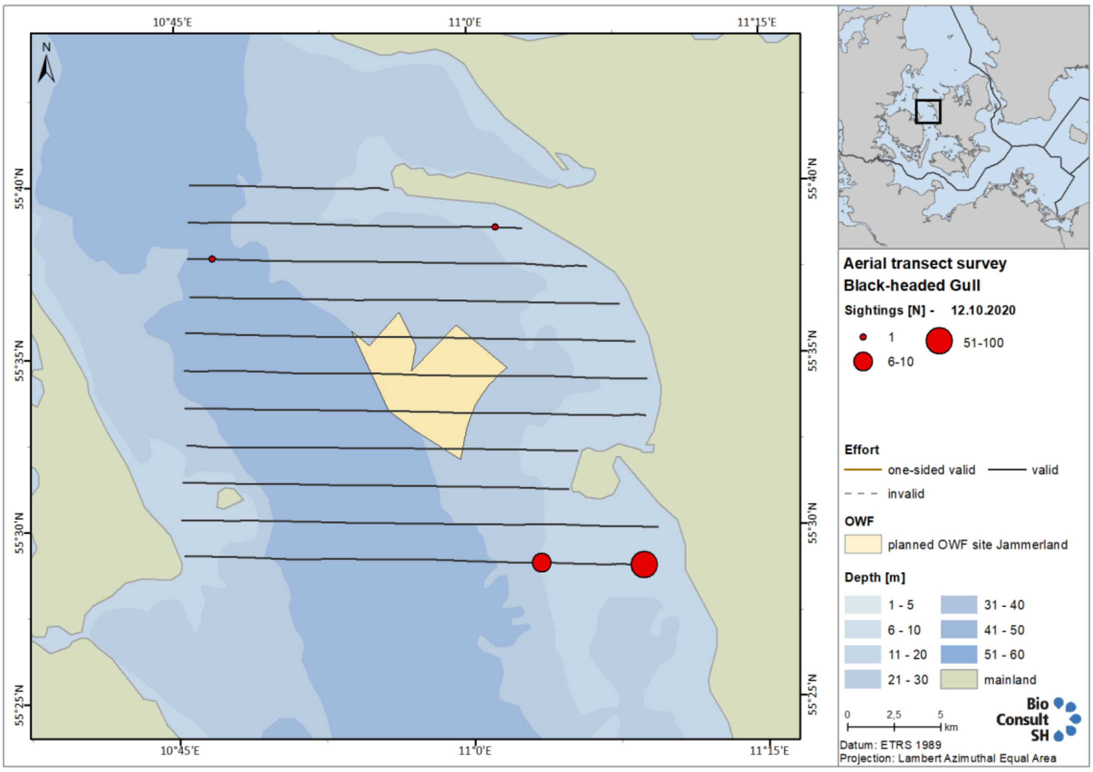

Figure A. 195 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 12th Oktober 2020.

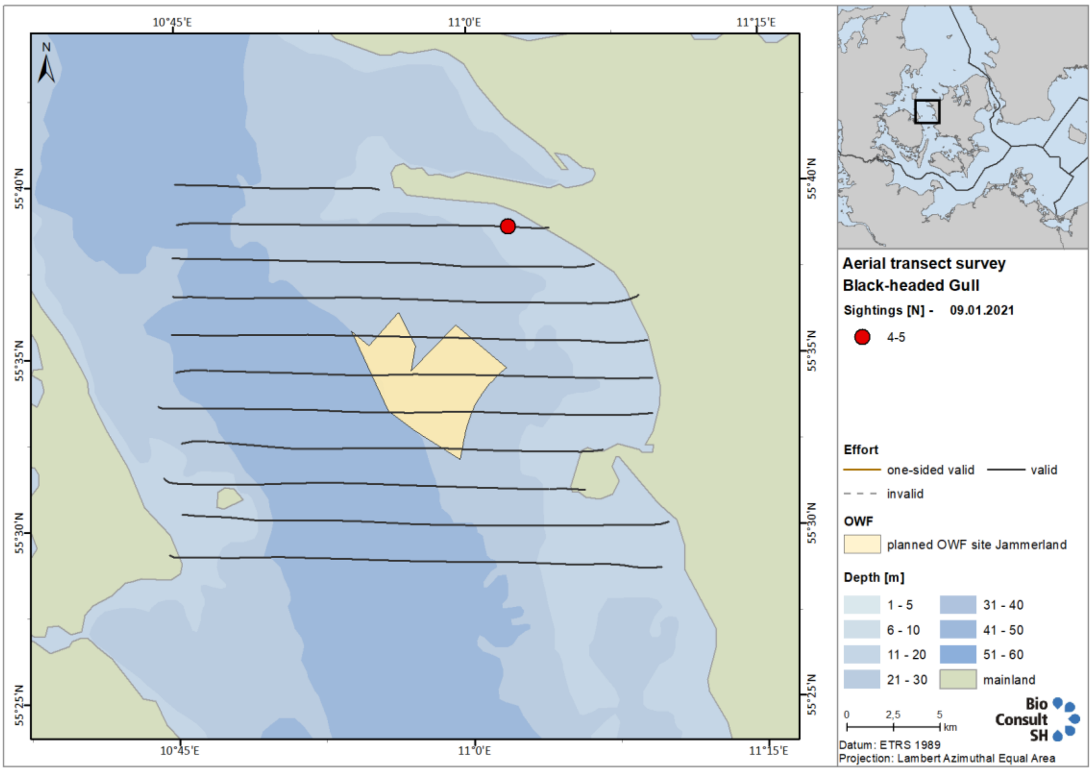

Figure A. 196 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

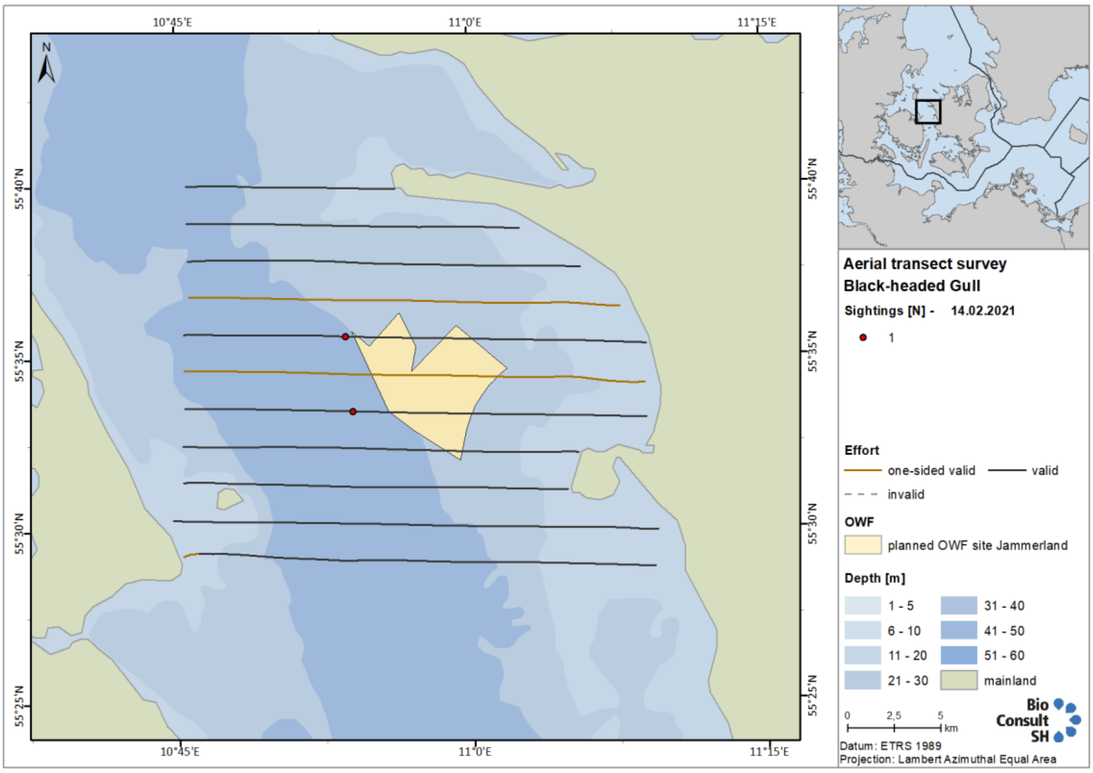

Figure A. 197 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

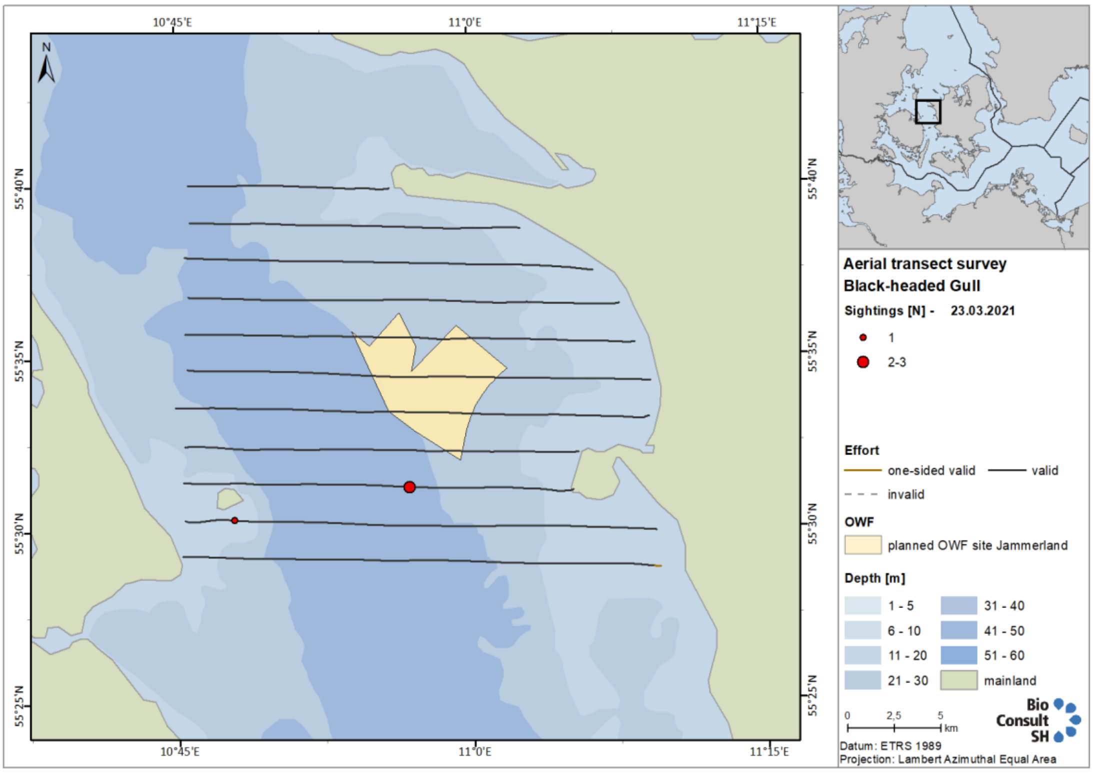

Figure A. 198 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

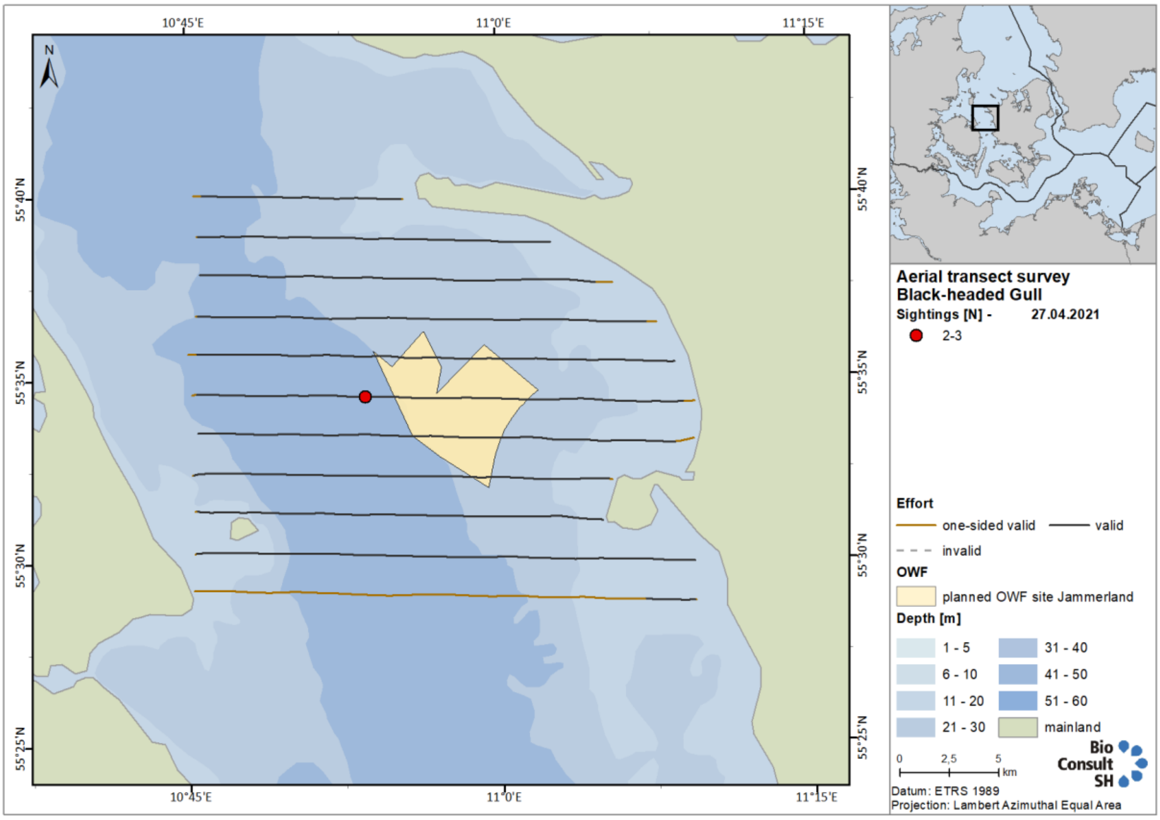

Figure A. 199 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

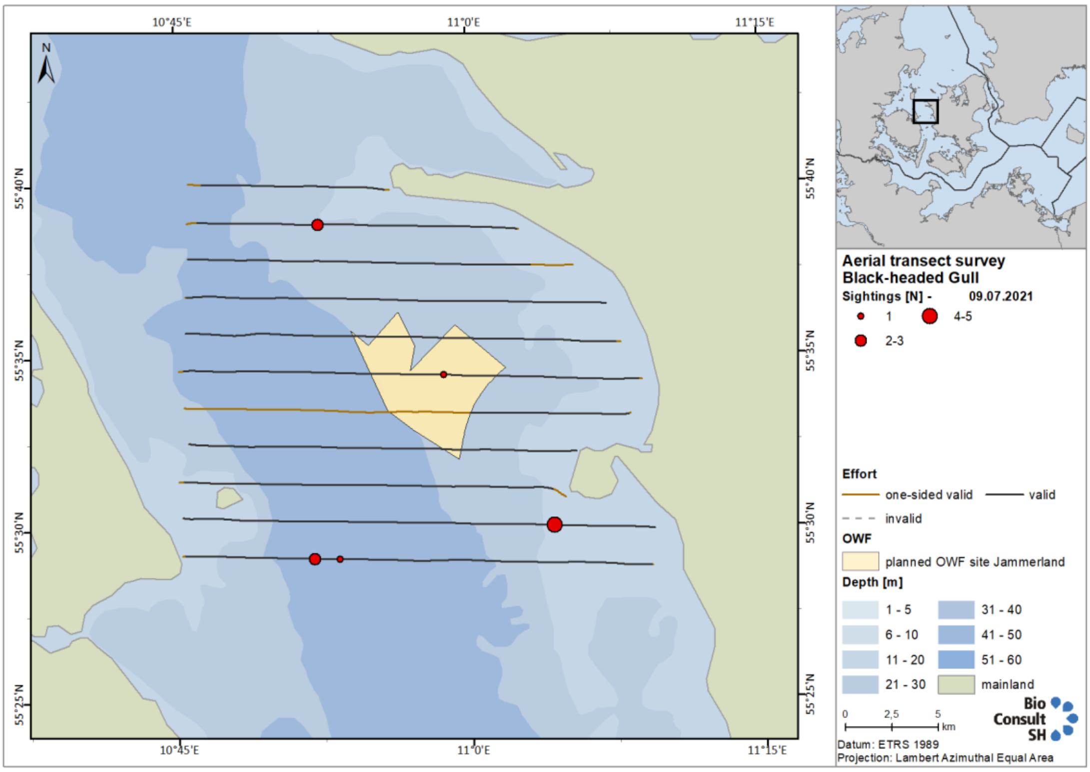

Figure A. 200 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

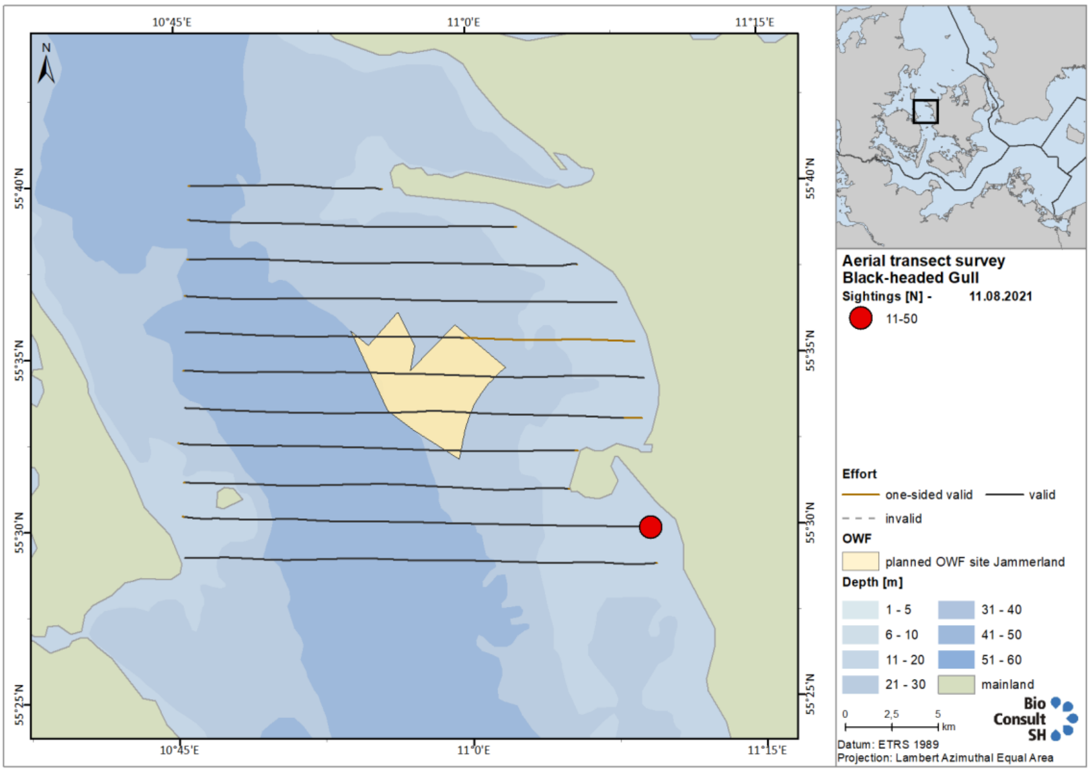

Figure A. 201 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

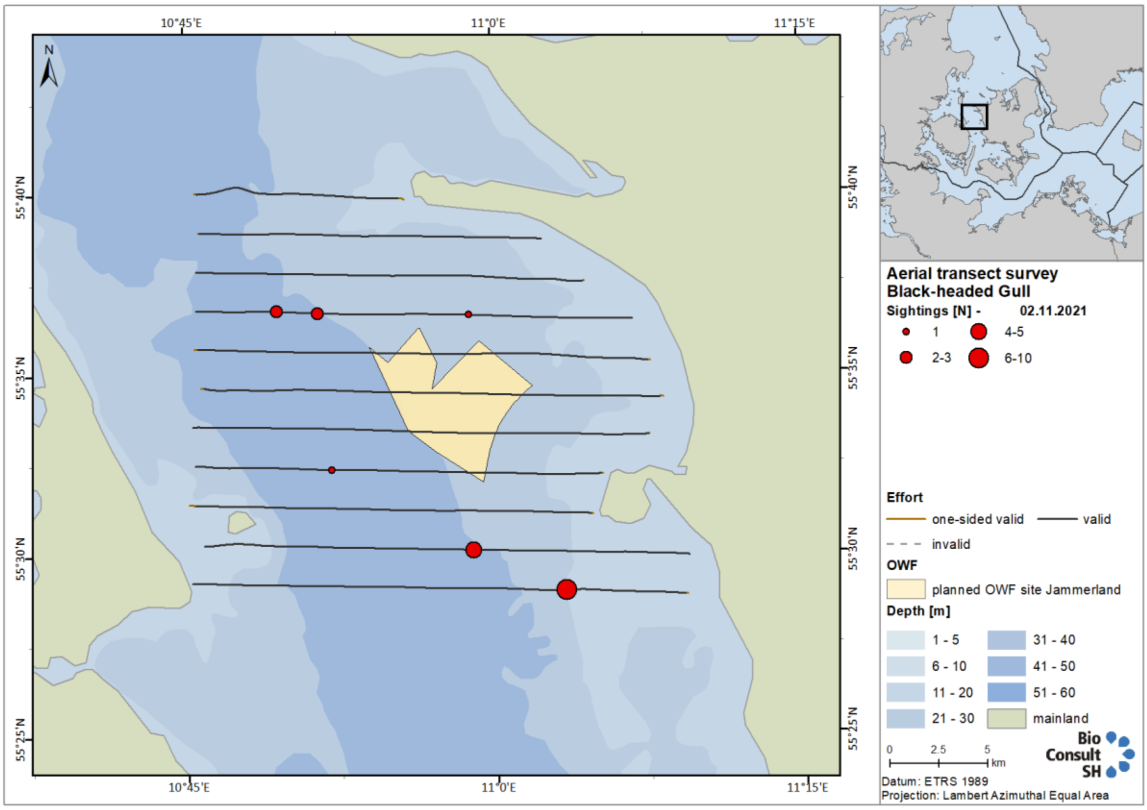

Figure A. 202 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

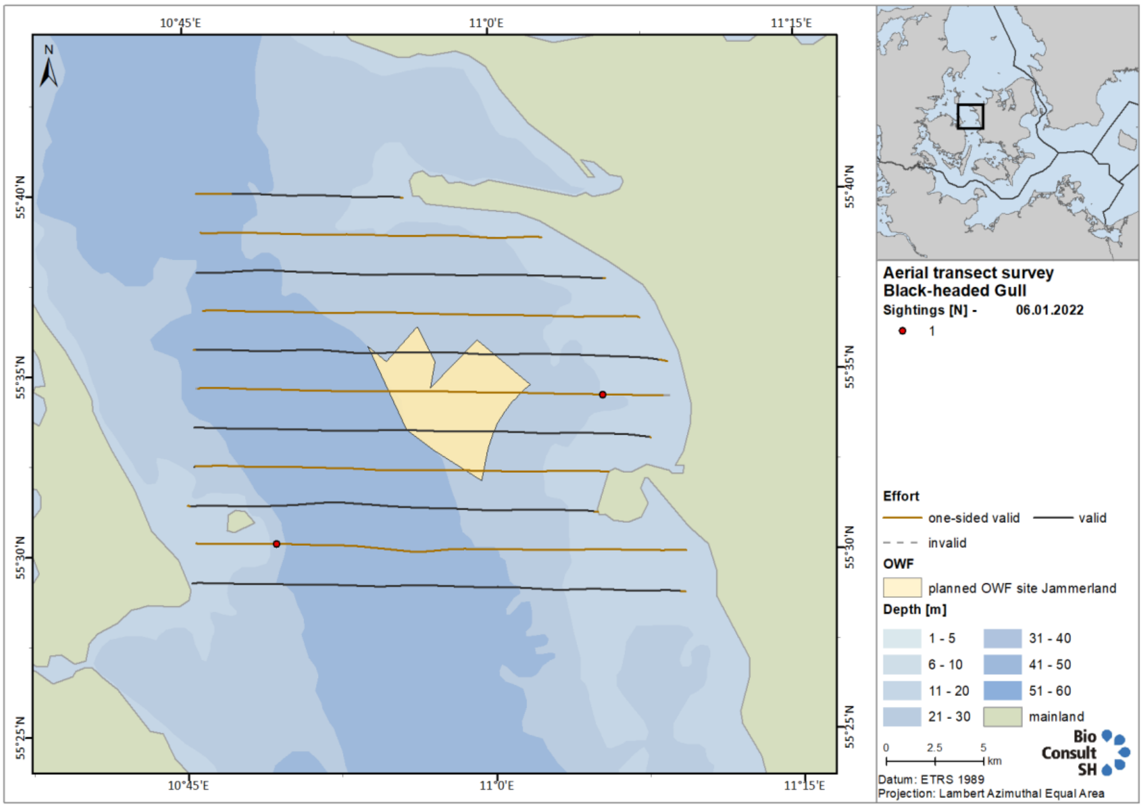

Figure A. 203 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

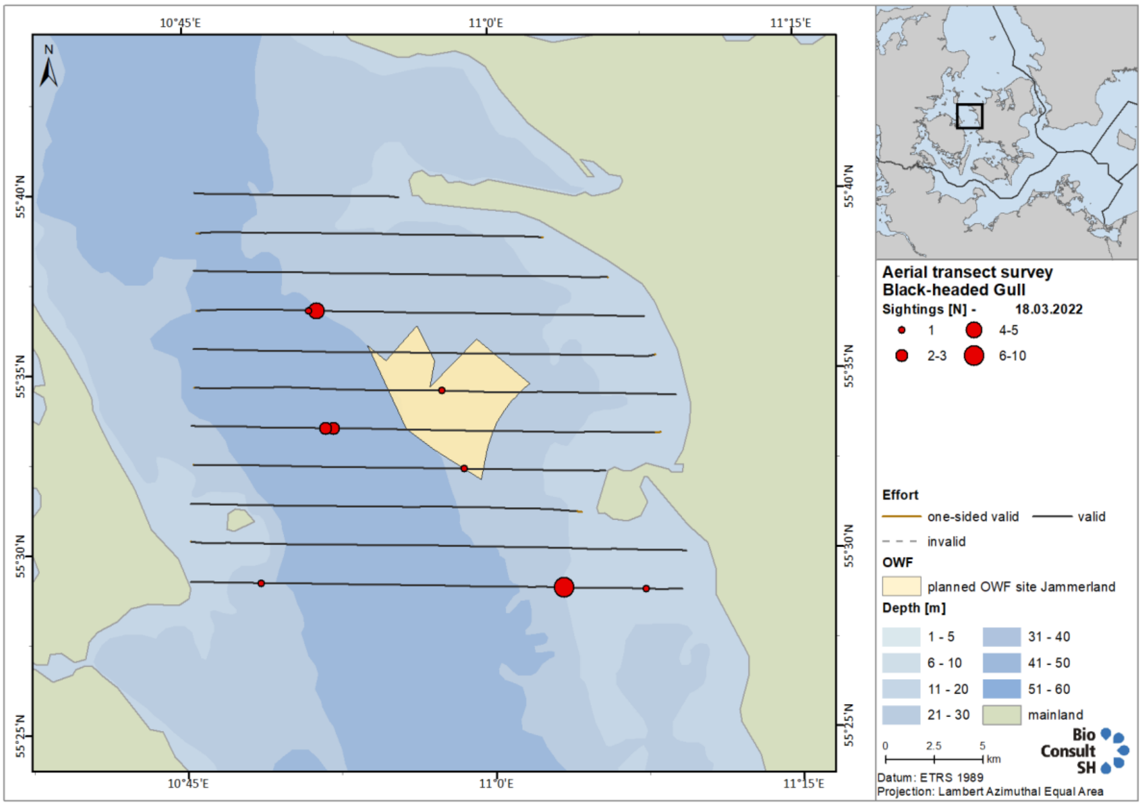

Figure A. 204 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

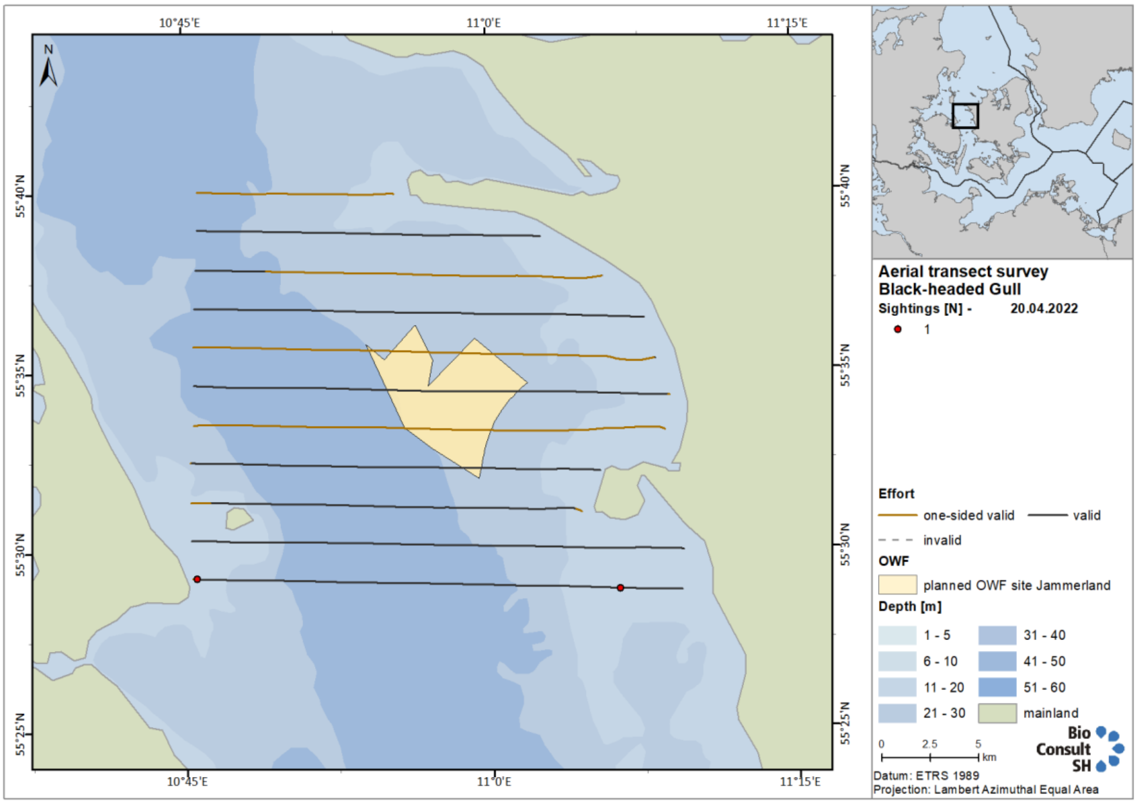

Figure A. 205 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

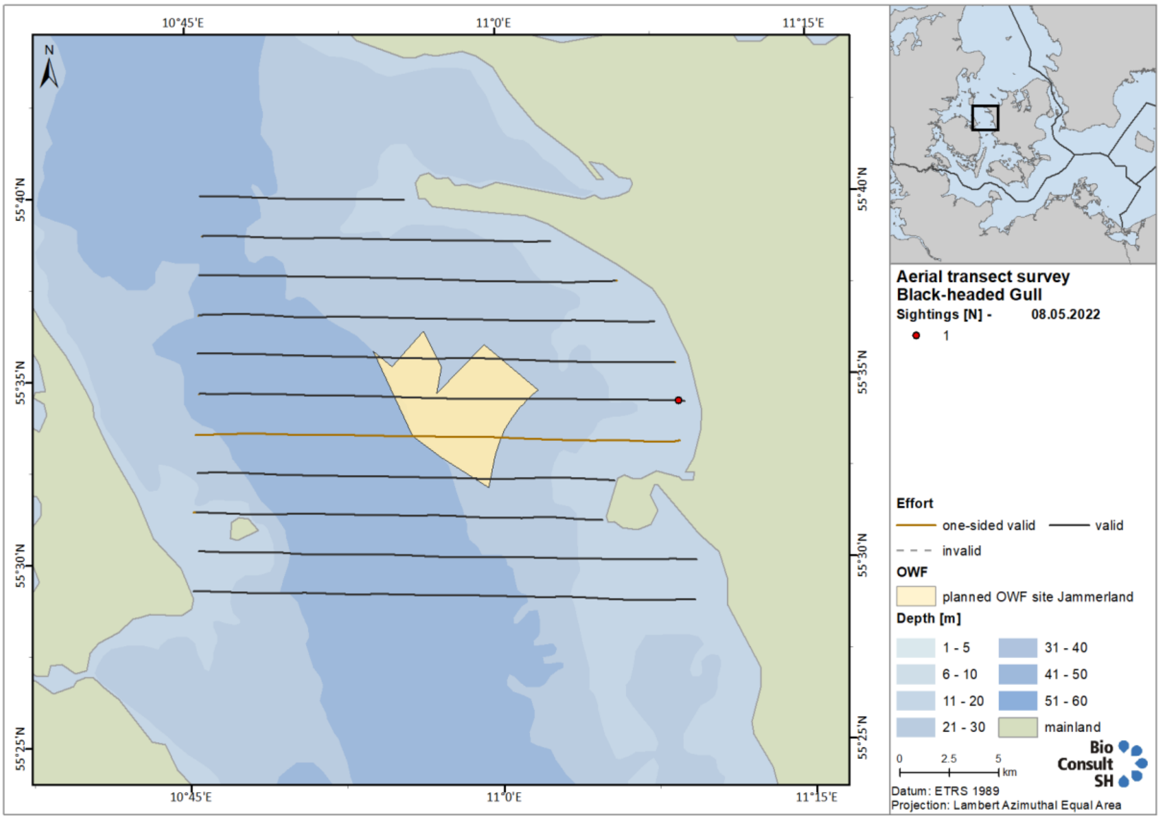

Figure A. 206 Black-headed Gull distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.18 Herring Gull

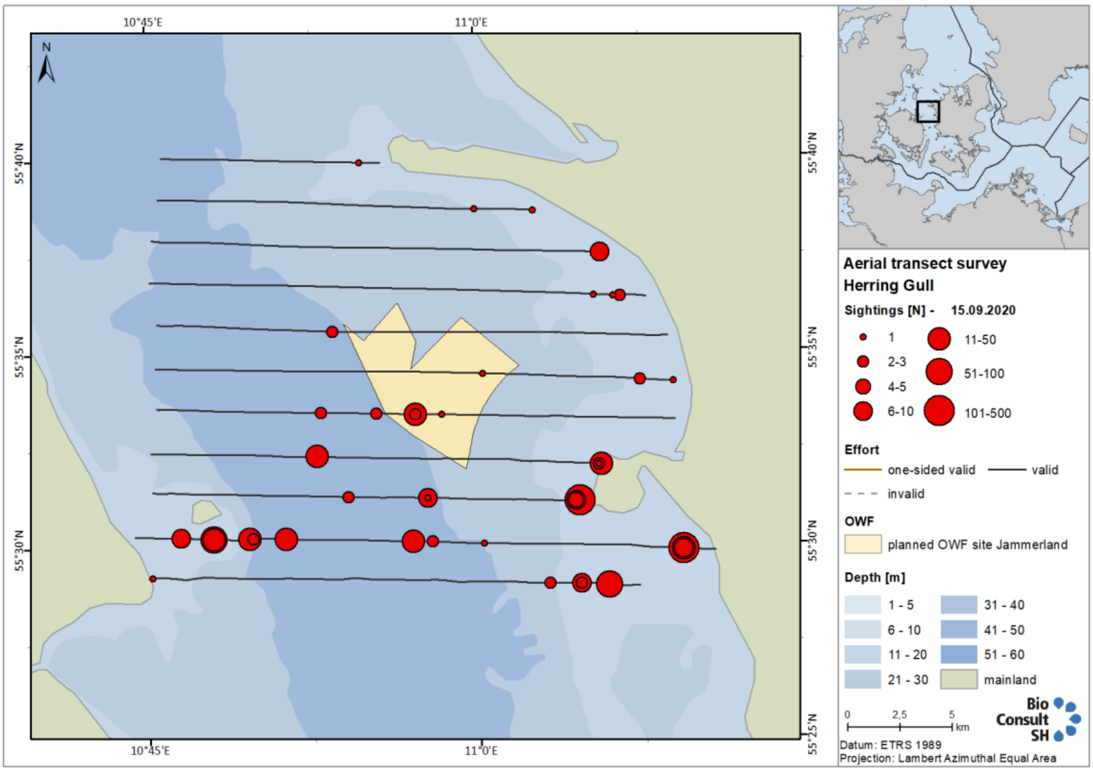

Figure A. 207 Herring Gull distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

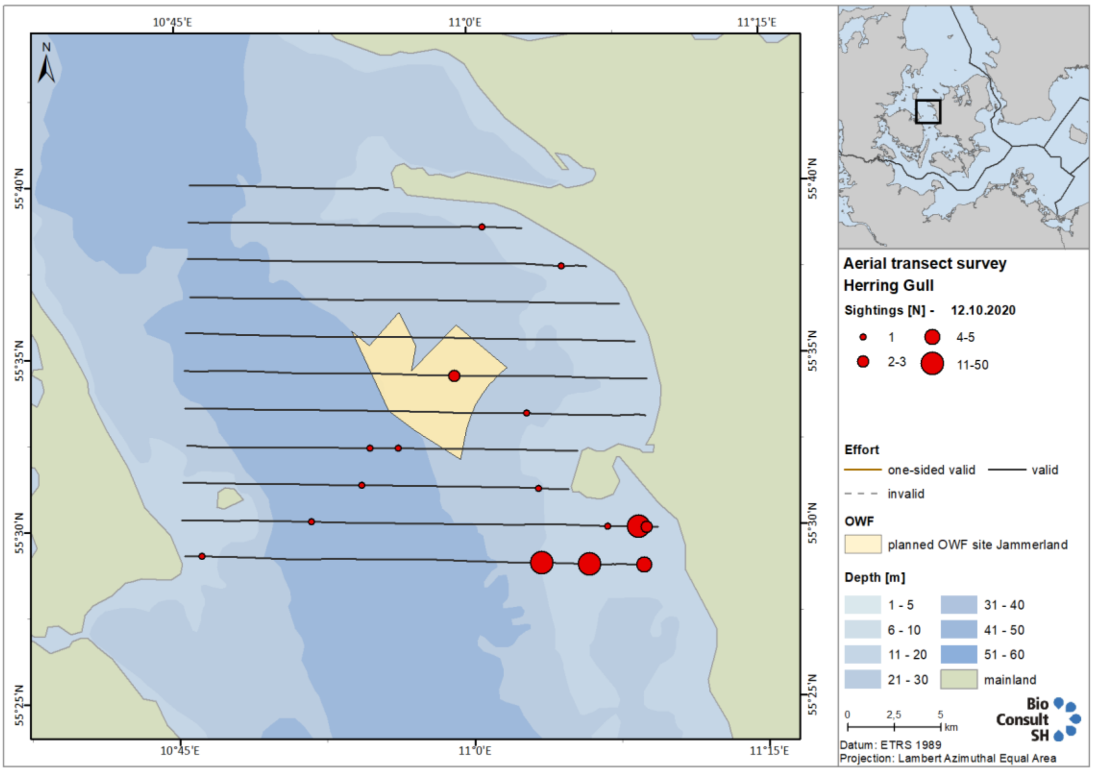

Figure A. 208 Herring Gull distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

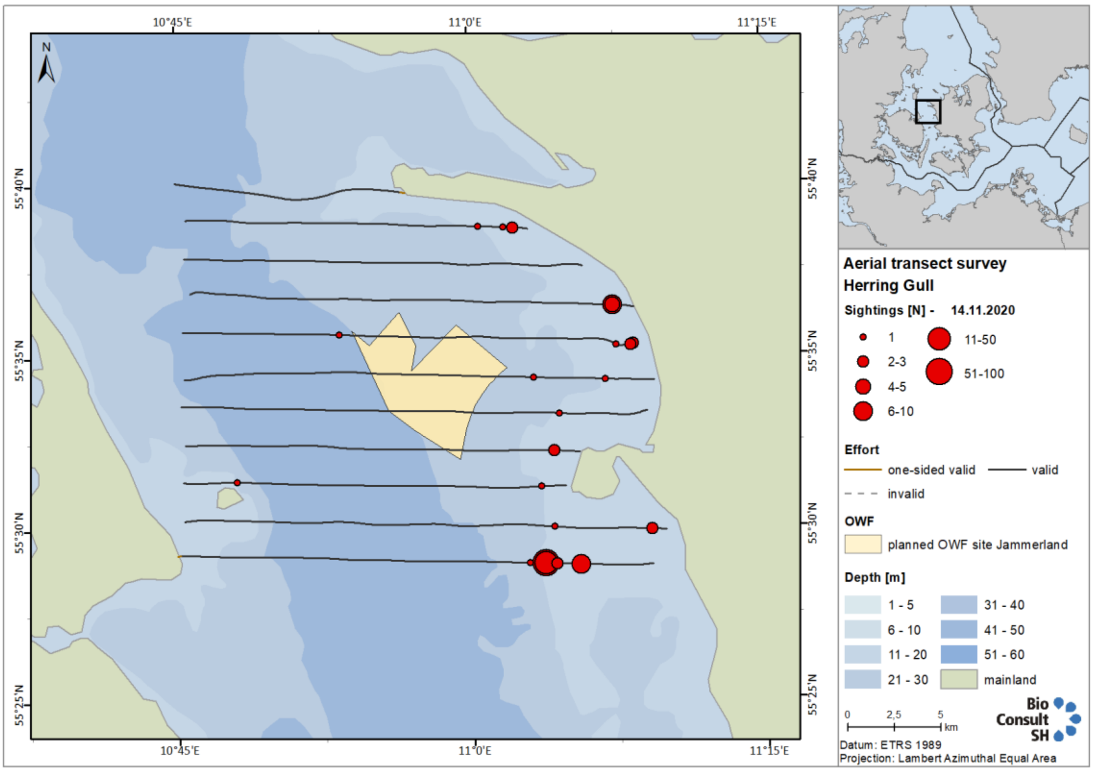

Figure A. 209 Herring Gull distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

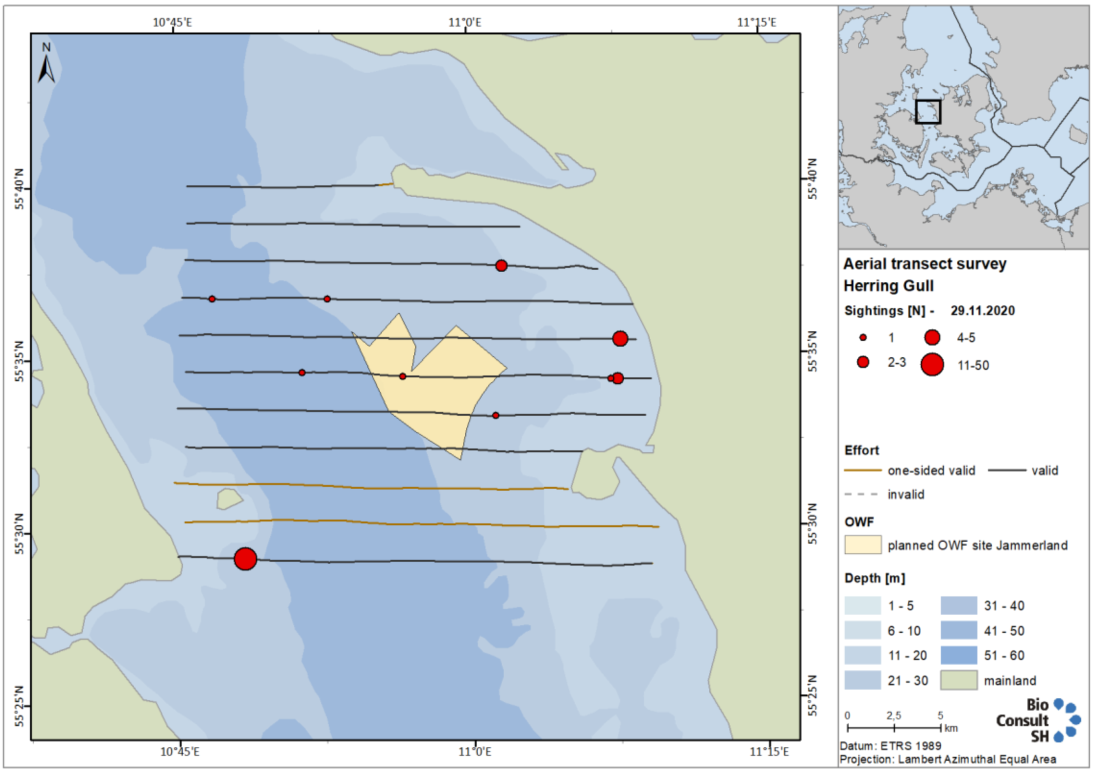

Figure A. 210 Herring Gull distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

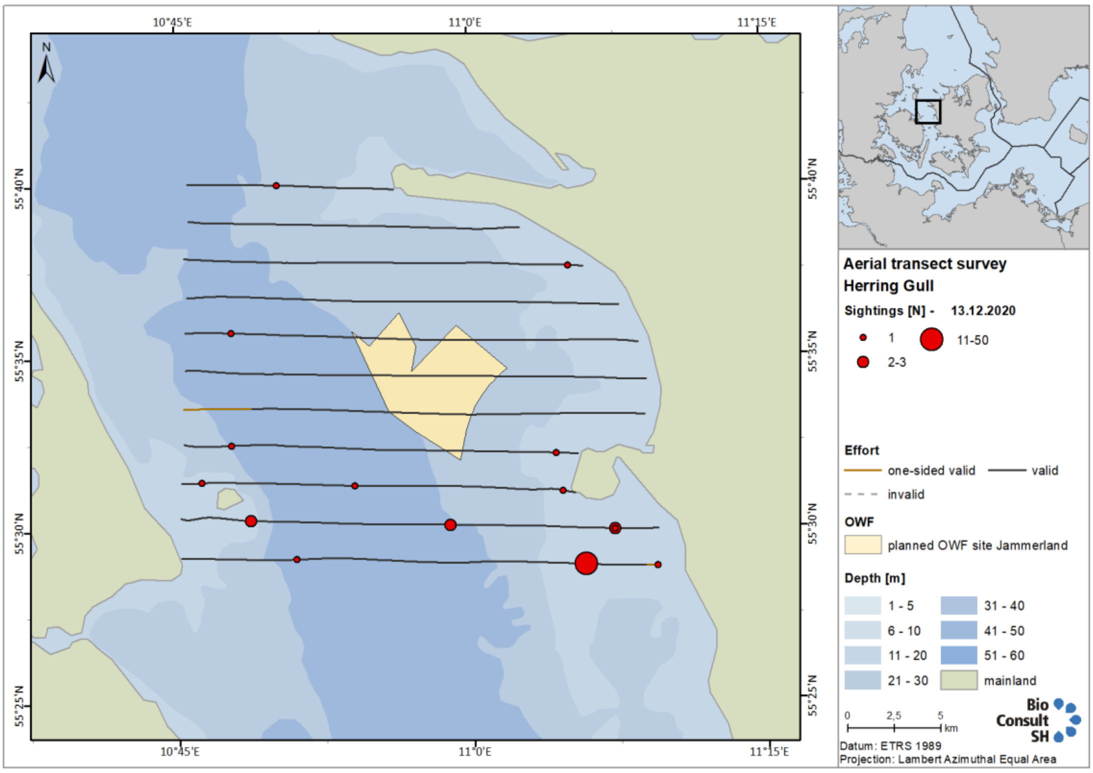

Figure A. 211 Herring Gull distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

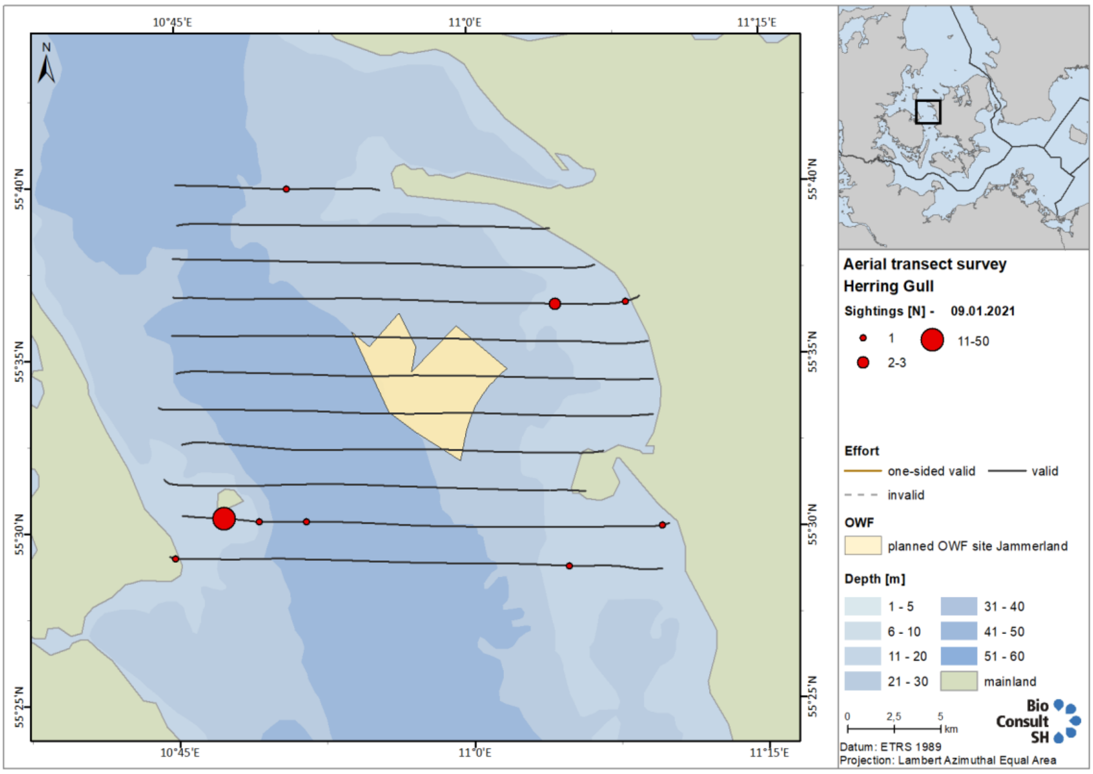

Figure A. 212 Herring Gull distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

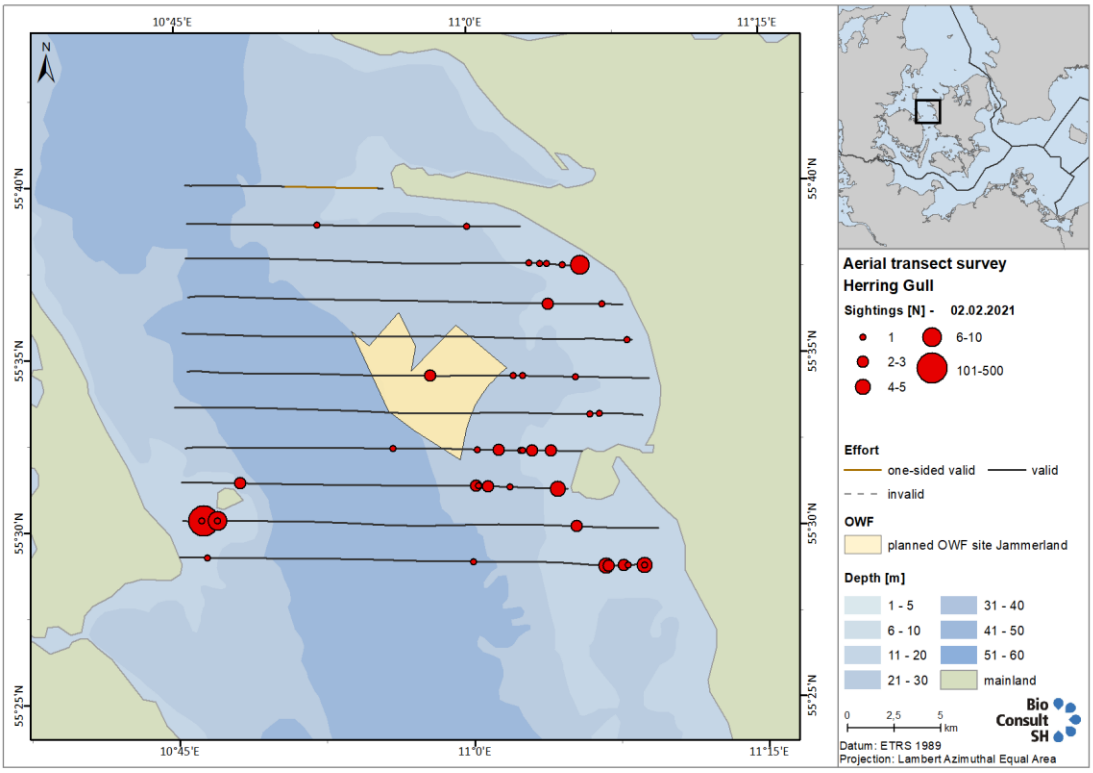

Figure A. 213 Herring Gull distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

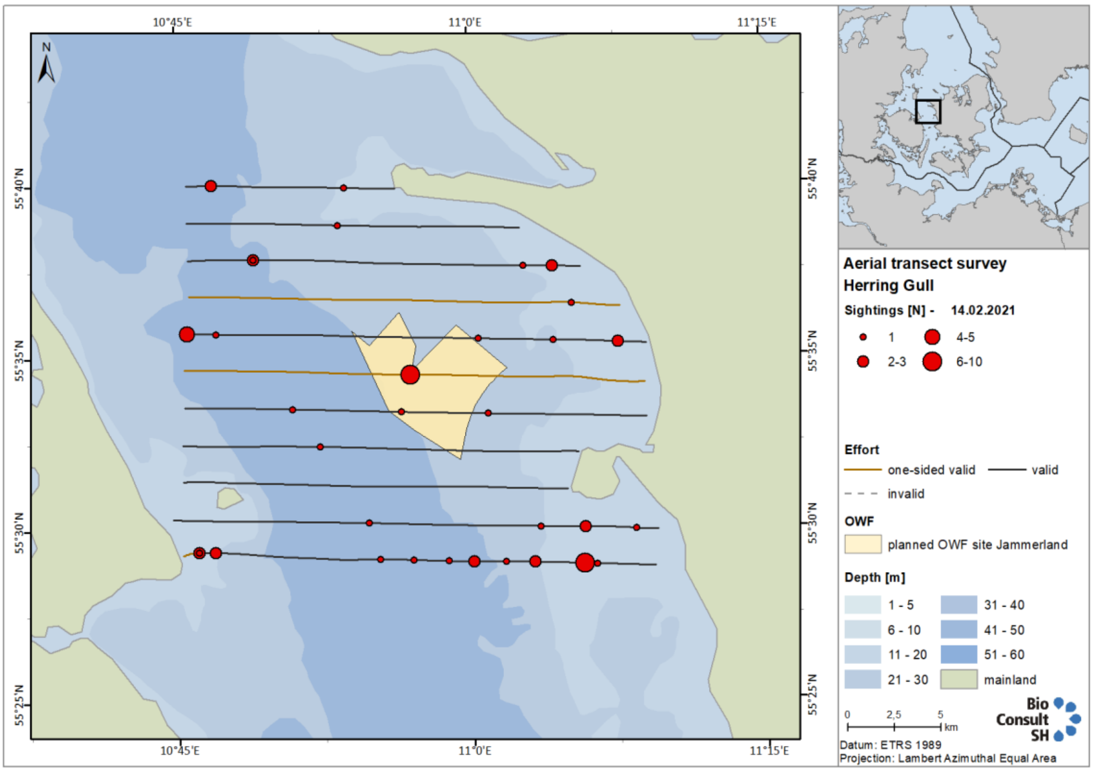

Figure A. 214 Herring Gull distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

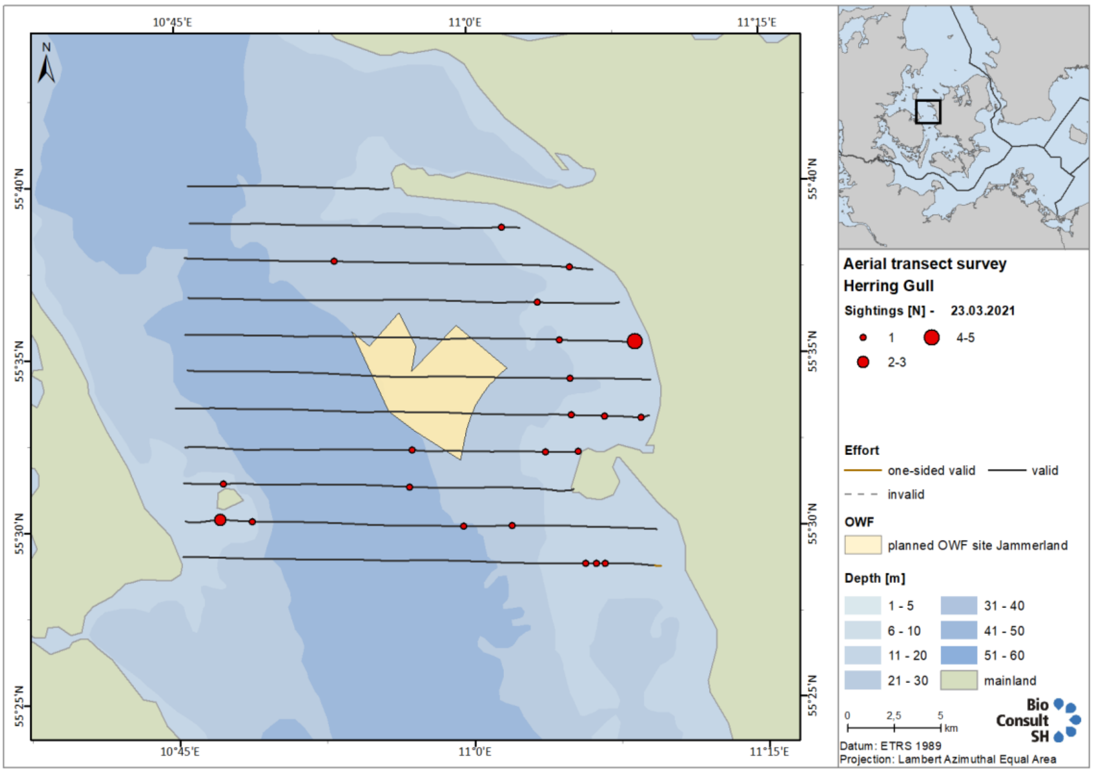

Figure A. 215 Herring Gull distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

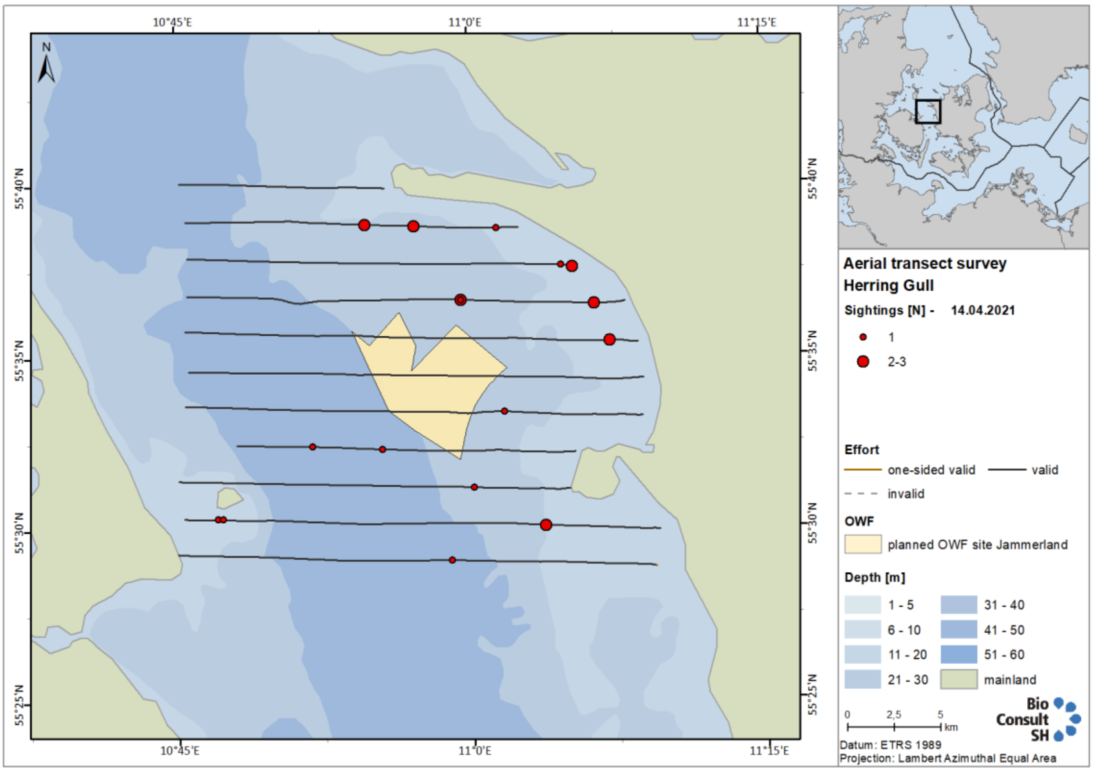

Figure A. 216 Herring Gull distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

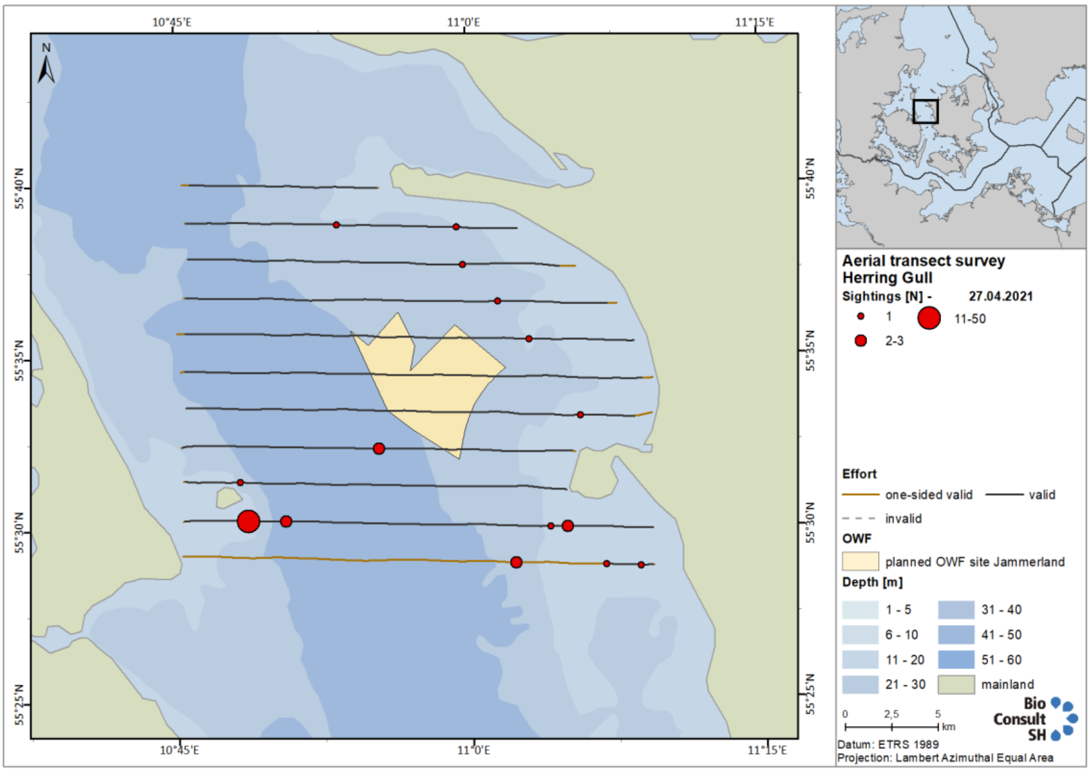

Figure A. 217 Herring Gull distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

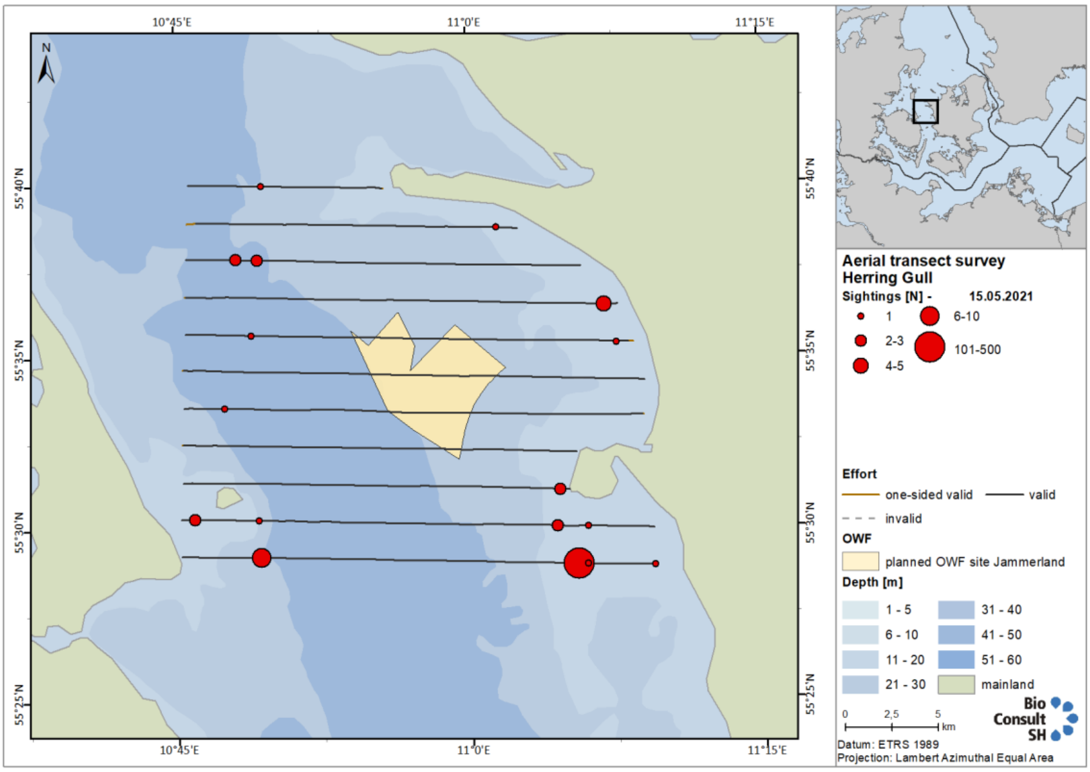

Figure A. 218 Herring Gull distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

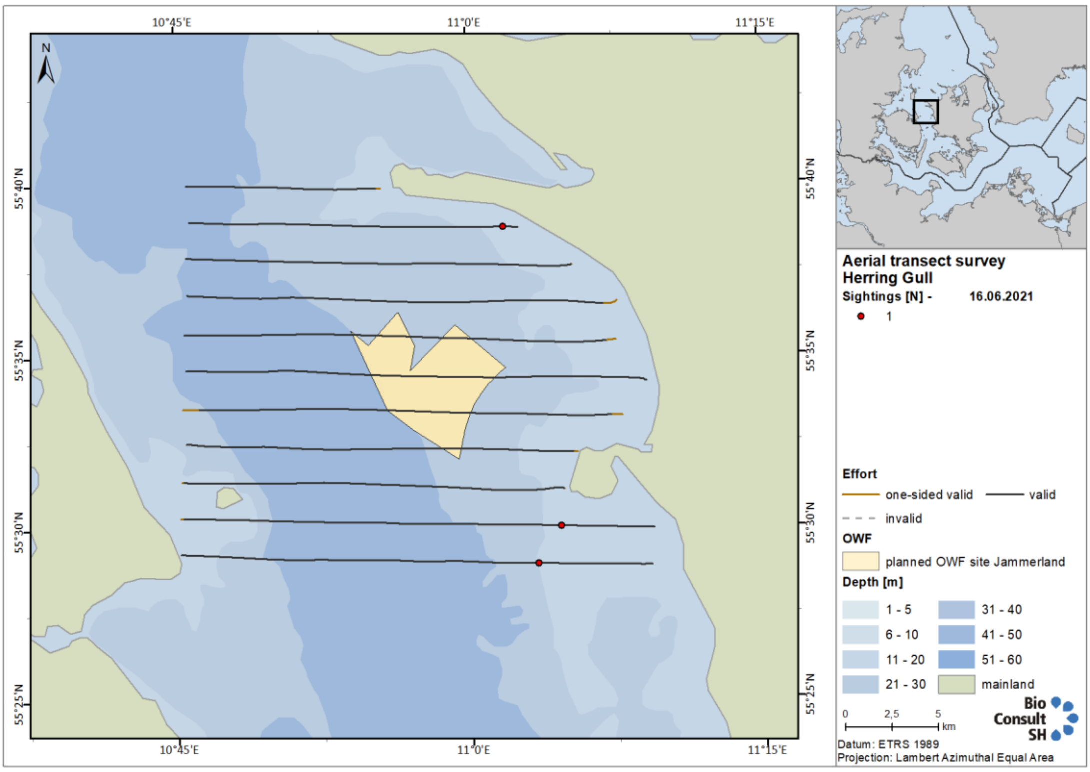

Figure A. 219 Herring Gull distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

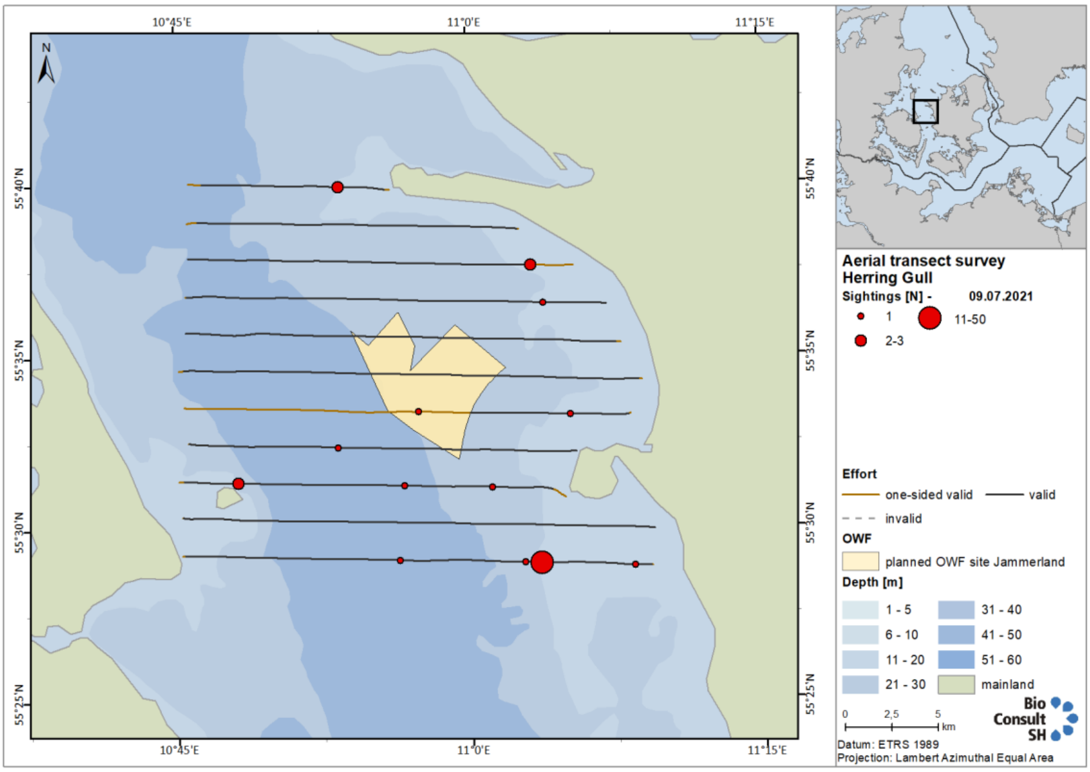

Figure A. 220 Herring Gull distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

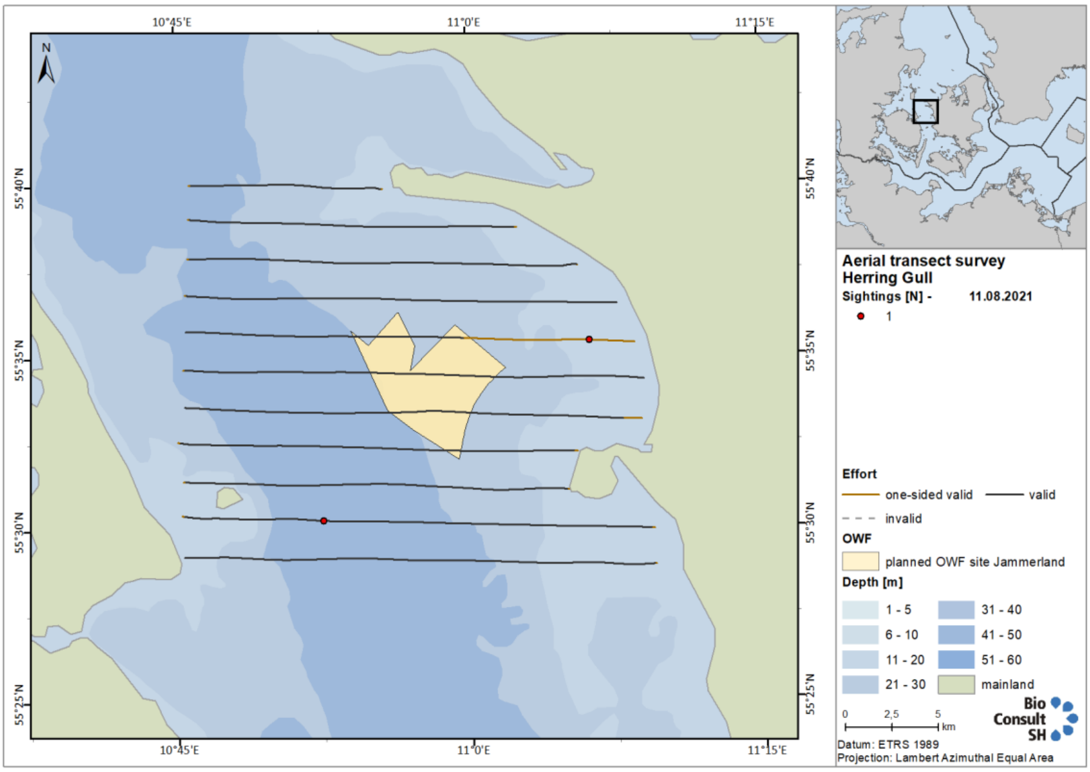

Figure A. 221 Herring Gull distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

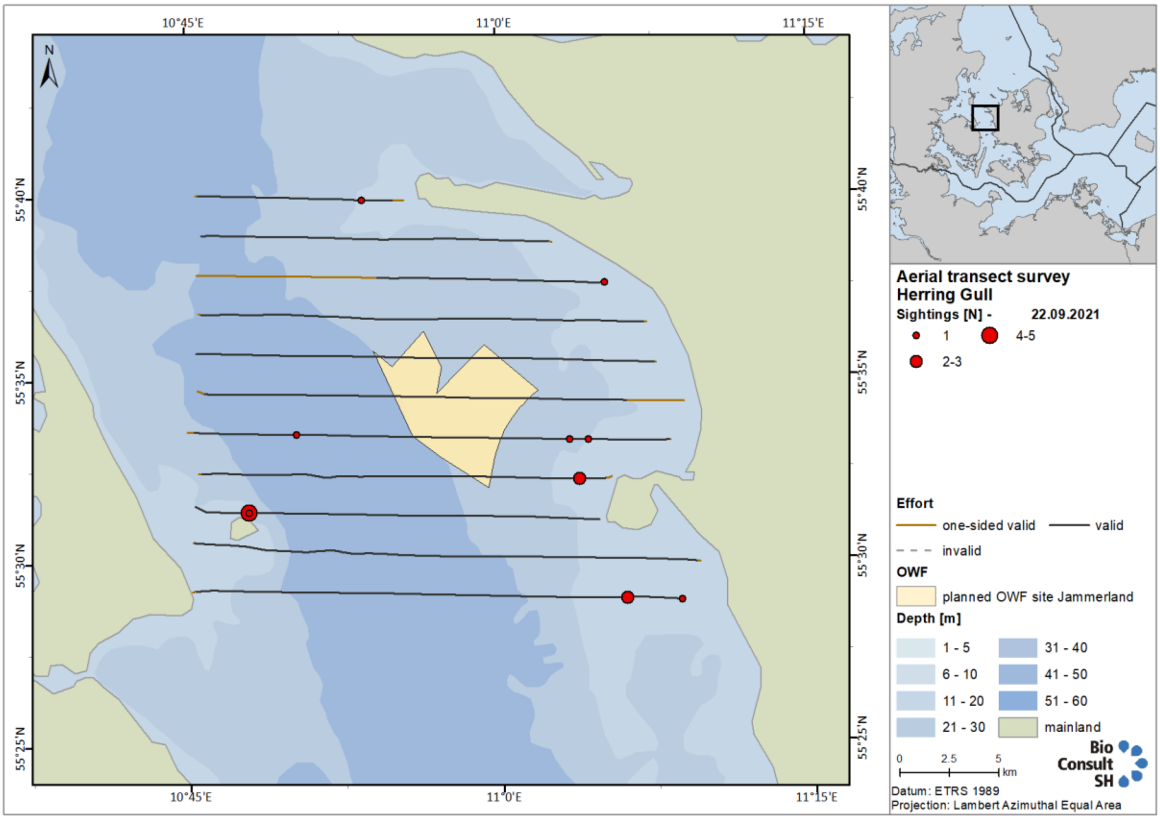

Figure A. 222 Herring Gull distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

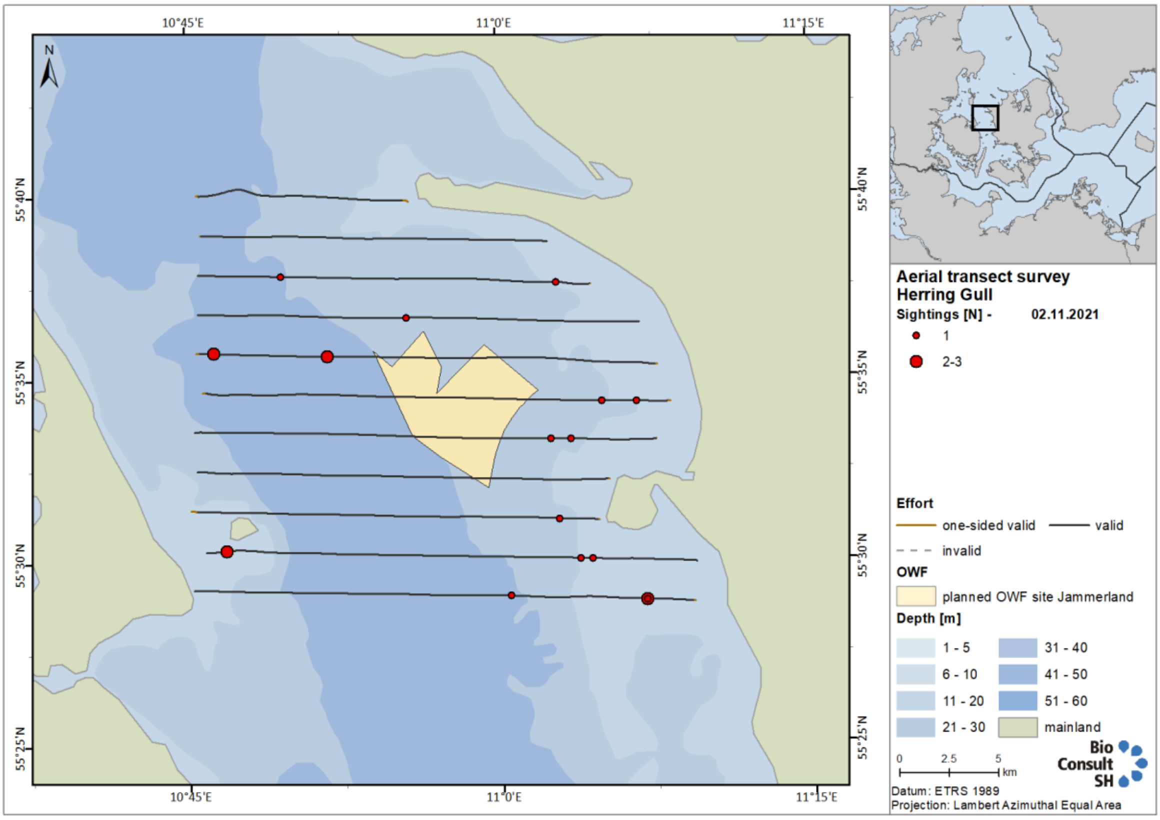

Figure A. 223 Herring Gull distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

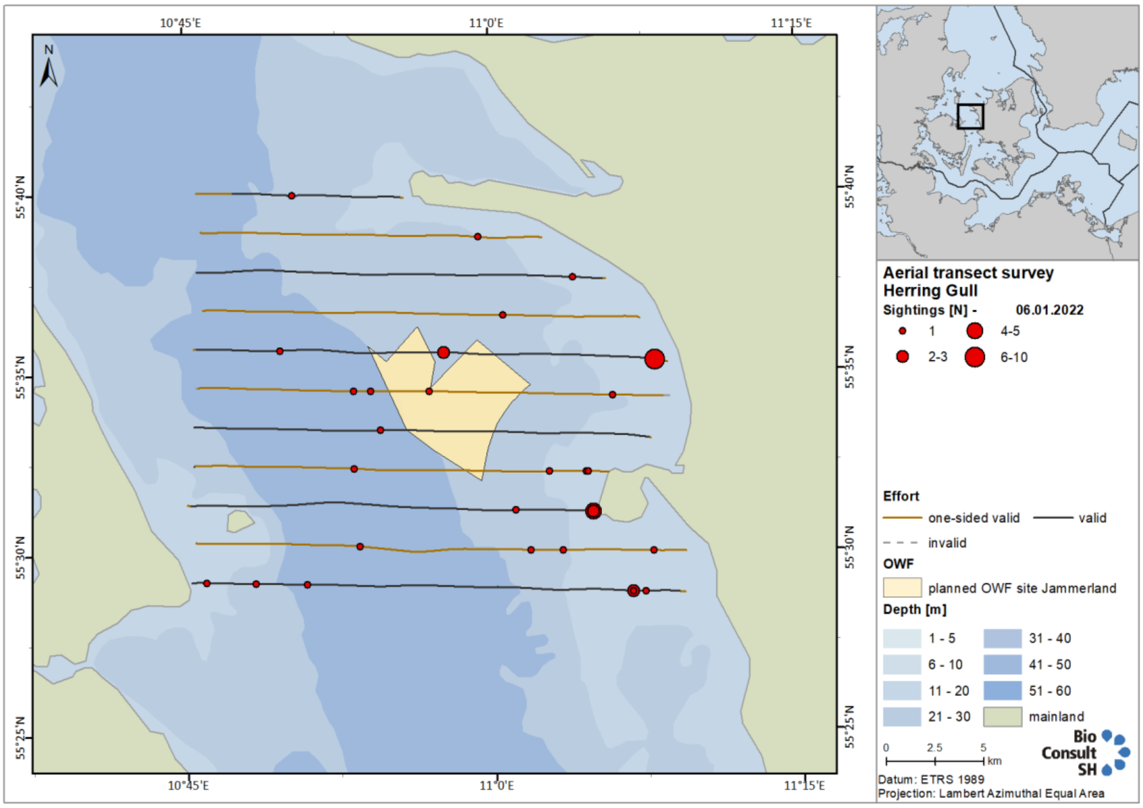

Figure A. 224 Herring Gull distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

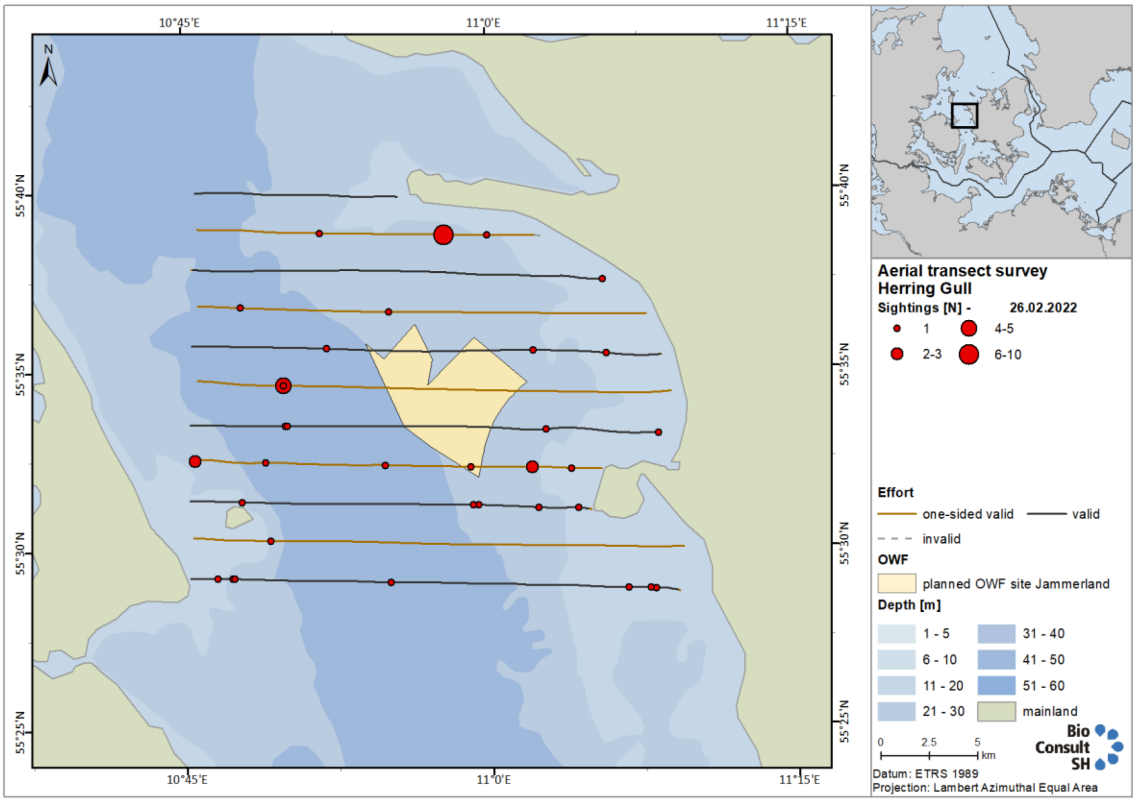

Figure A. 225 Herring Gull distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

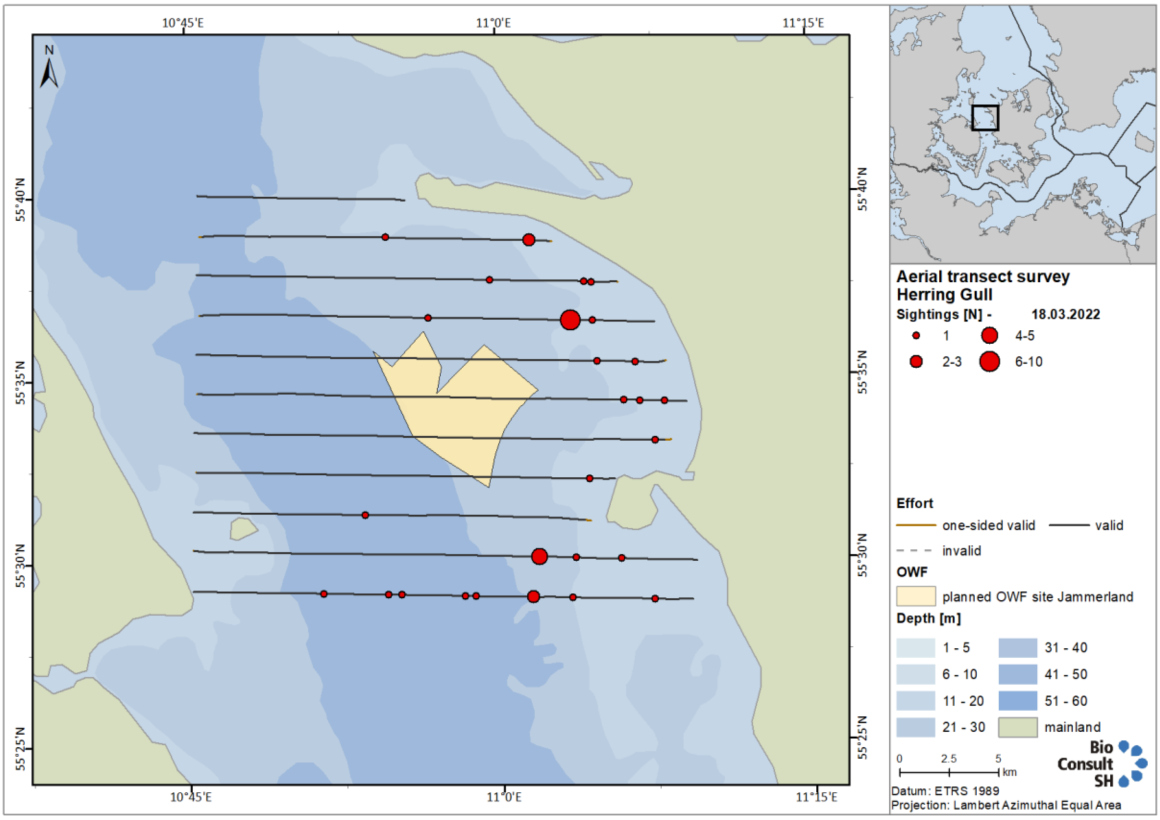

Figure A. 226 Herring Gull distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

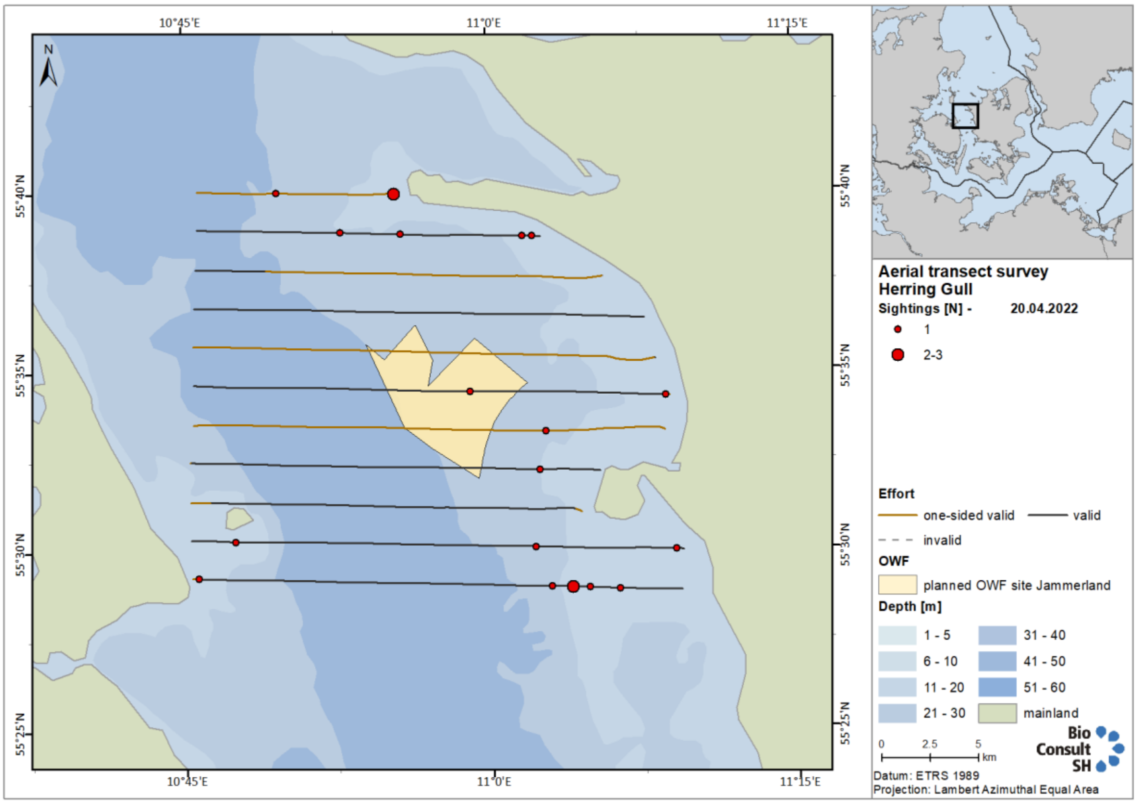

Figure A. 227 Herring Gull distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

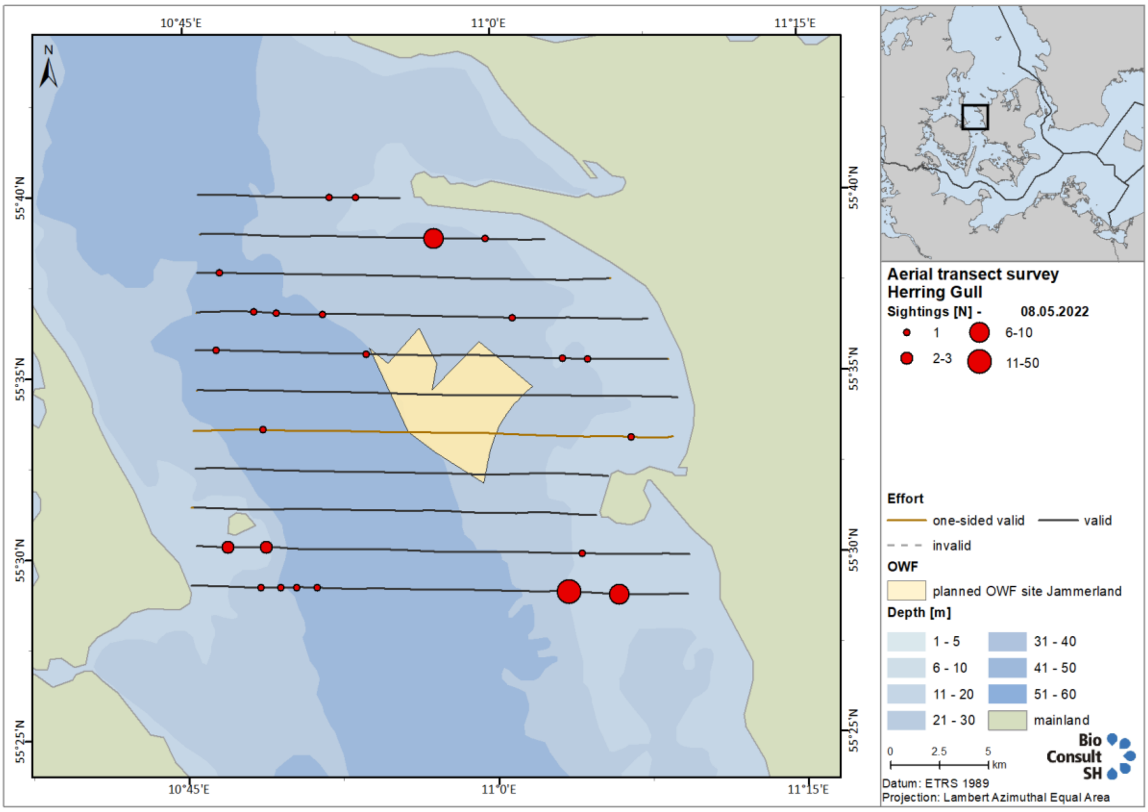

Figure A. 228 Herring Gull distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.19 Common Gull

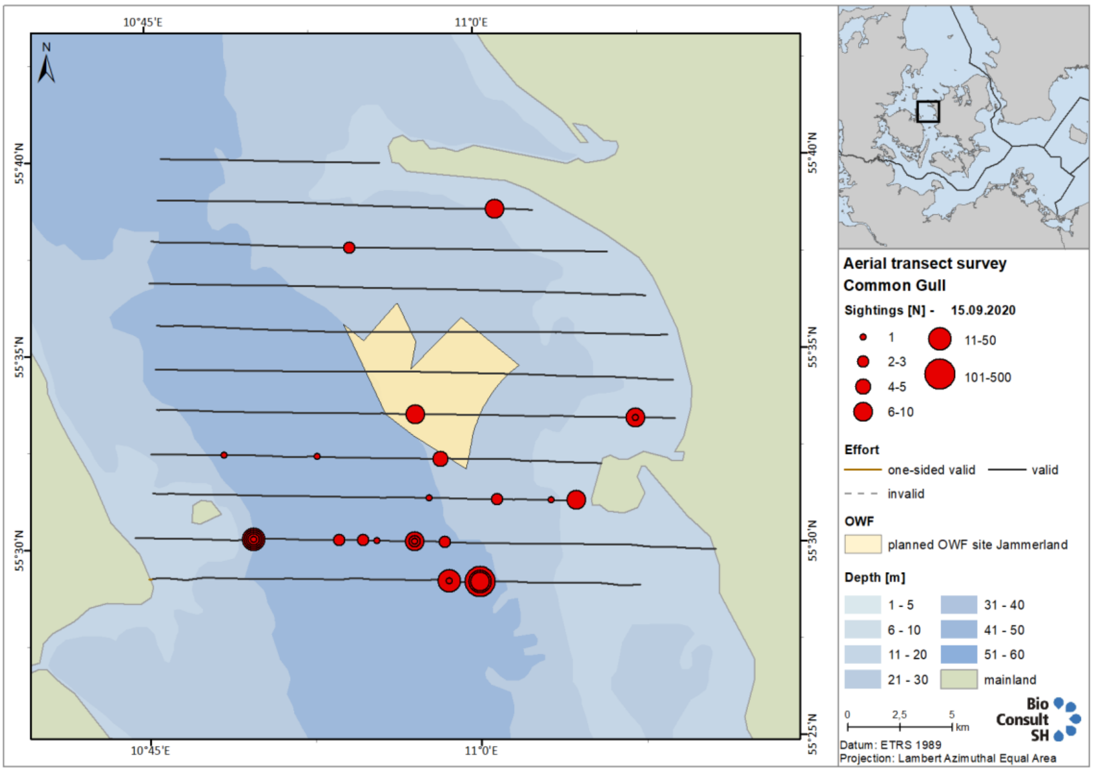

Figure A. 229 Common Gull distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

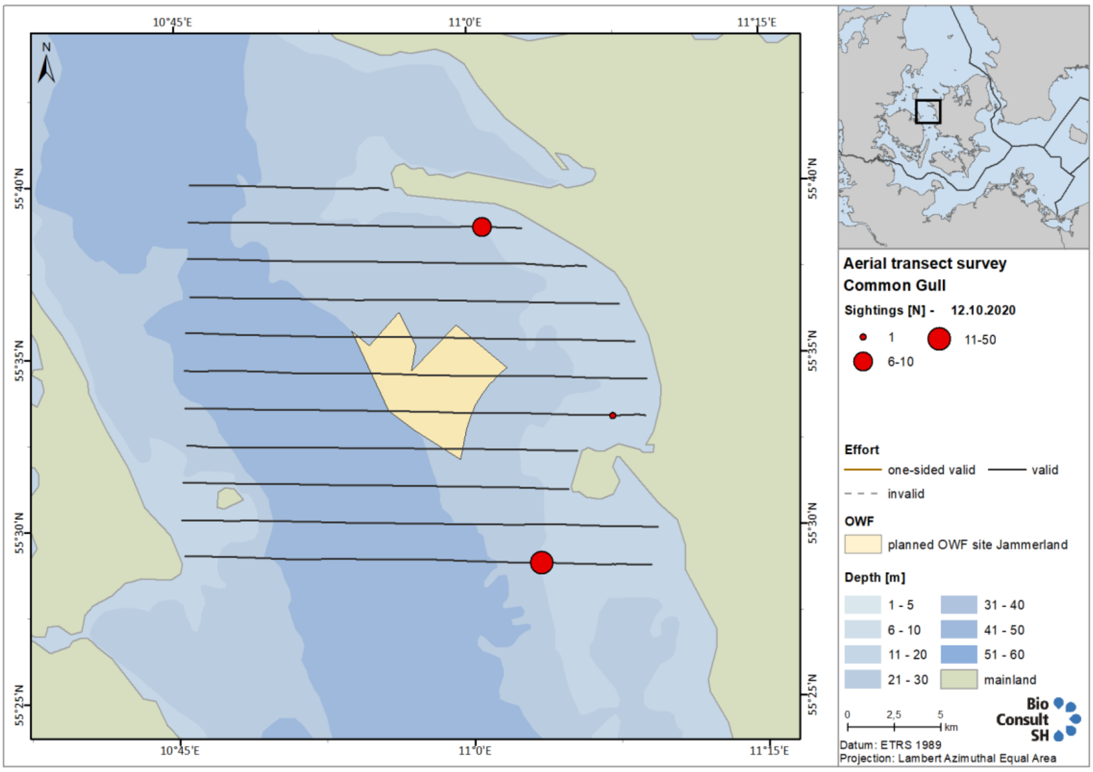

Figure A. 230 Common Gull distribution in the Jammerland area during the aerial survey flight on 12th October 2020.

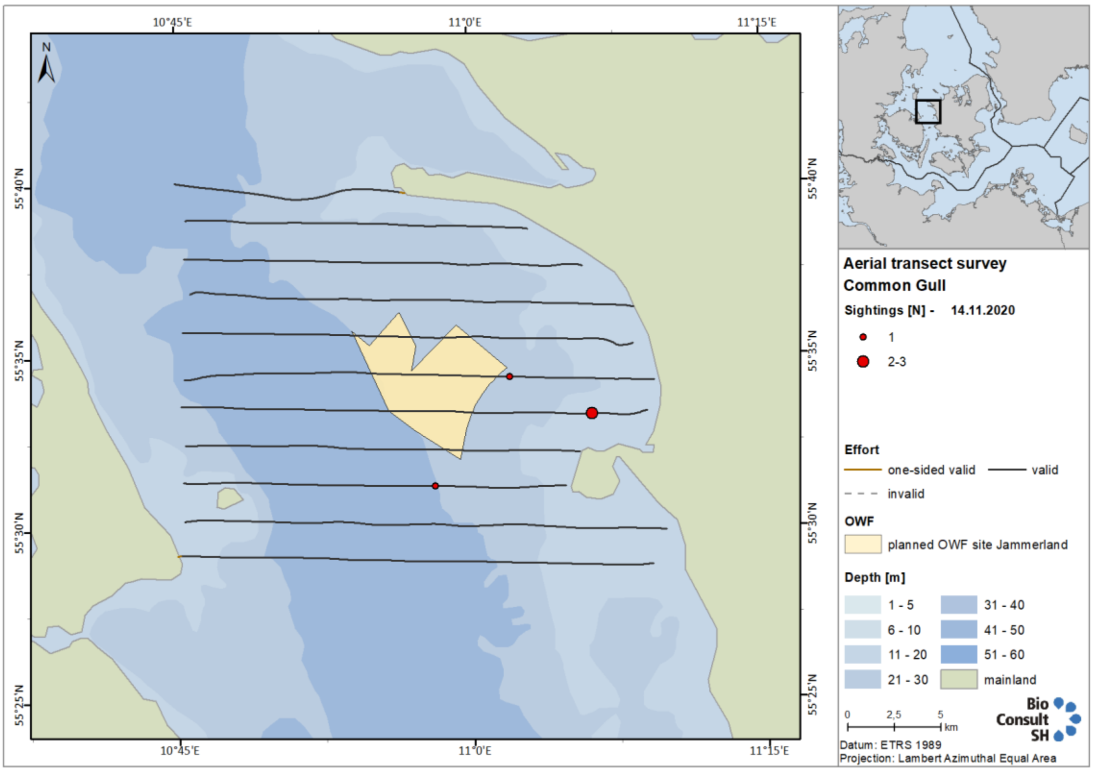

Figure A. 231 Common Gull distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

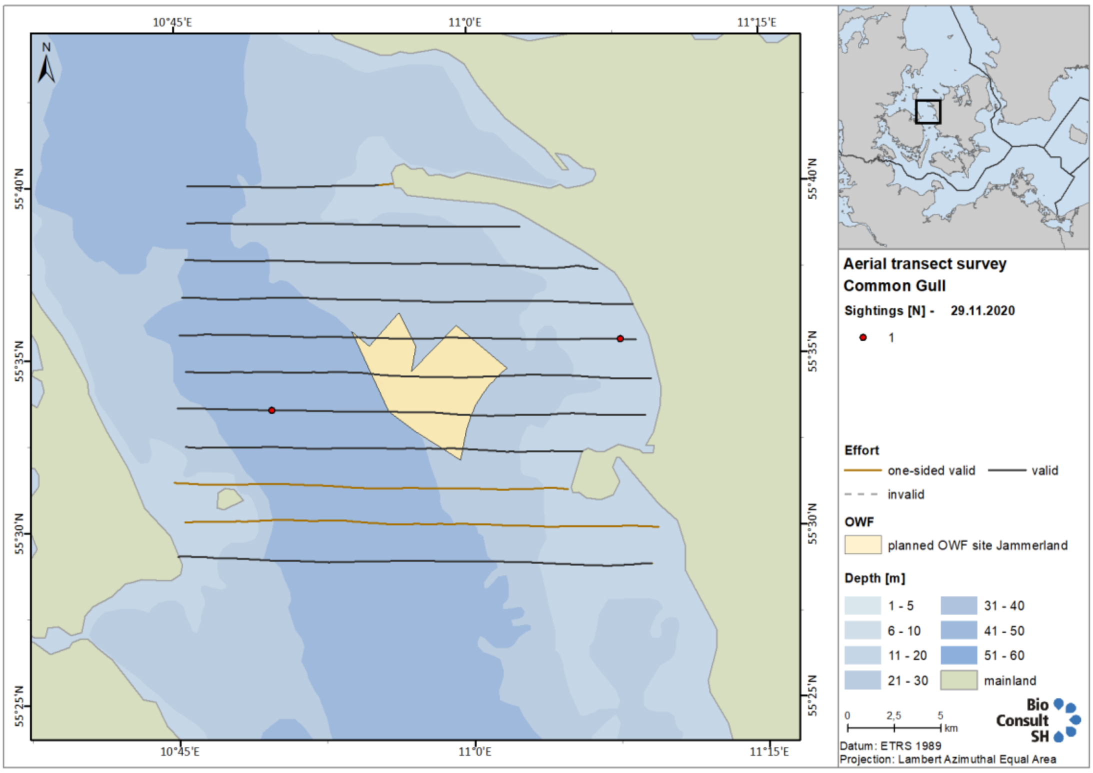

Figure A. 232 Common Gull distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

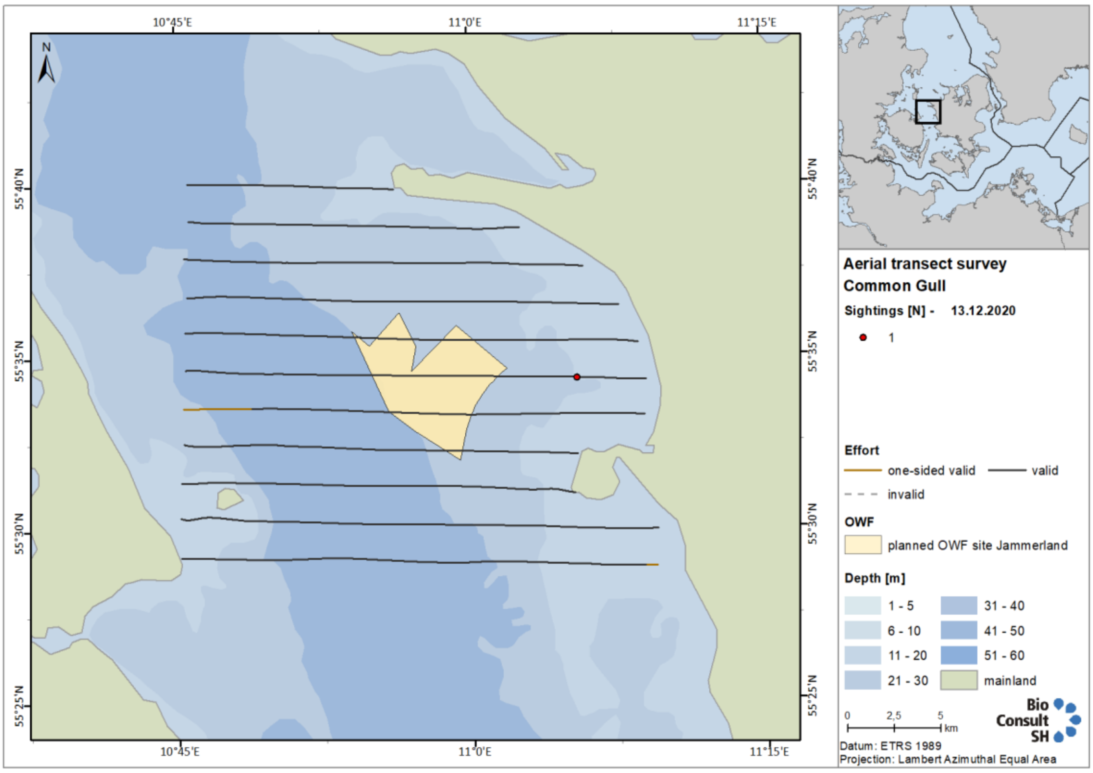

Figure A. 233 Common Gull distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

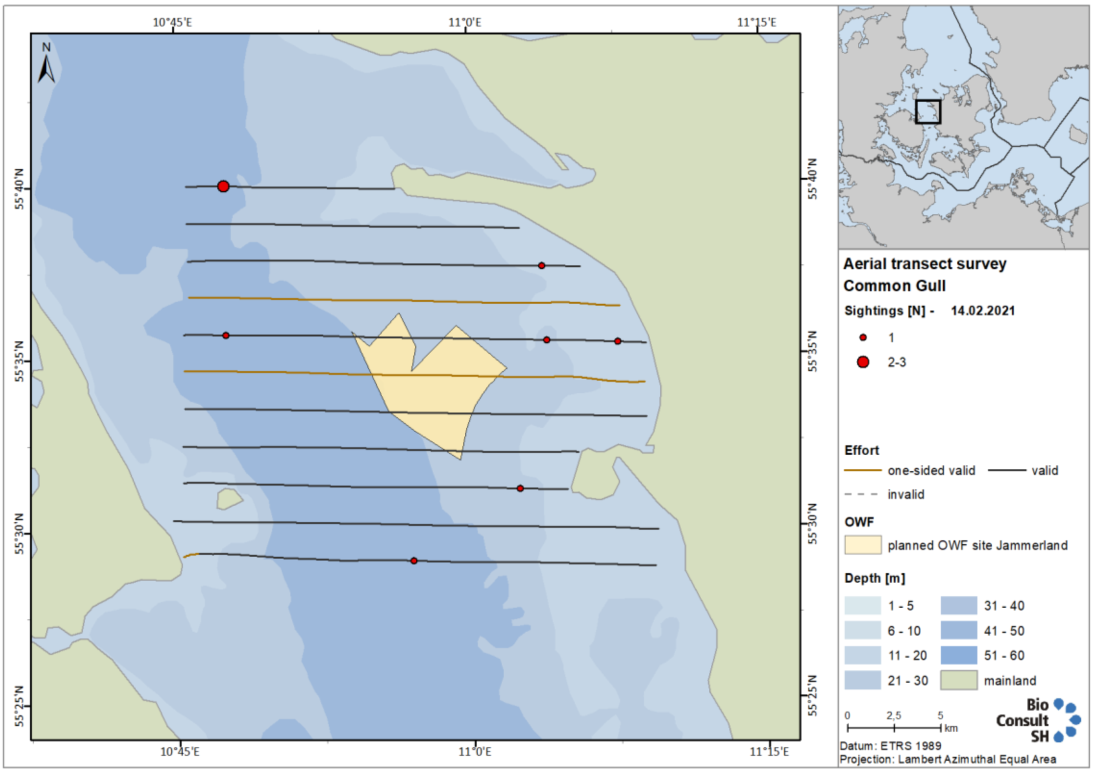

Figure A. 234 Common Gull distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

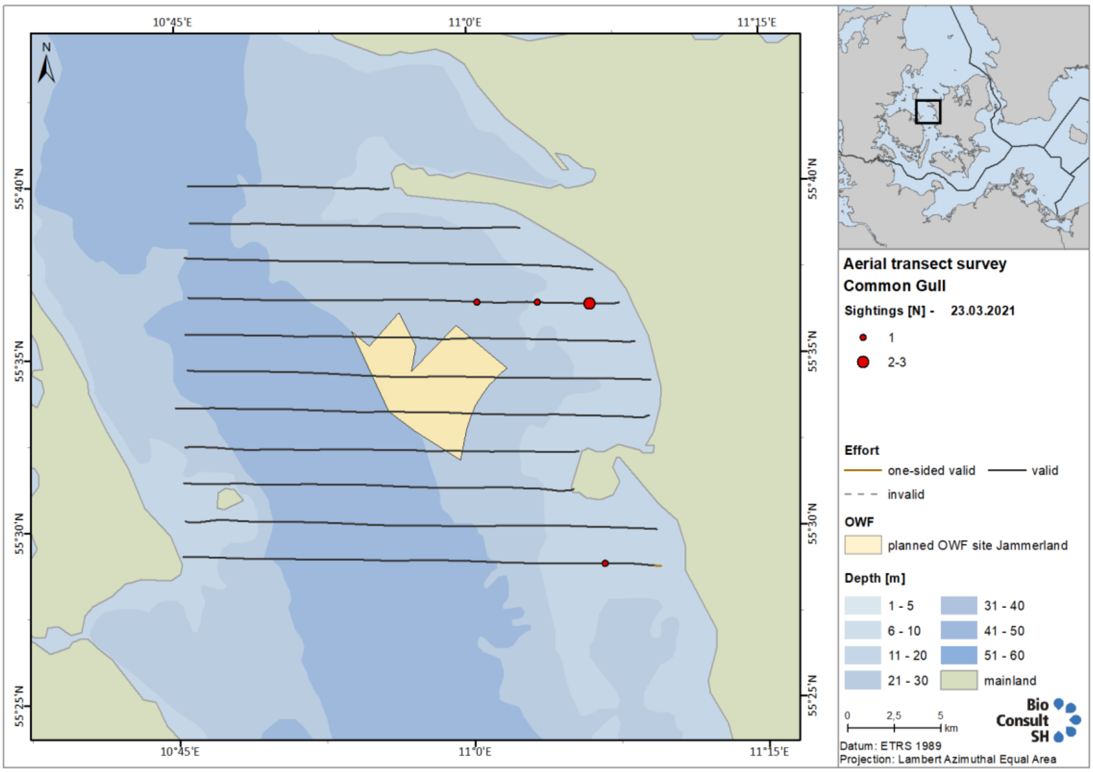

Figure A. 235 Common Gull distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

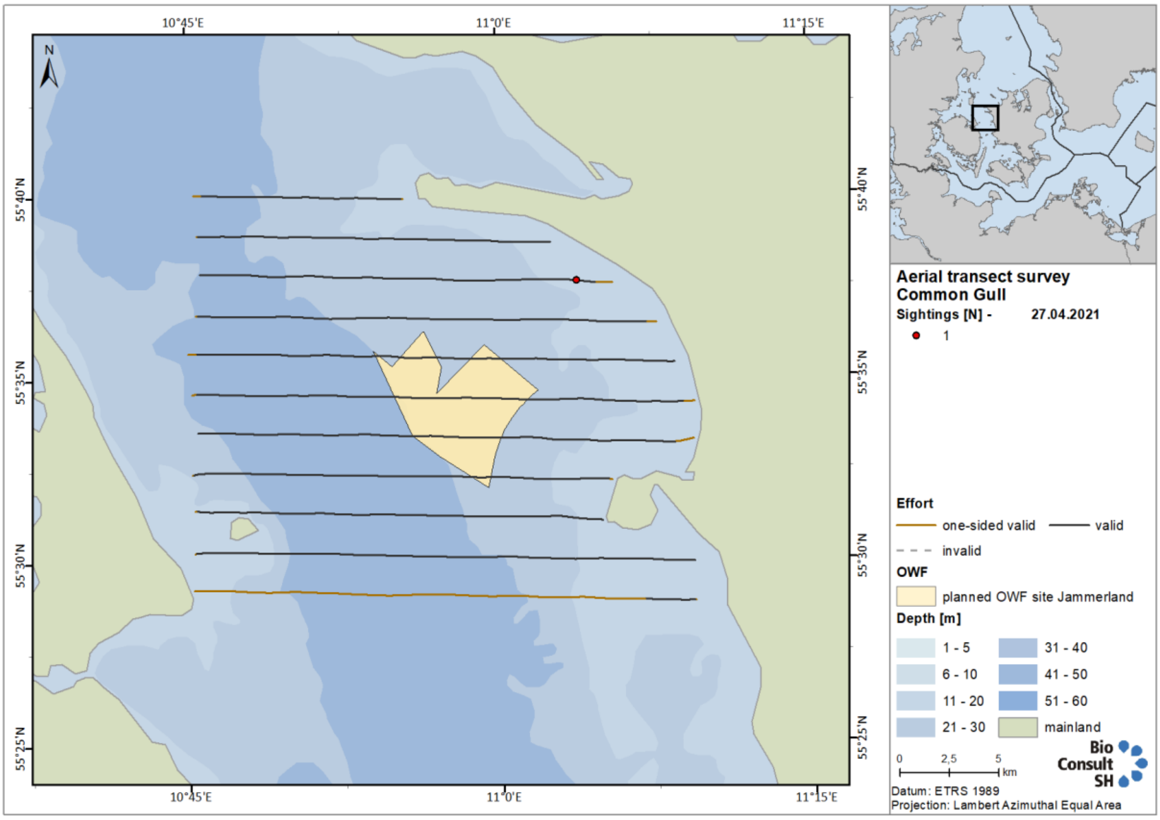

Figure A. 236 Common Gull distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

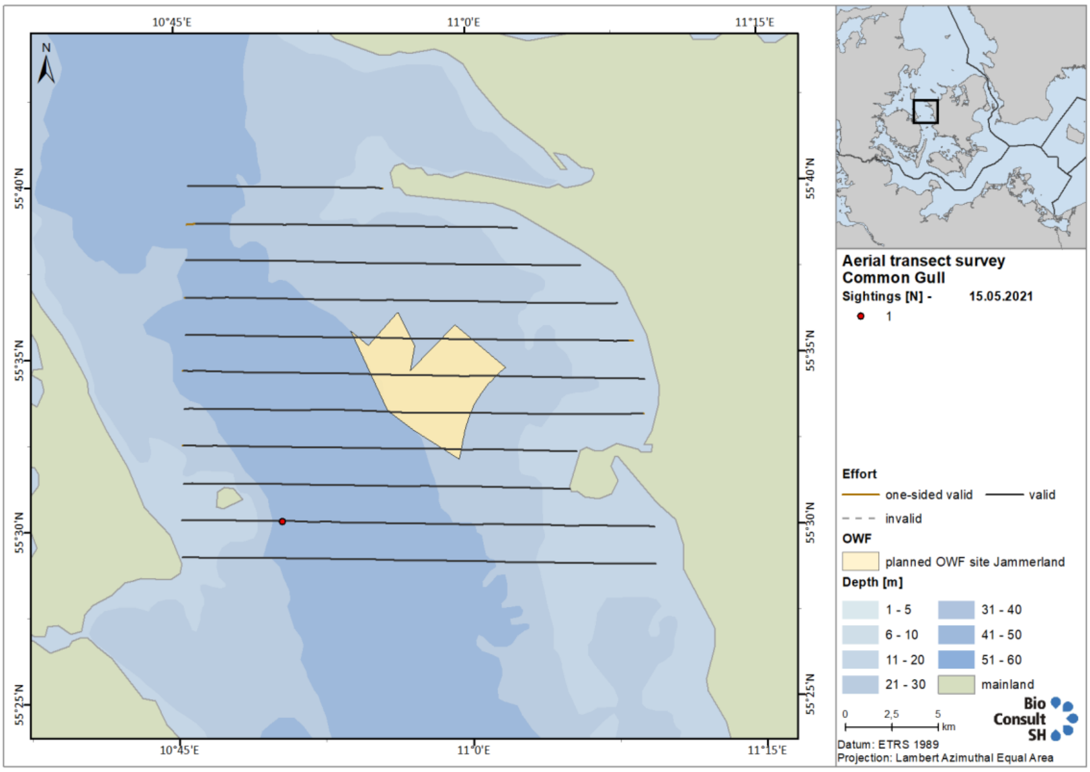

Figure A. 237 Common Gull distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

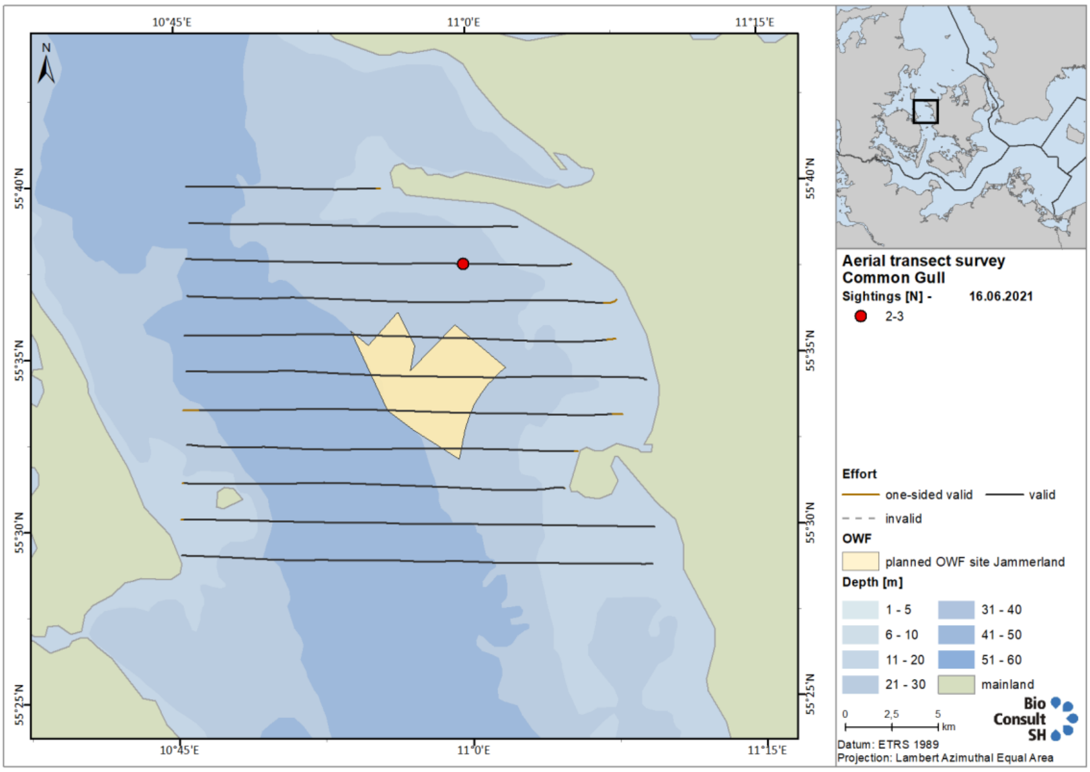

Figure A. 238 Common Gull distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

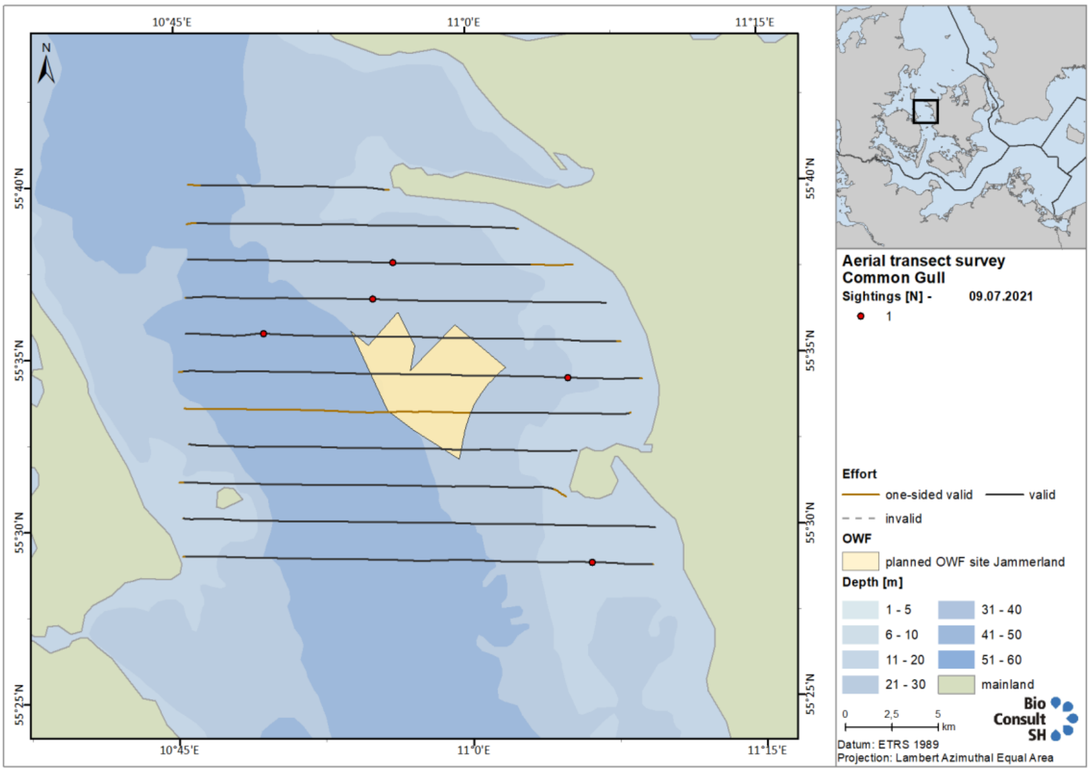

Figure A. 239 Common Gull distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

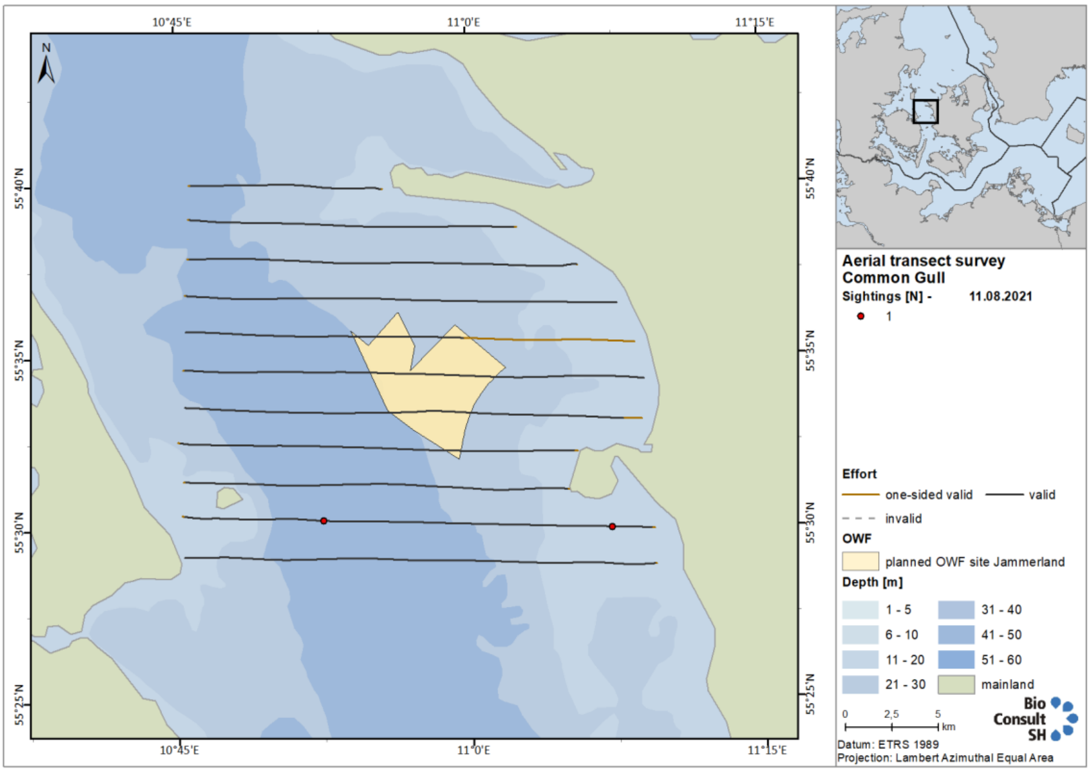

Figure A. 240 Common Gull distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

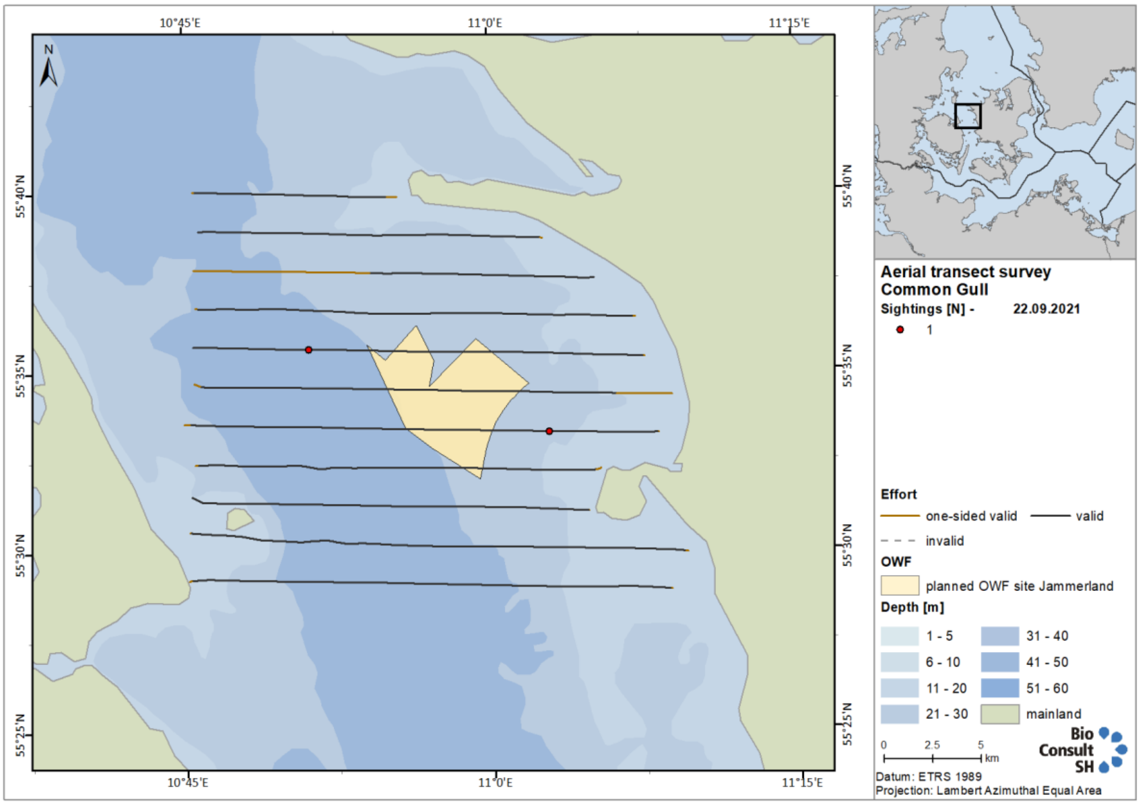

Figure A. 241 Common Gull distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

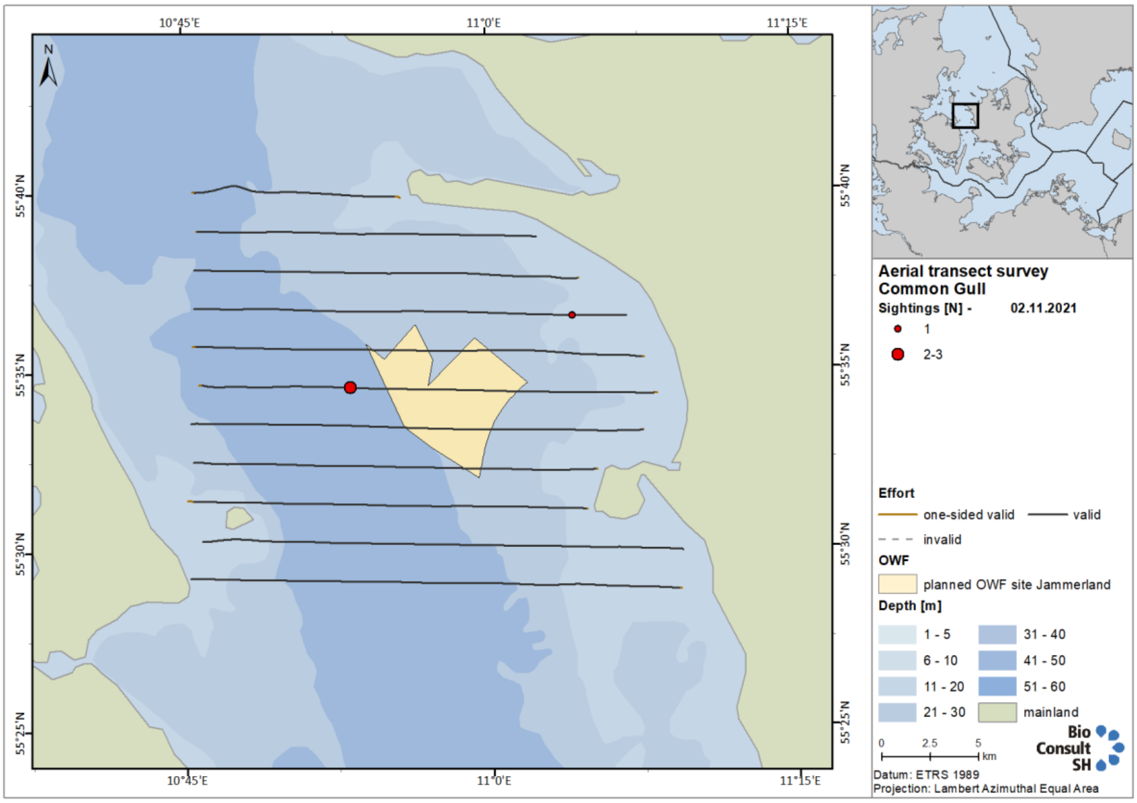

Figure A. 242 Common Gull distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

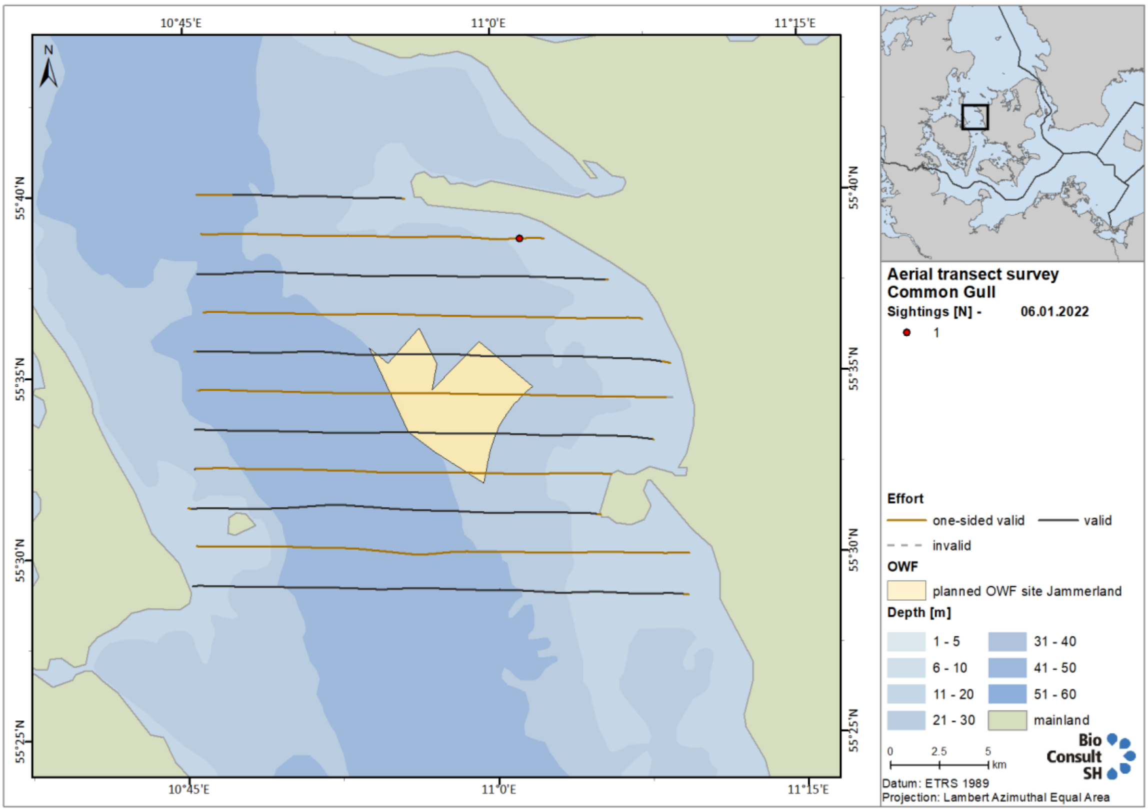

Figure A. 243 Common Gull distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

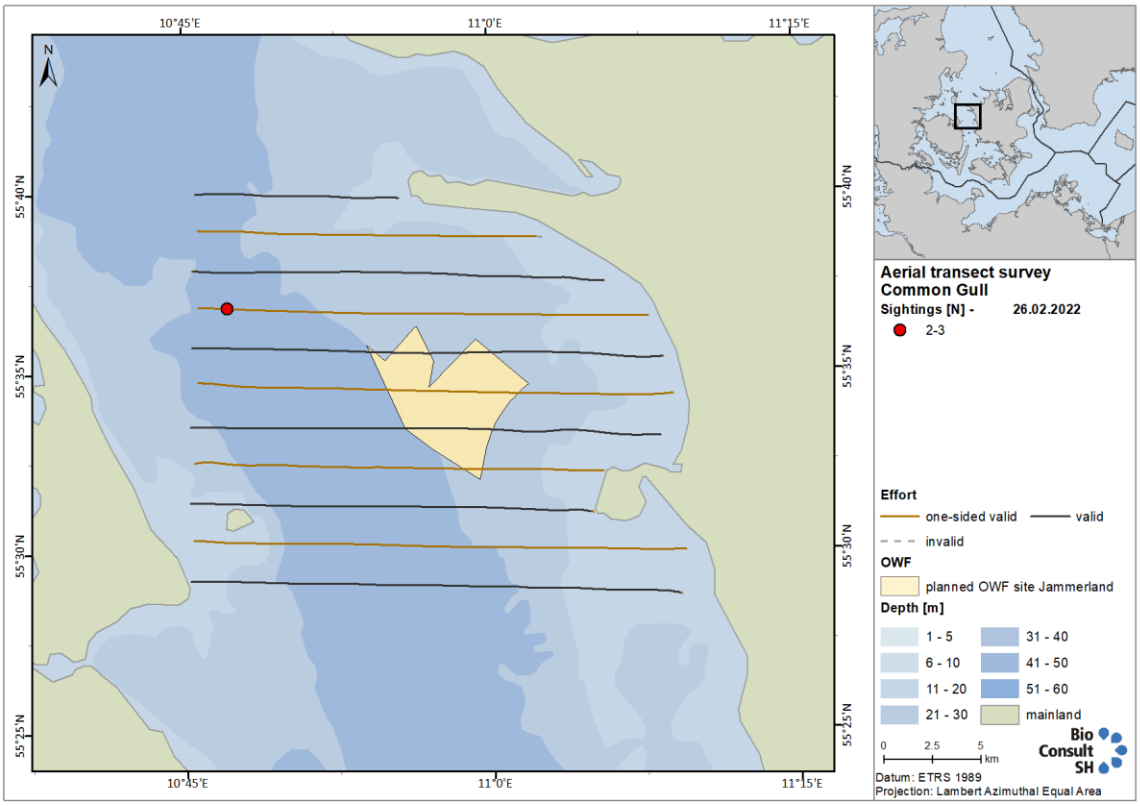

Figure A. 244 Common Gull distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

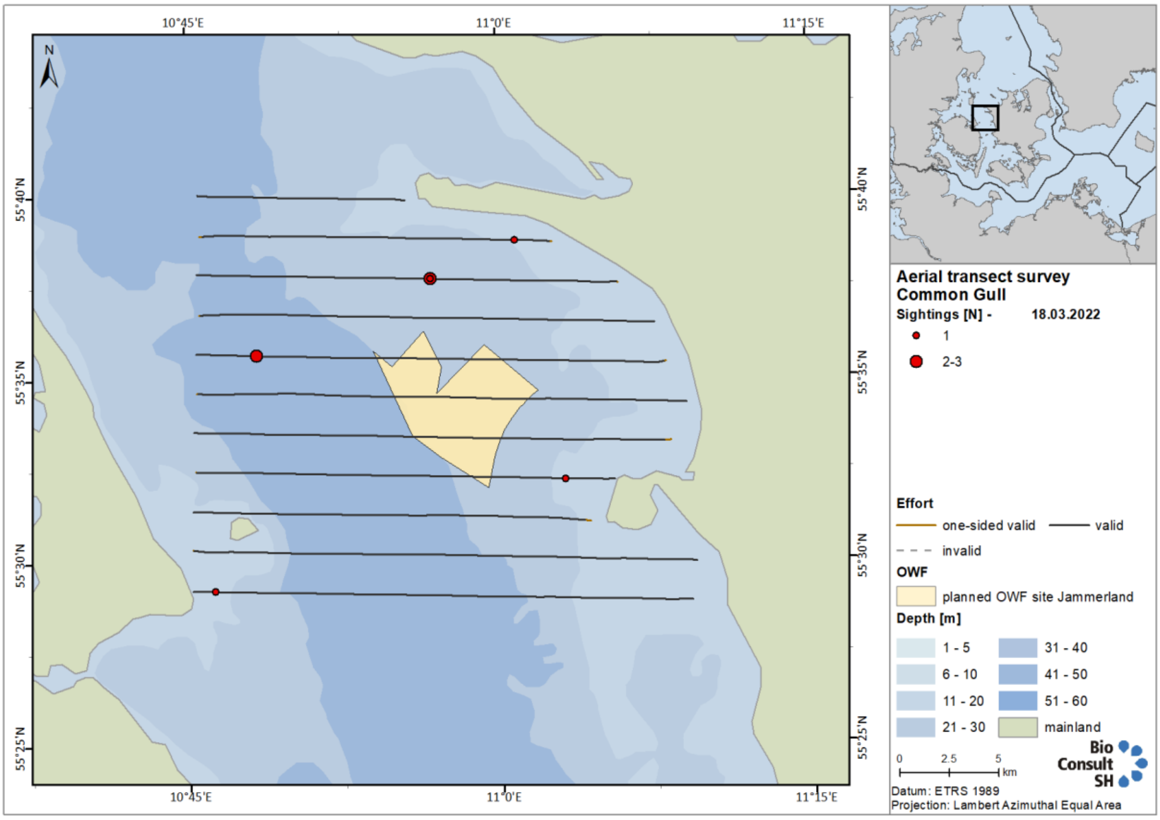

Figure A. 245 Common Gull distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

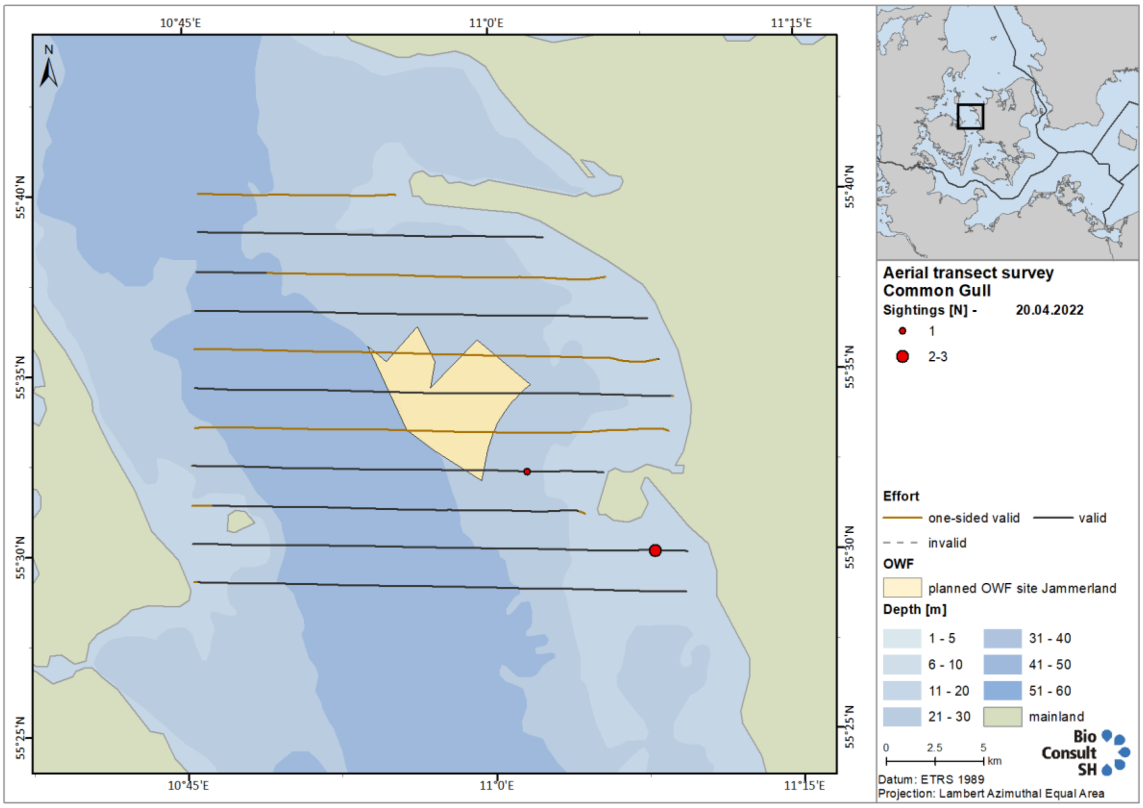

Figure A. 246 Common Gull distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

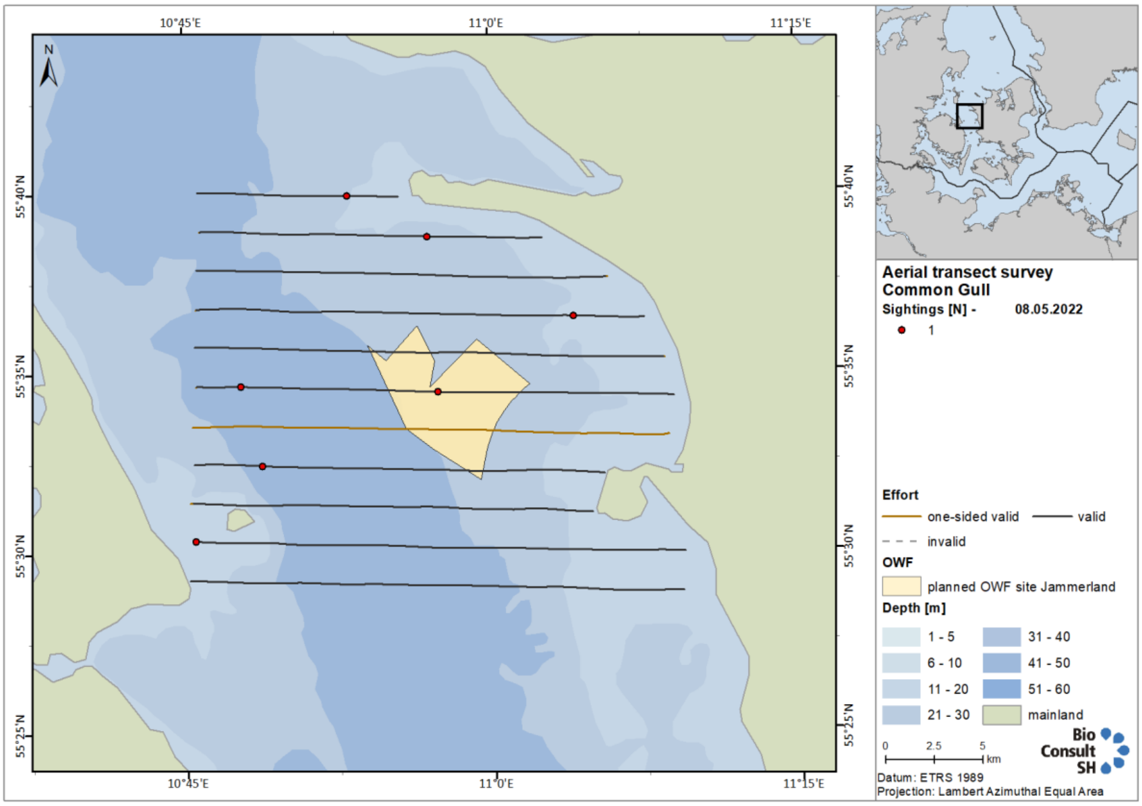

Figure A. 247 Common Gull distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.20 Lesser Black-backed Gull

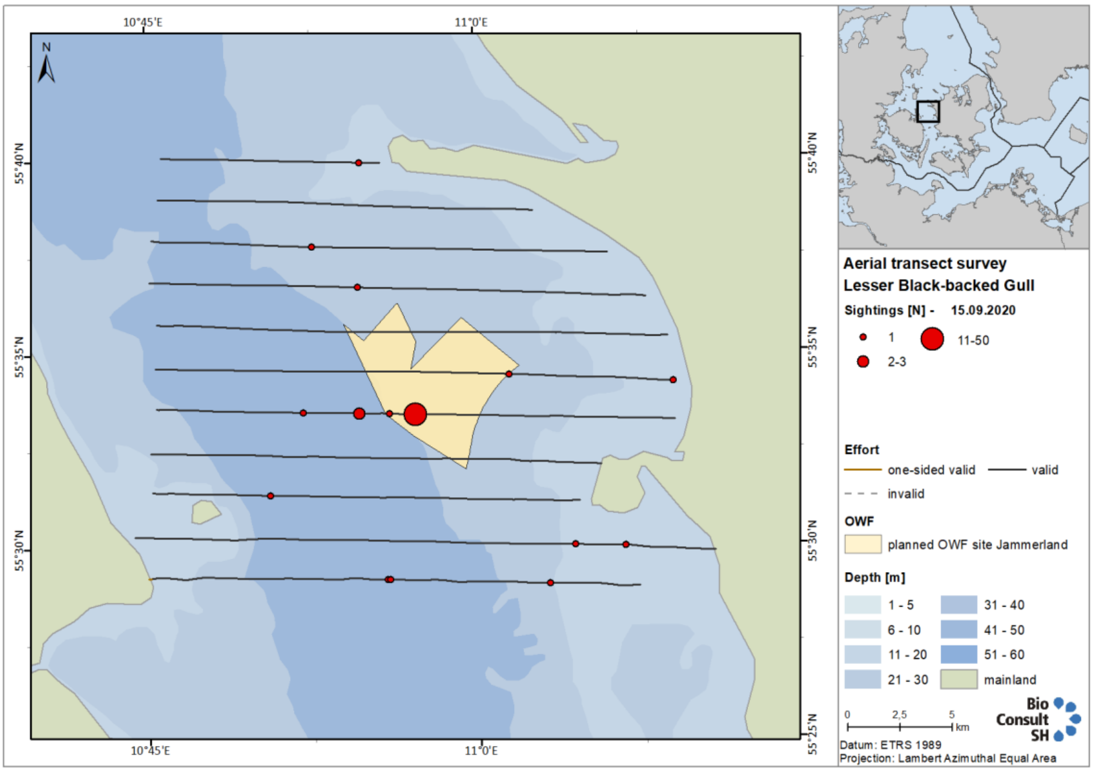

Figure A. 248 Lesser Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

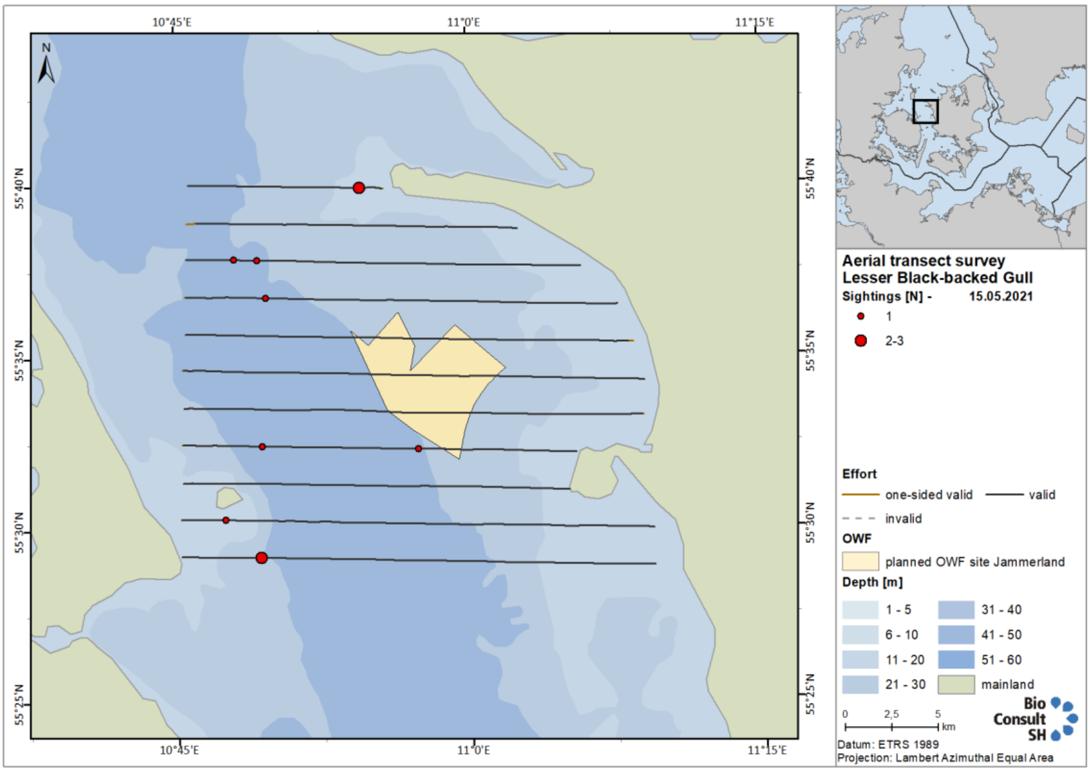

Figure A. 249 Lesser Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

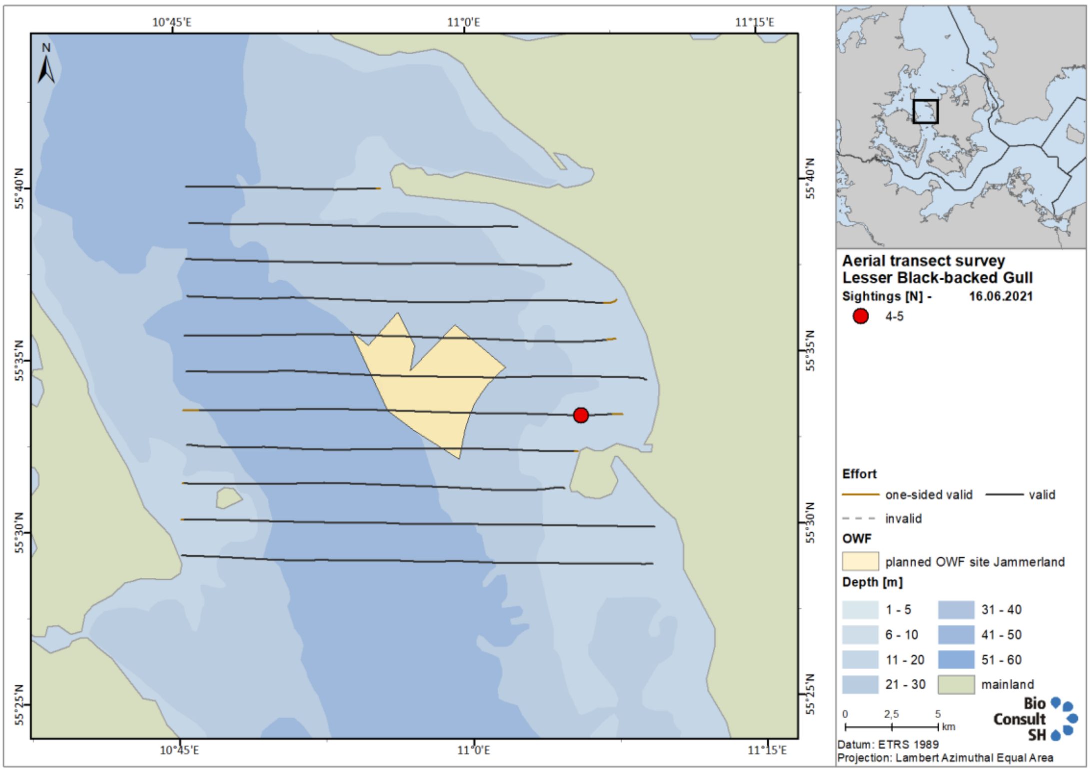

Figure A. 250 Lesser Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

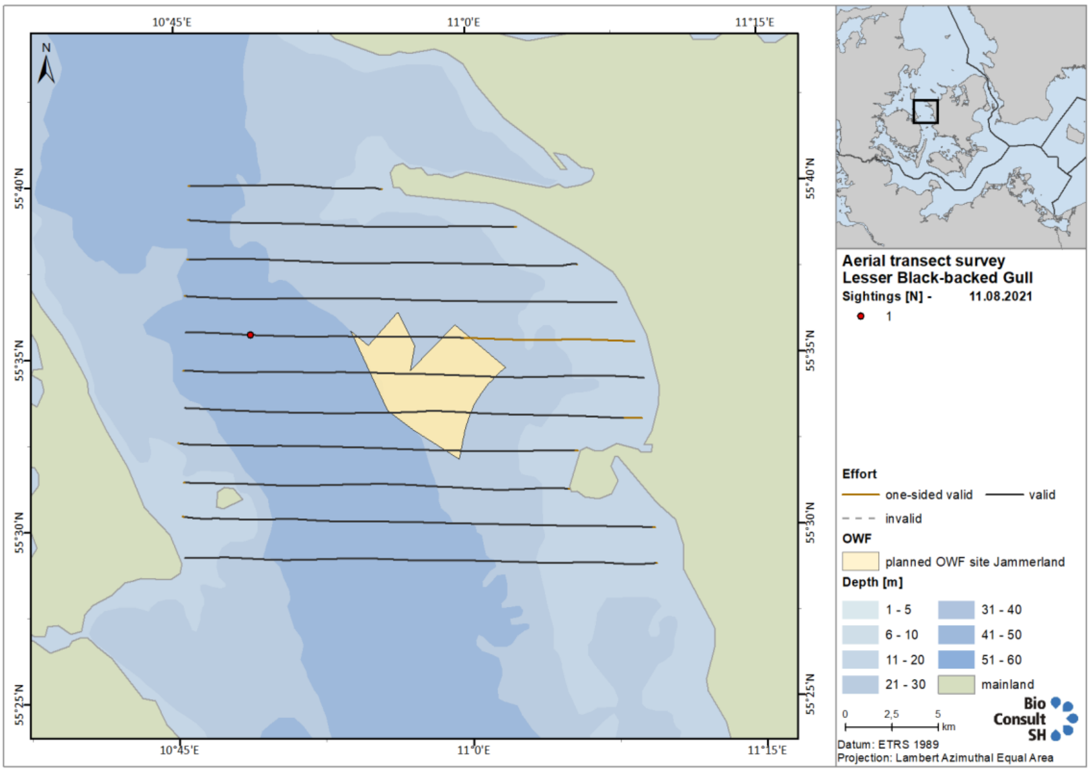

Figure A. 251 Lesser Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

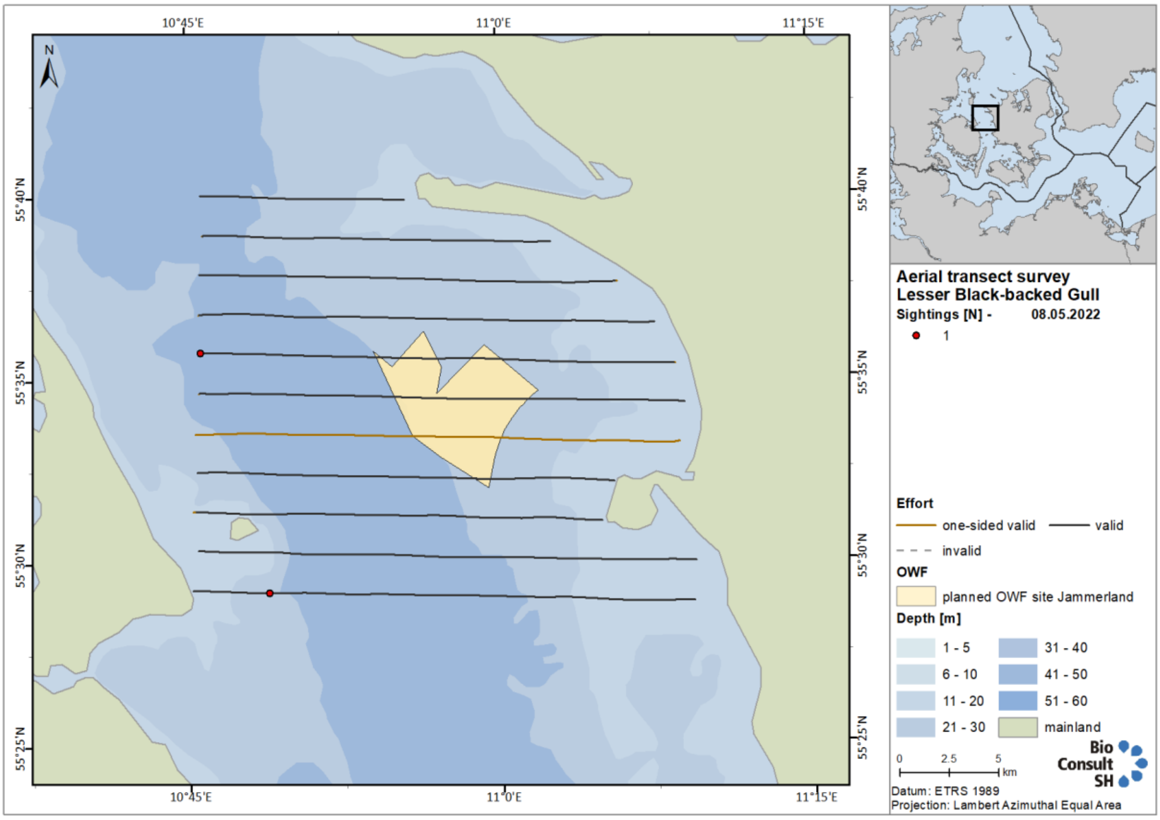

Figure A. 252 Lesser Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.21 Great Black-backed Gull

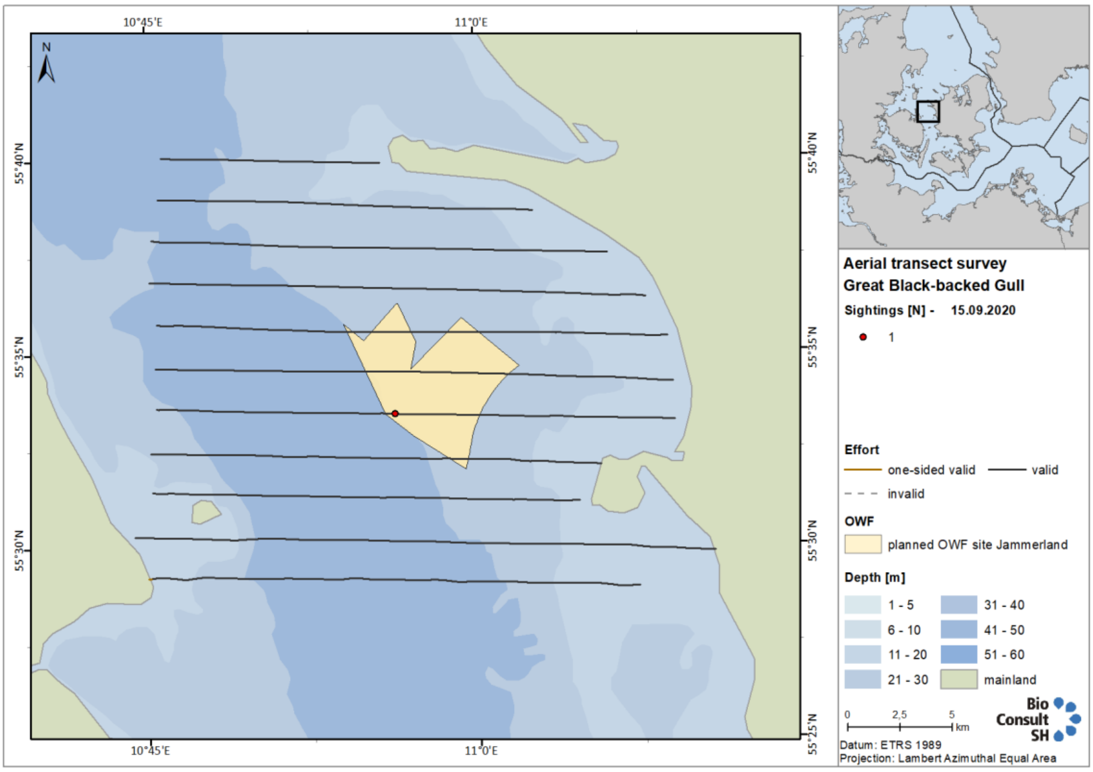

Figure A. 253 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

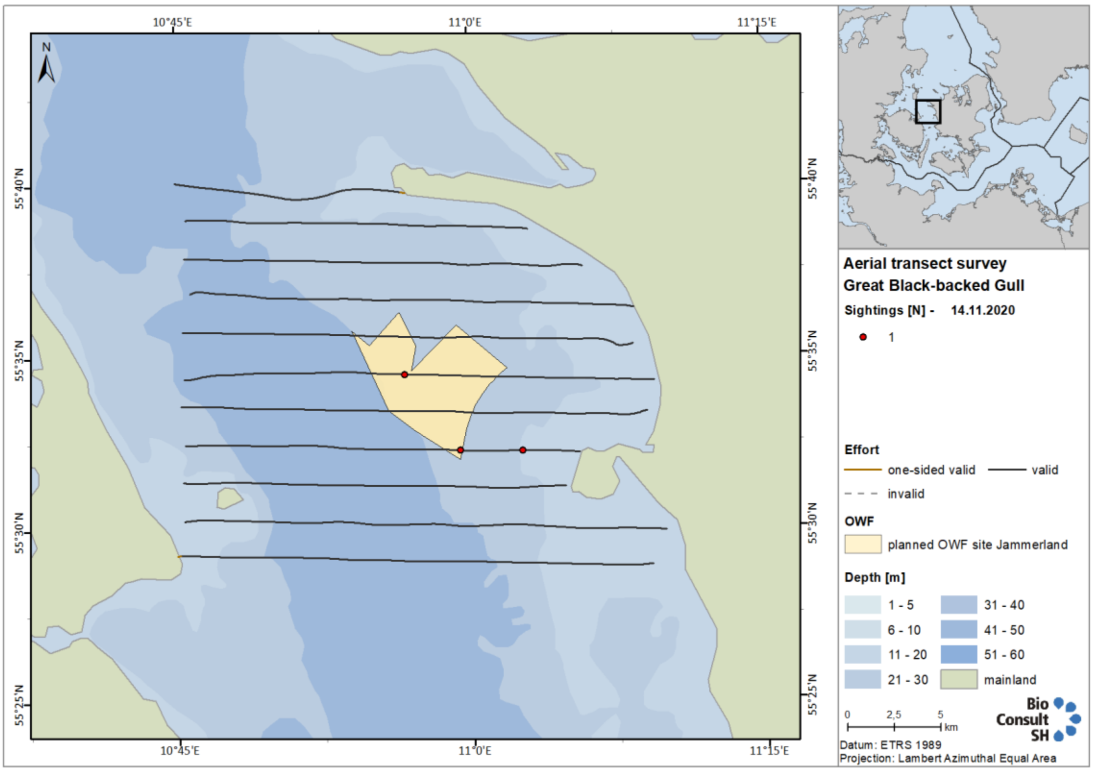

Figure A. 254 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

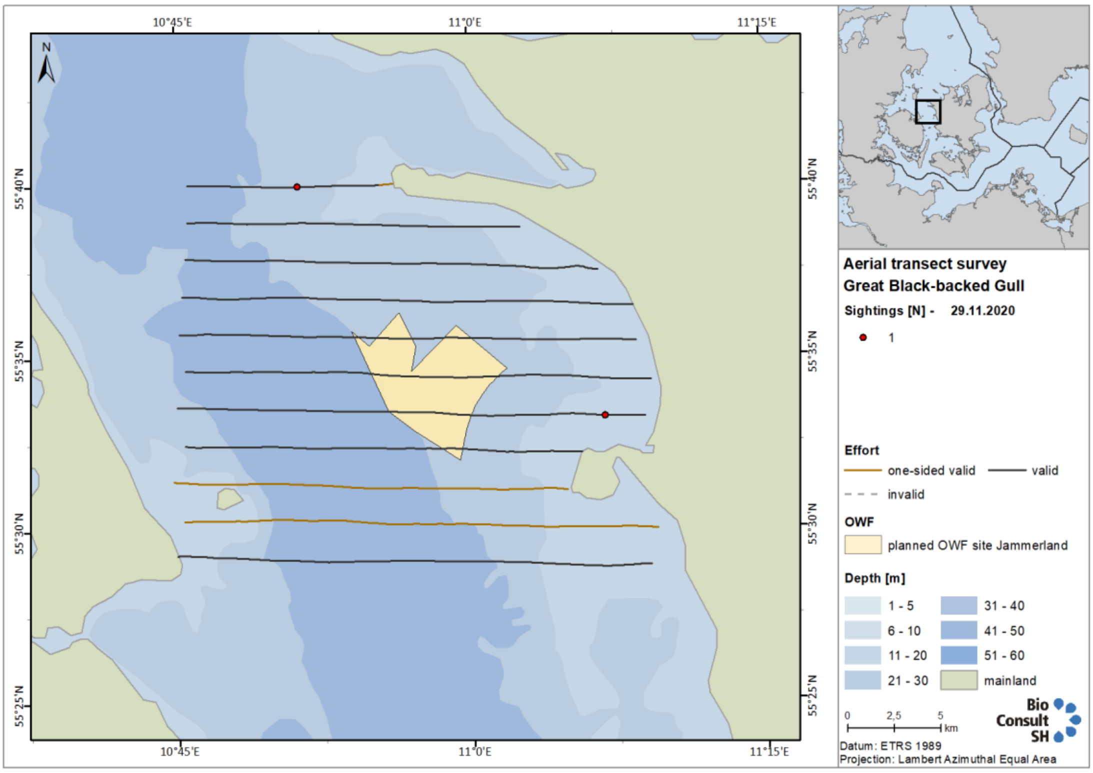

Figure A. 255 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 29th November 2020.

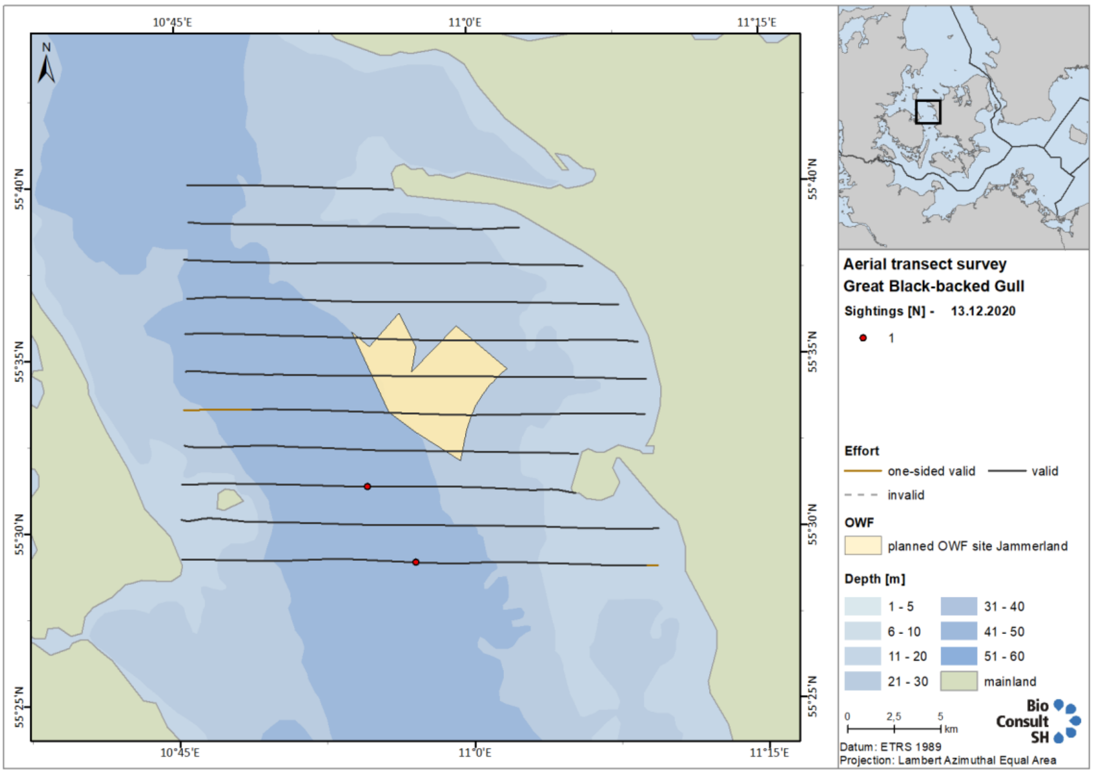

Figure A. 256 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

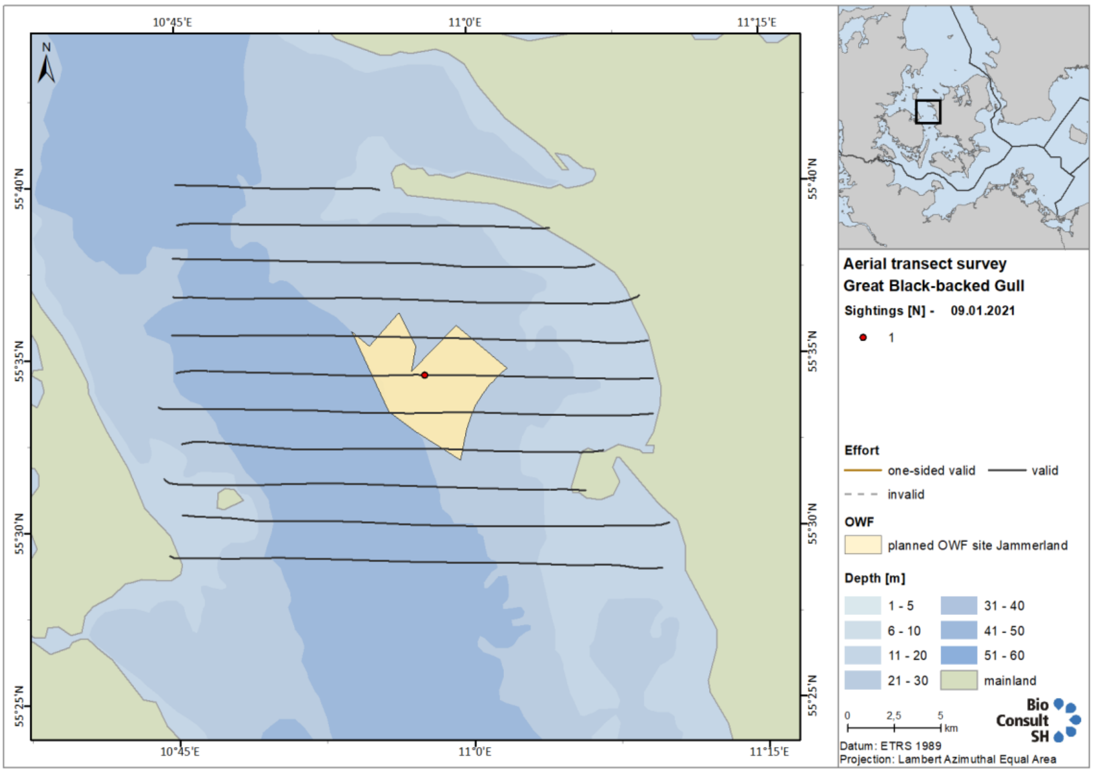

Figure A. 257 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

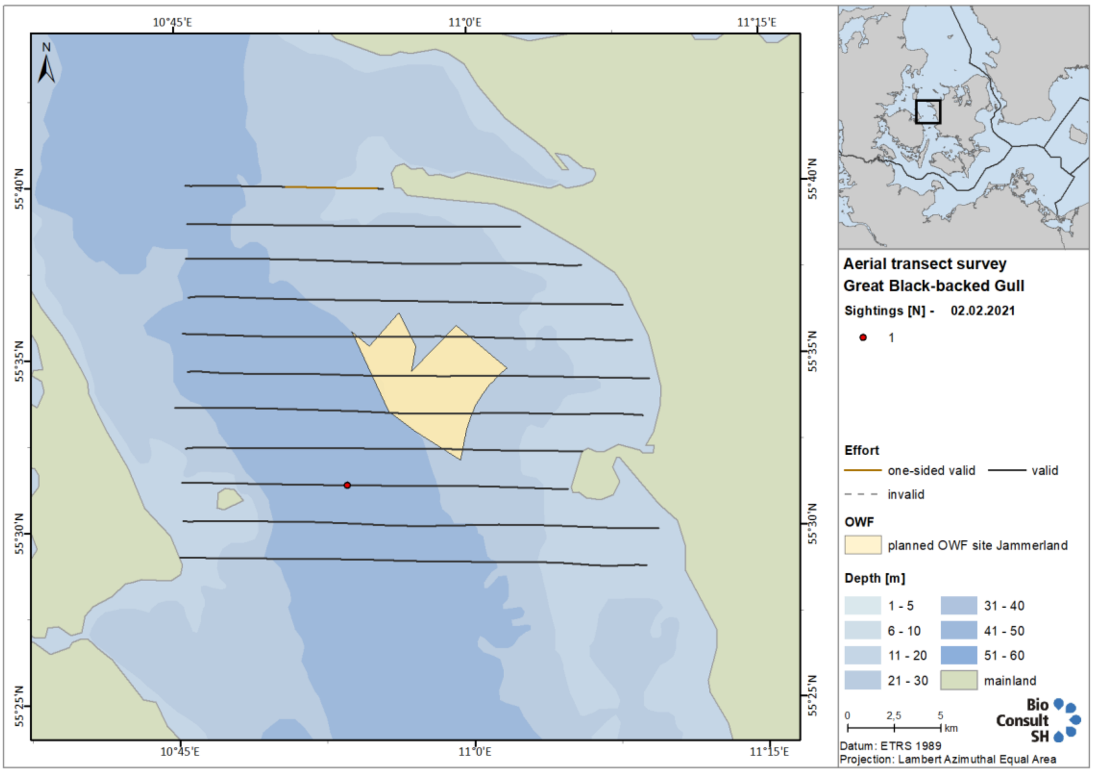

Figure A. 258 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

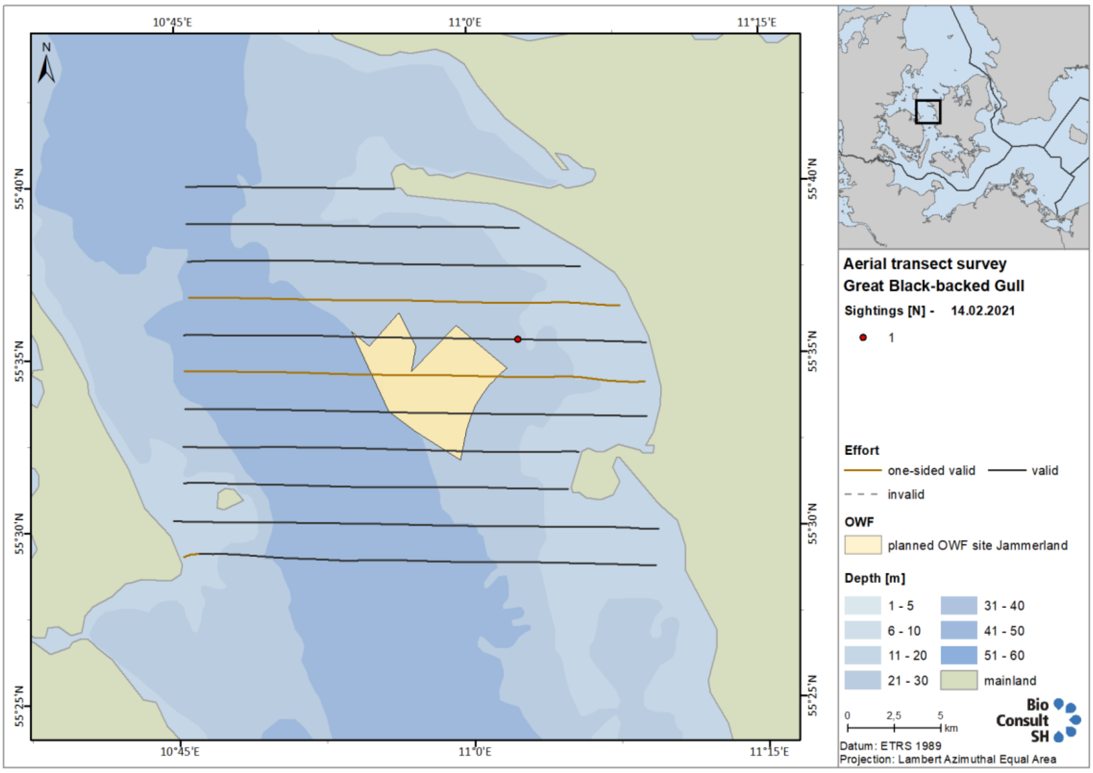

Figure A. 259 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

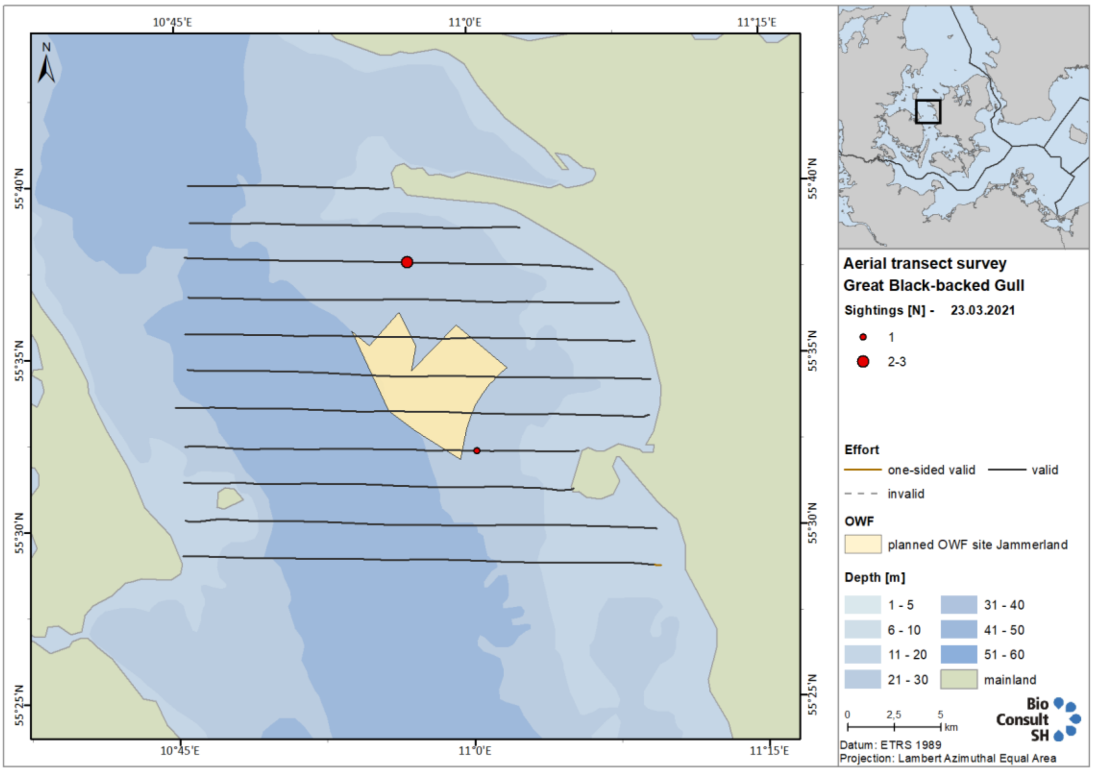

Figure A. 260 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

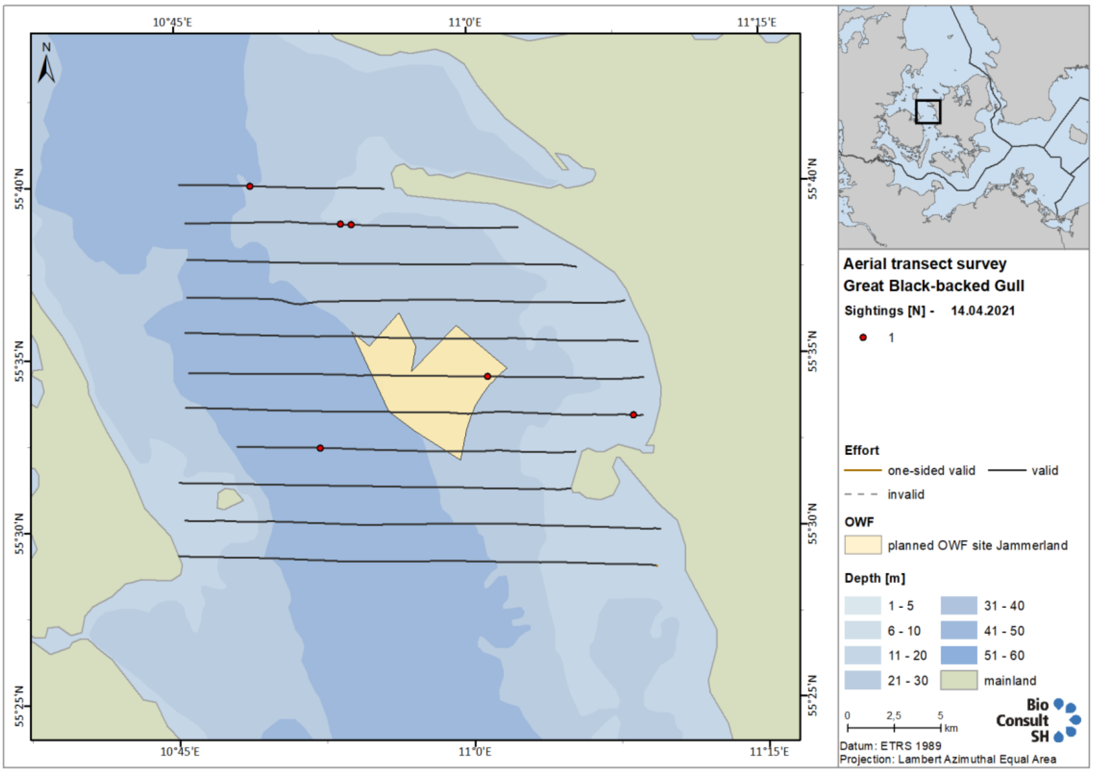

Figure A. 261 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

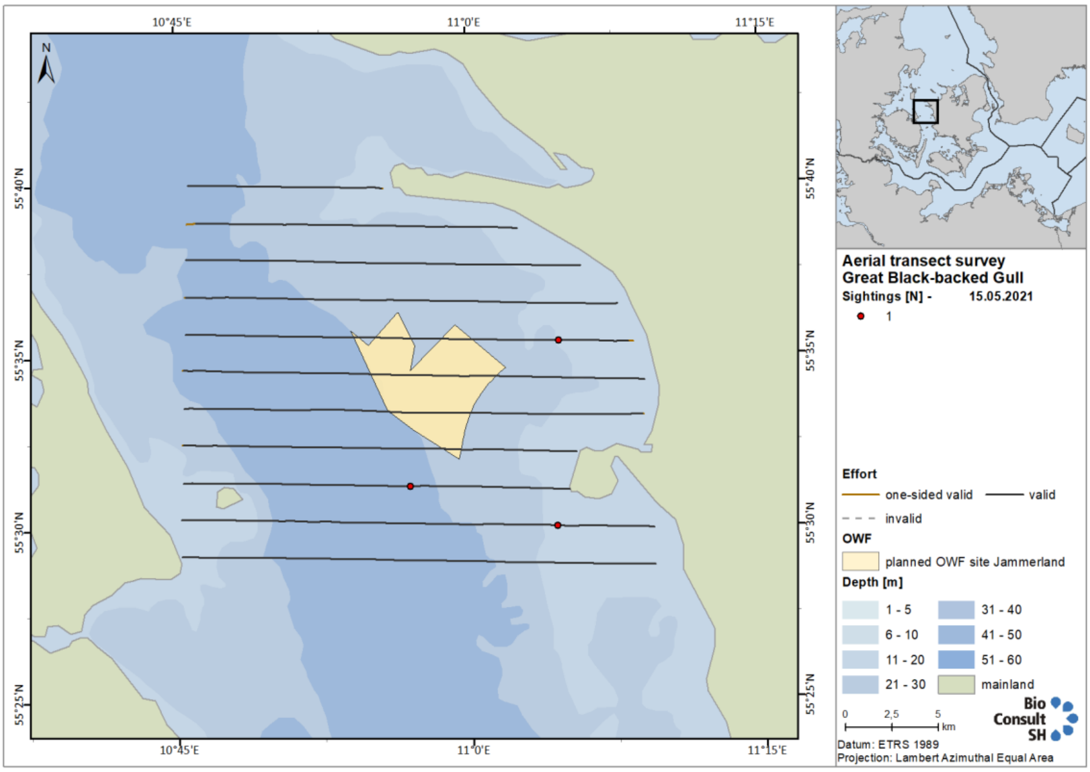

Figure A. 262 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

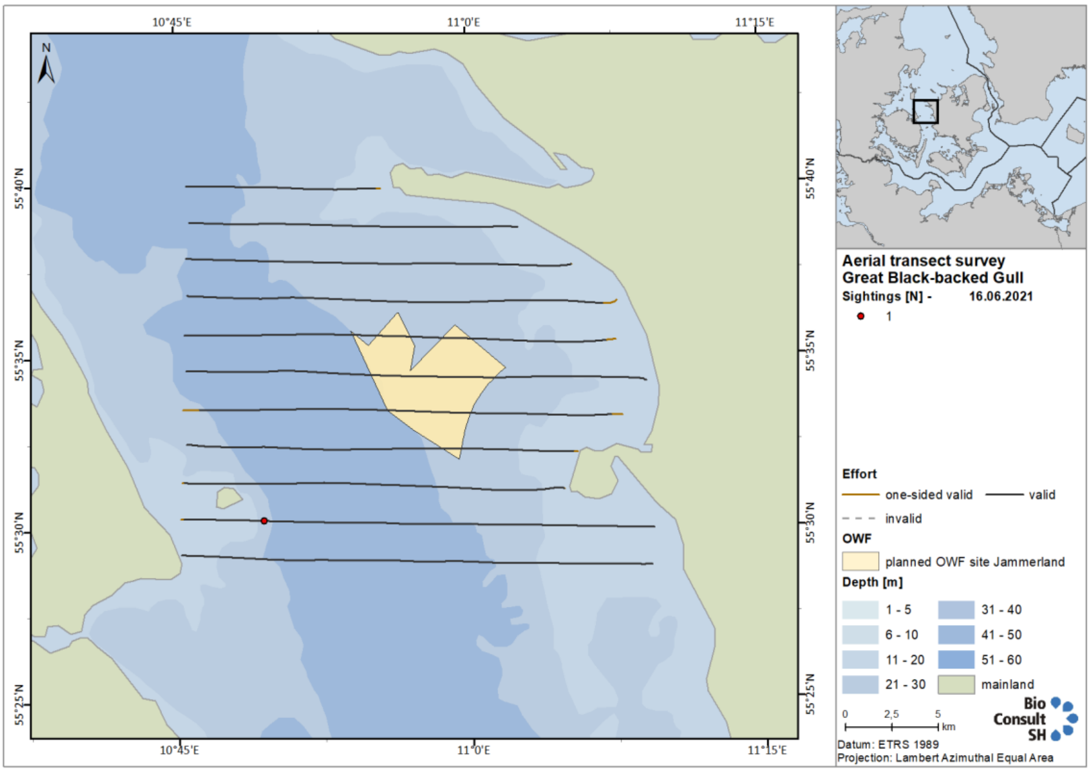

Figure A. 263 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

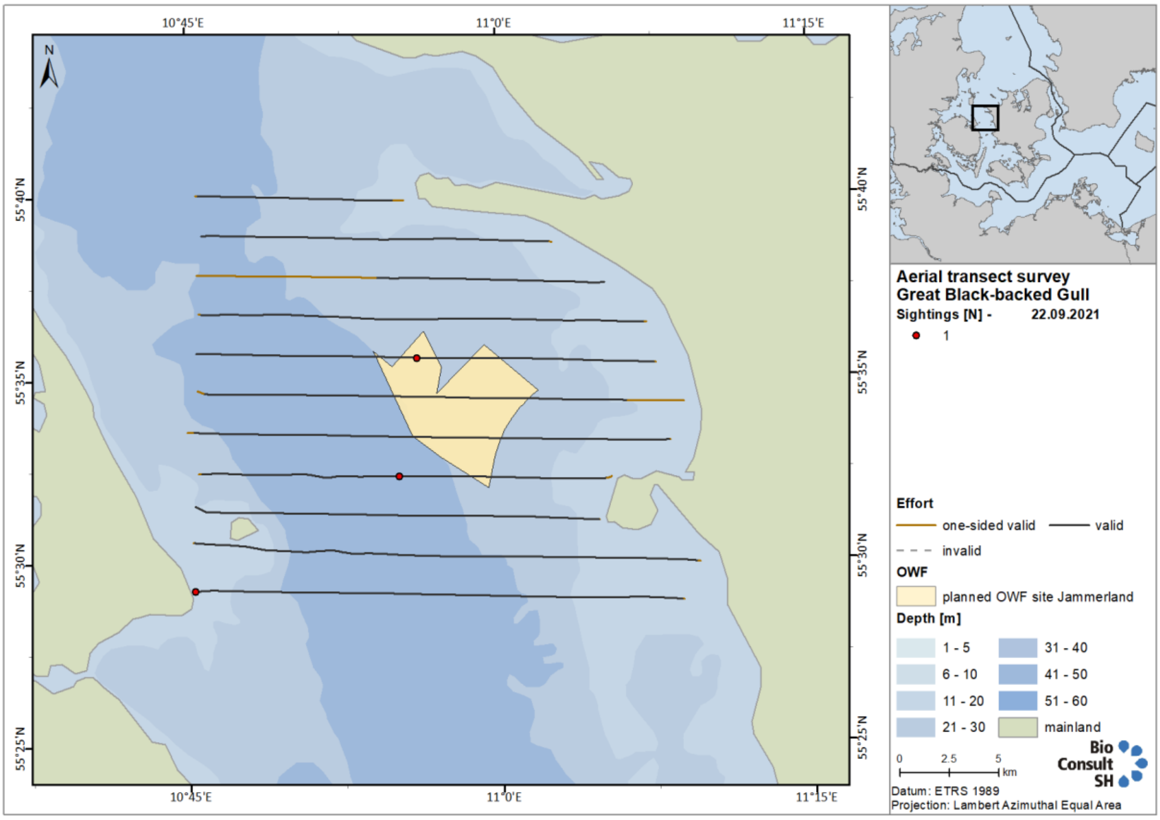

Figure A. 264 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

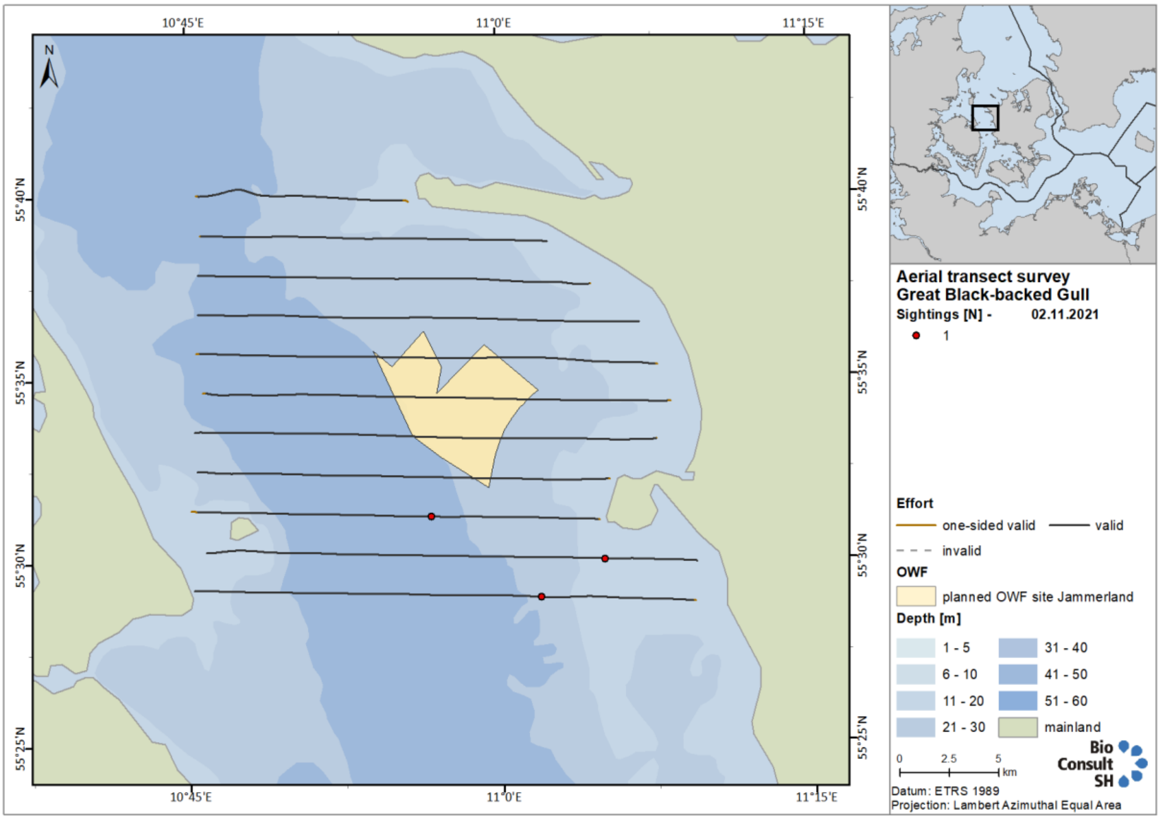

Figure A. 265 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

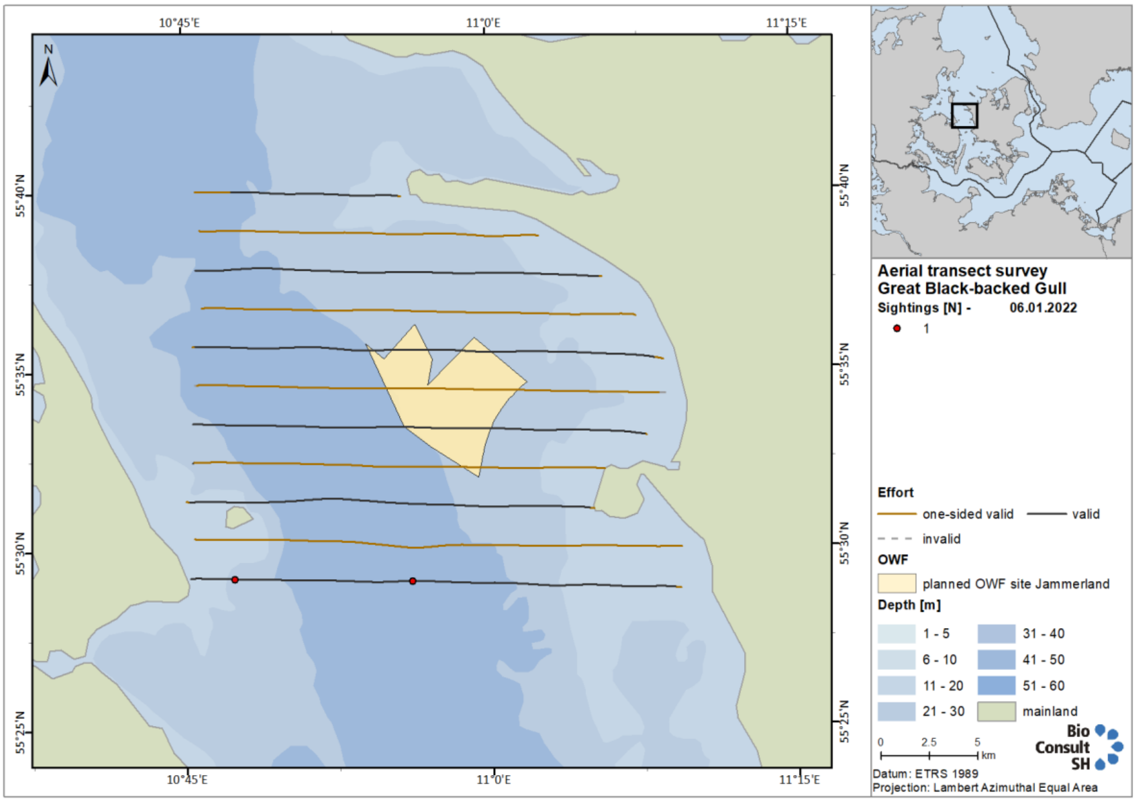

Figure A. 266 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

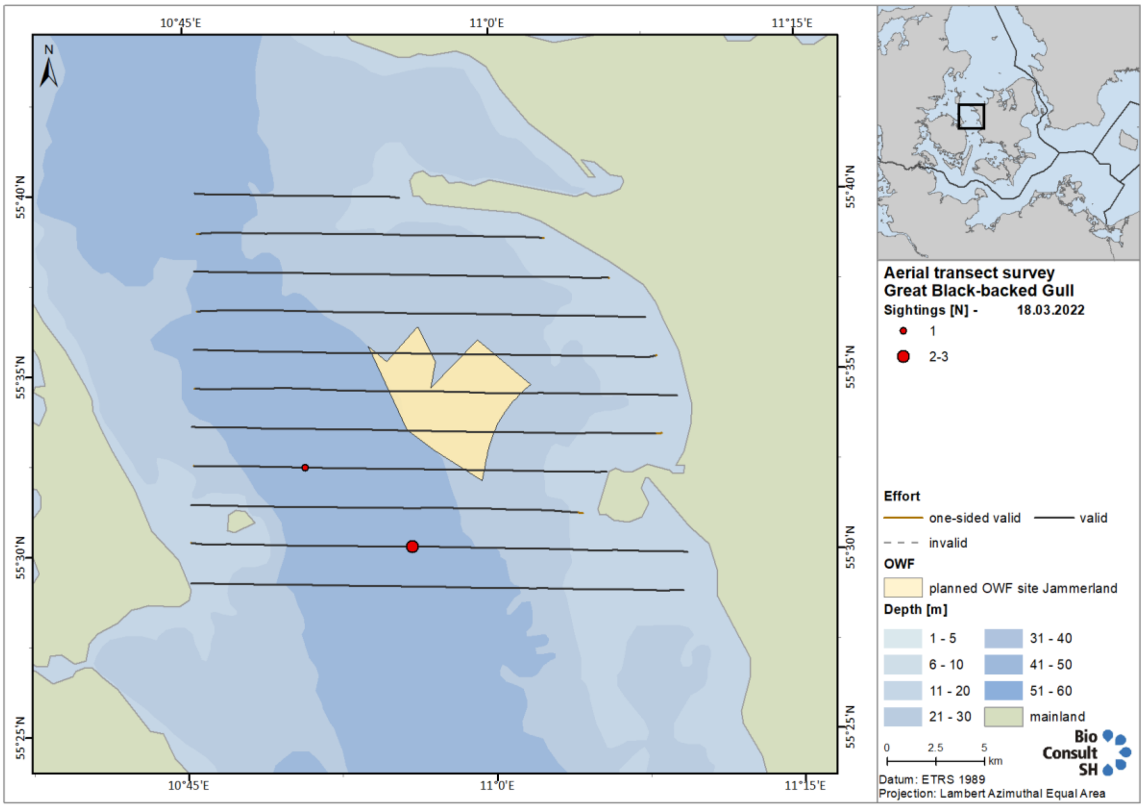

Figure A. 267 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

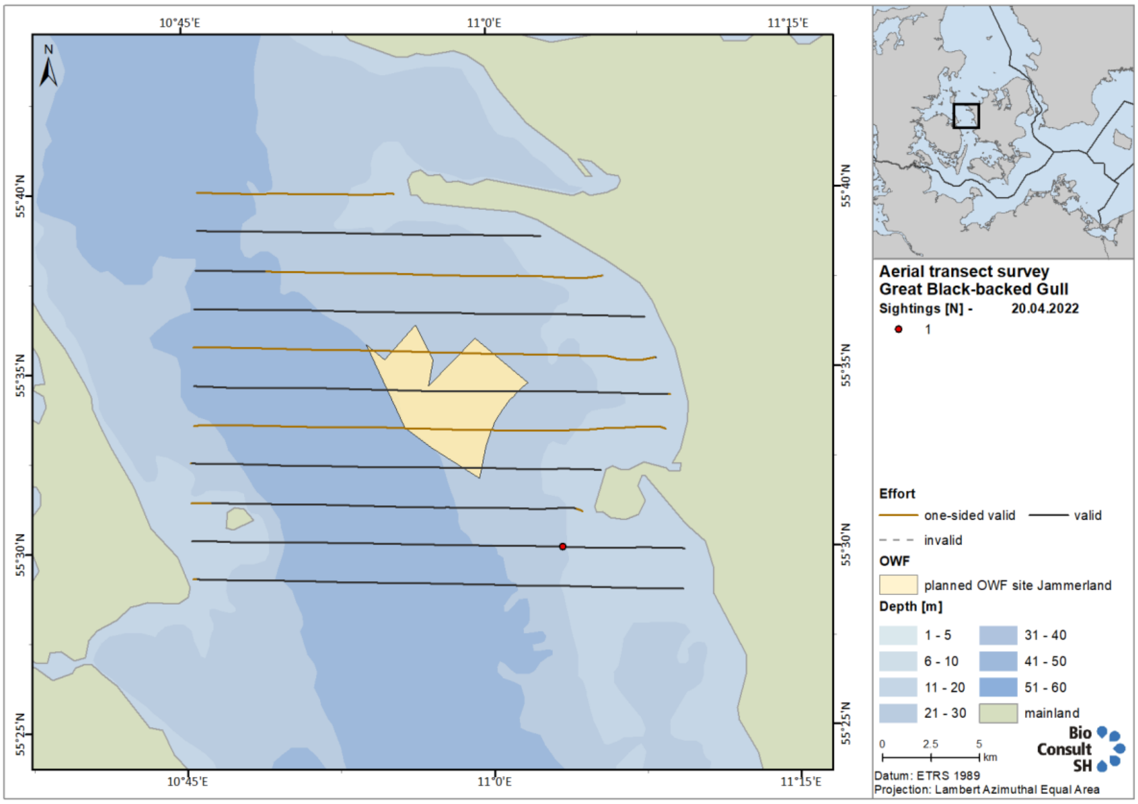

Figure A. 268 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

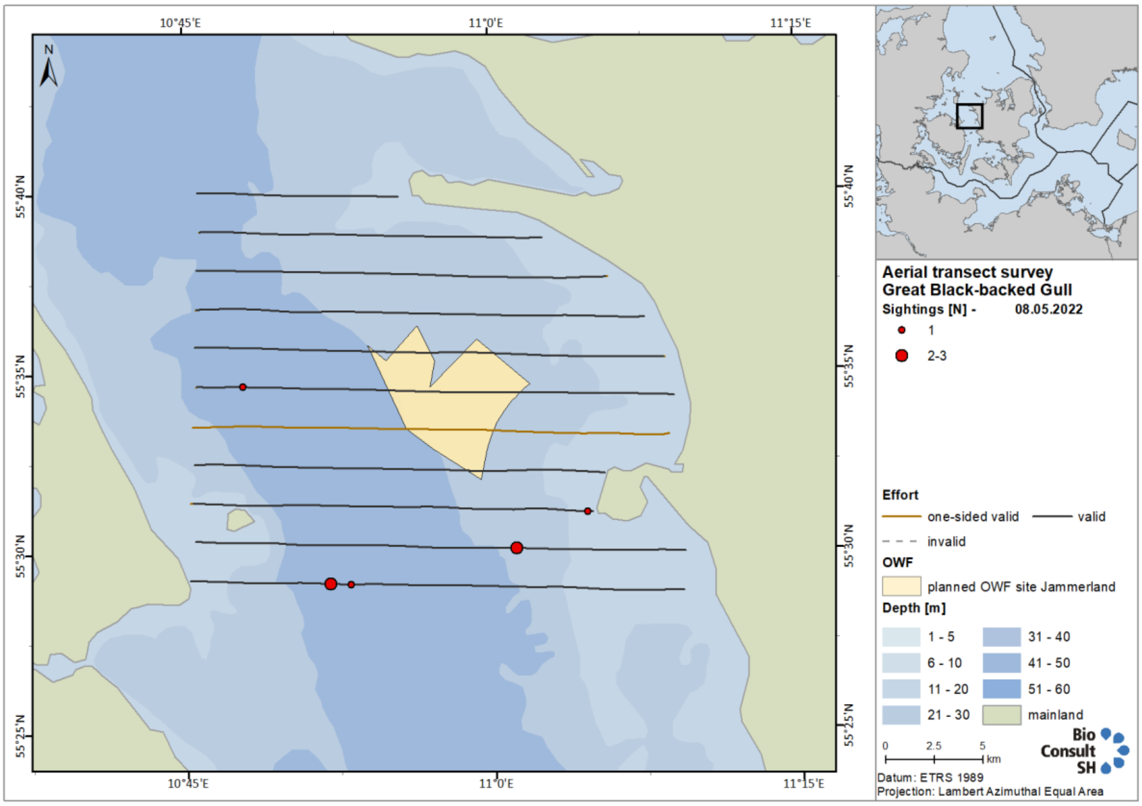

Figure A. 269 Great Black-backed Gull distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.22 Terns

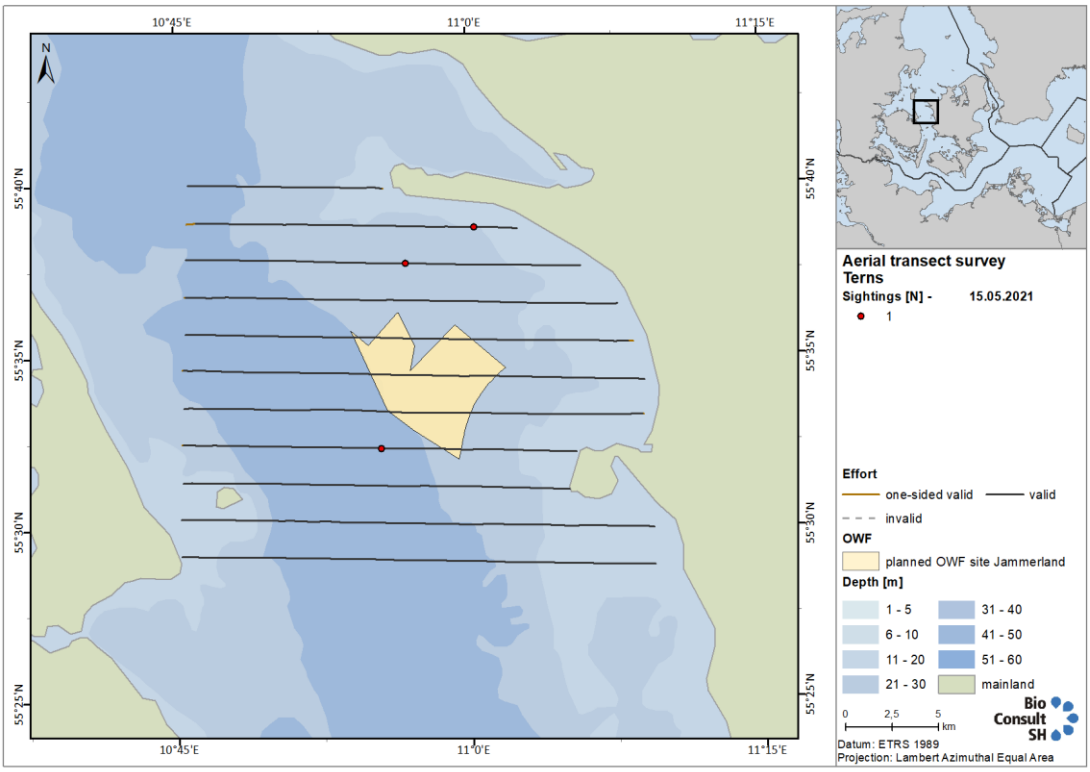

Figure A. 270 Terns distribution in the Jammerland area during the aerial survey flight on 15th May 2021

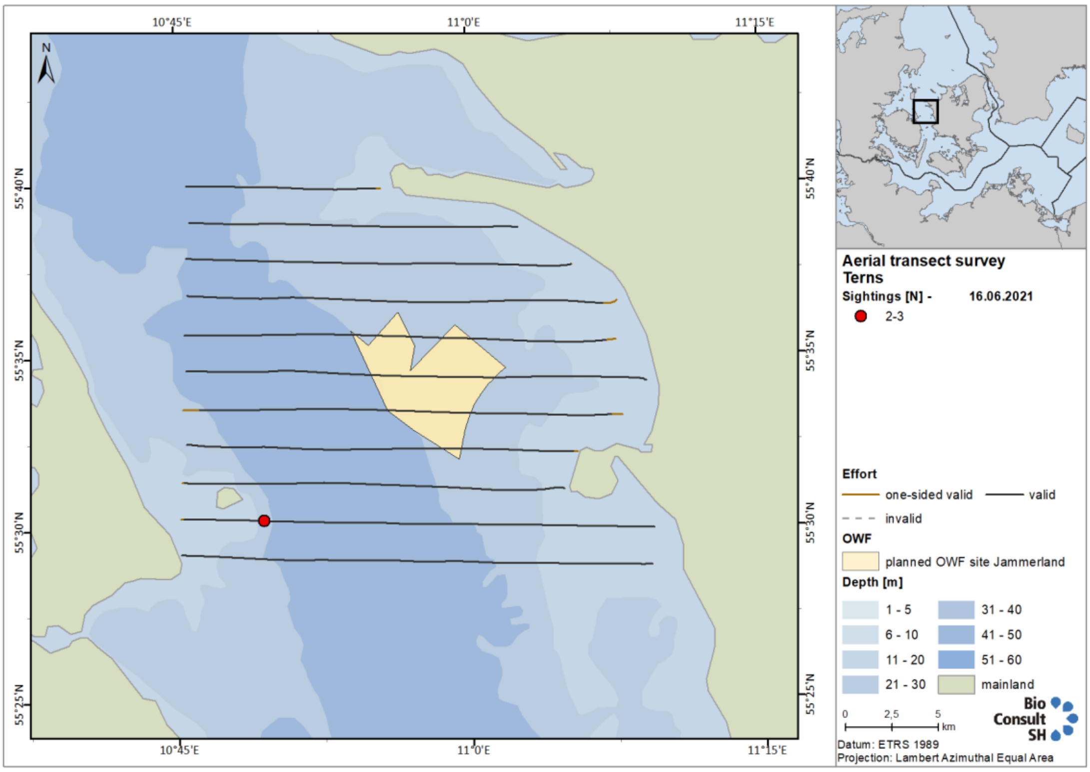

Figure A. 271 Terns distribution in the Jammerland area during the aerial survey flight on 16th June 2021

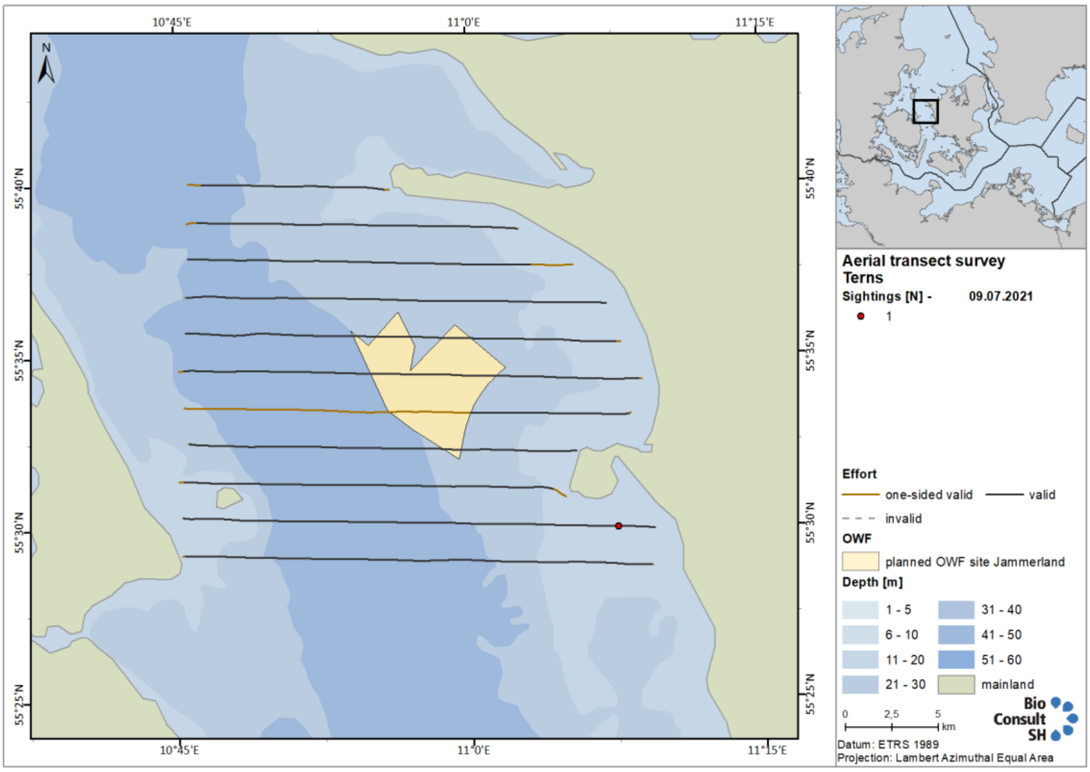

Figure A. 272 Terns distribution in the Jammerland area during the aerial survey flight on 9th July 2021

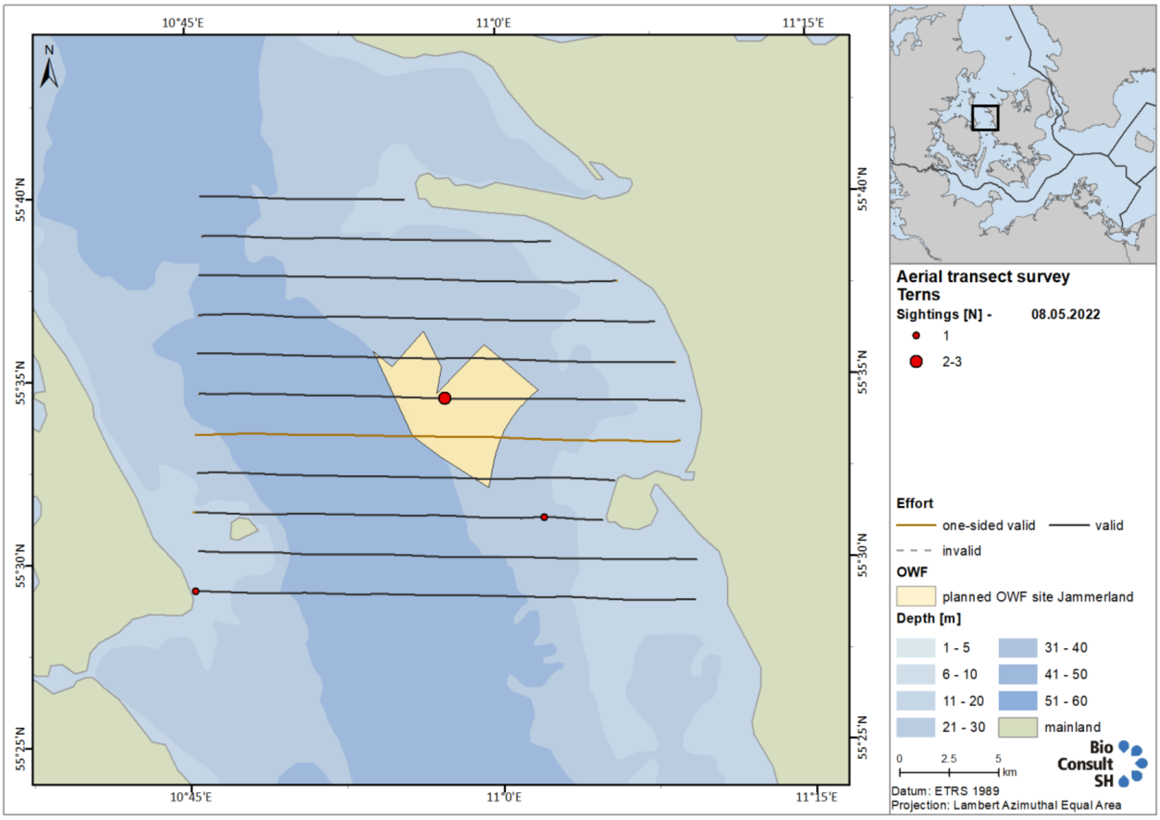

Figure A. 273 Terns distribution in the Jammerland area during the aerial survey flight on 8th May2022.

A.1.23 Common Guillemot

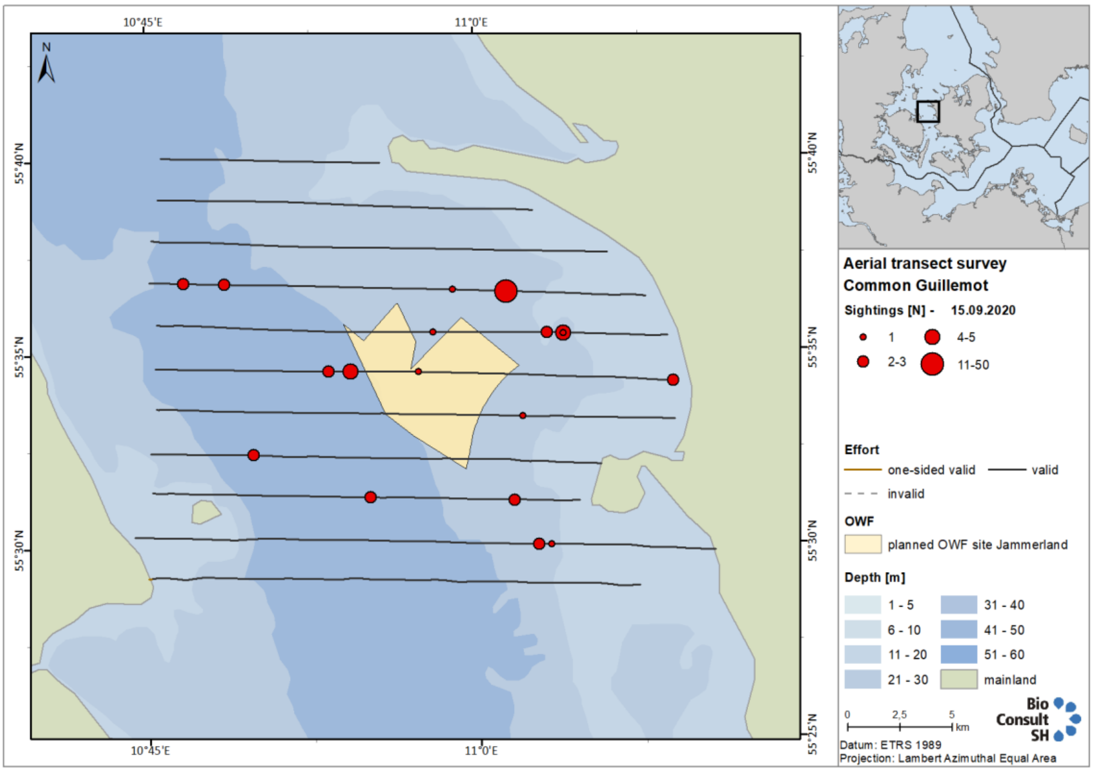

Figure A. 274 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

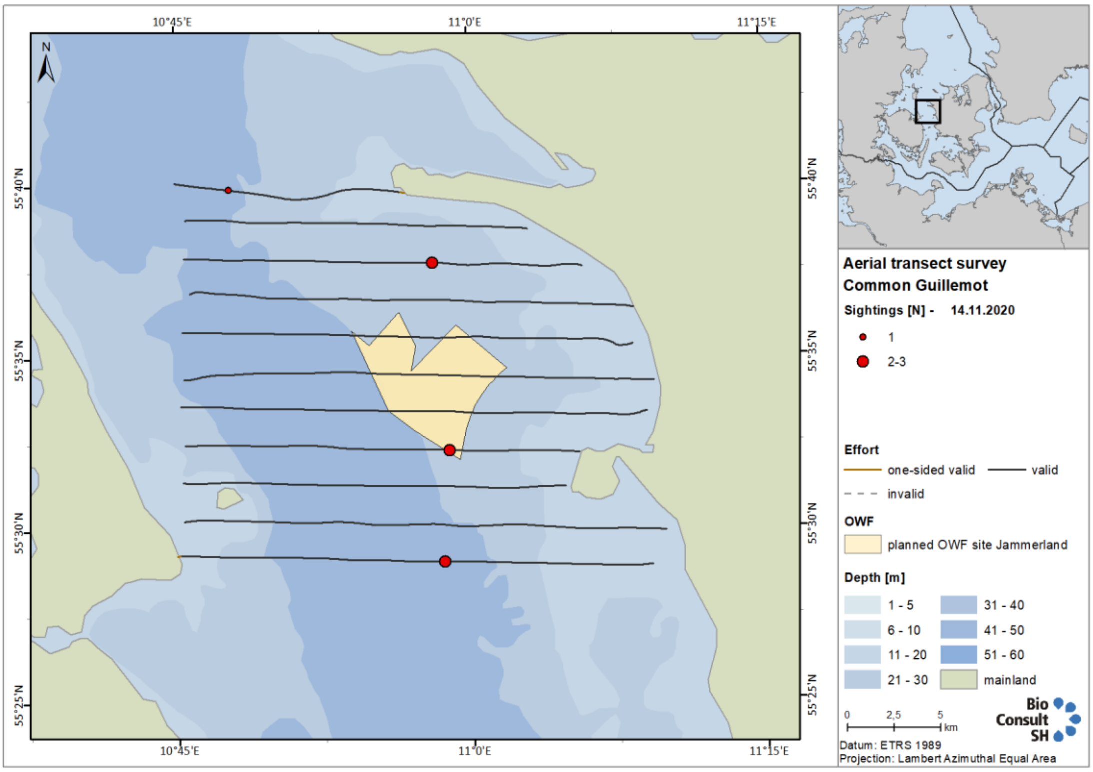

Figure A. 275 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

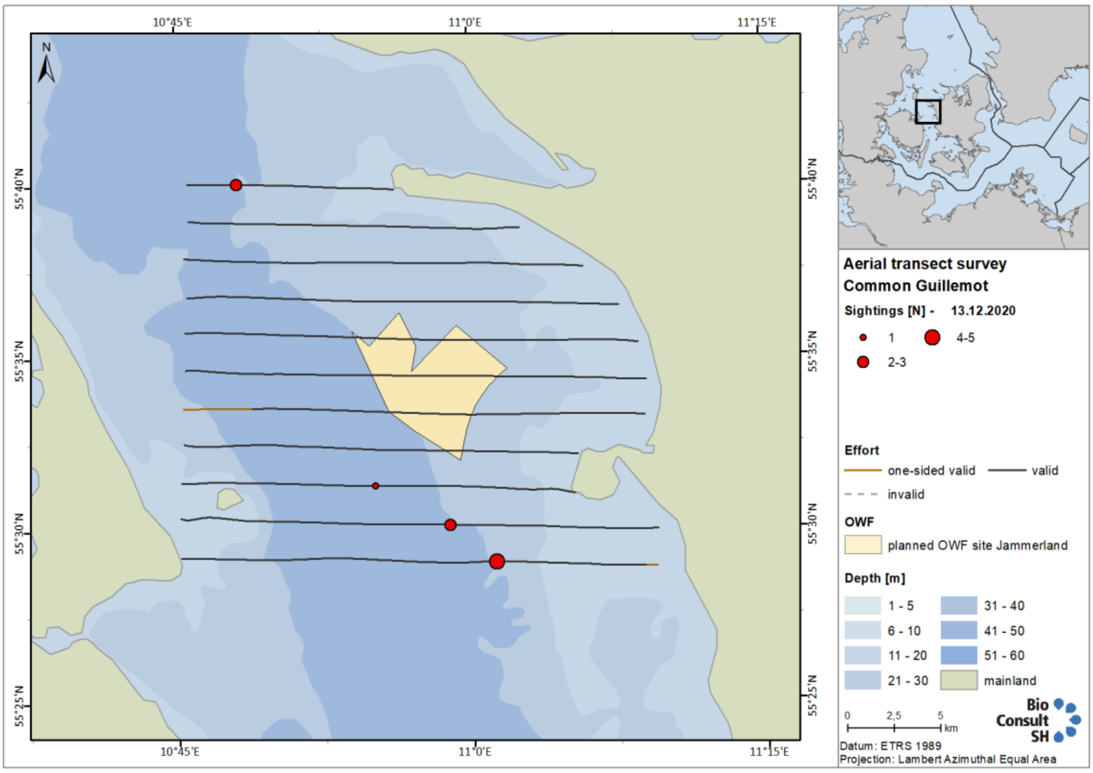

Figure A. 276 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 13th December 2020.

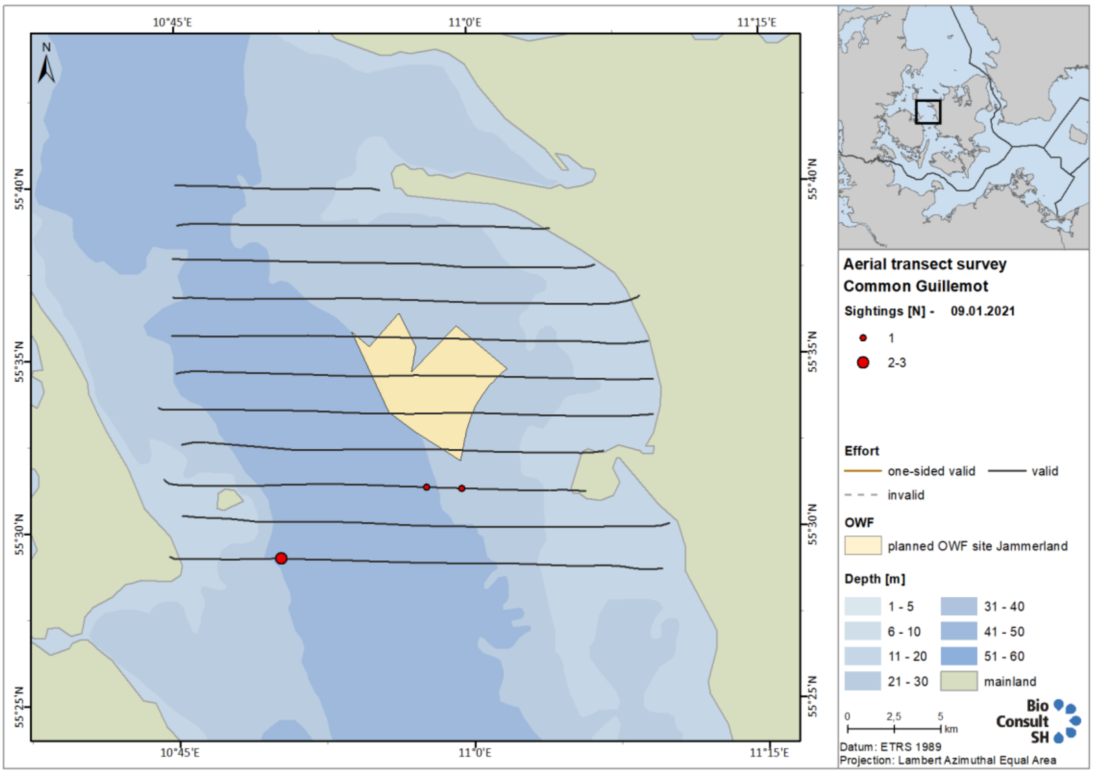

Figure A. 277 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

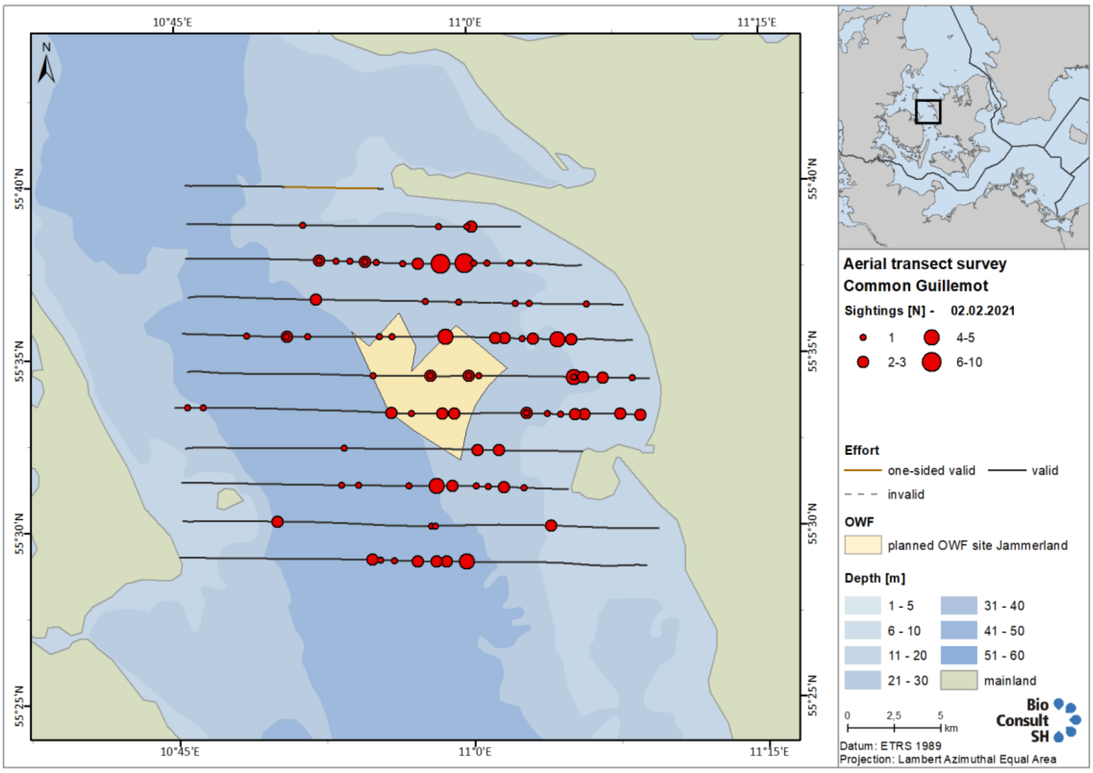

Figure A. 278 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

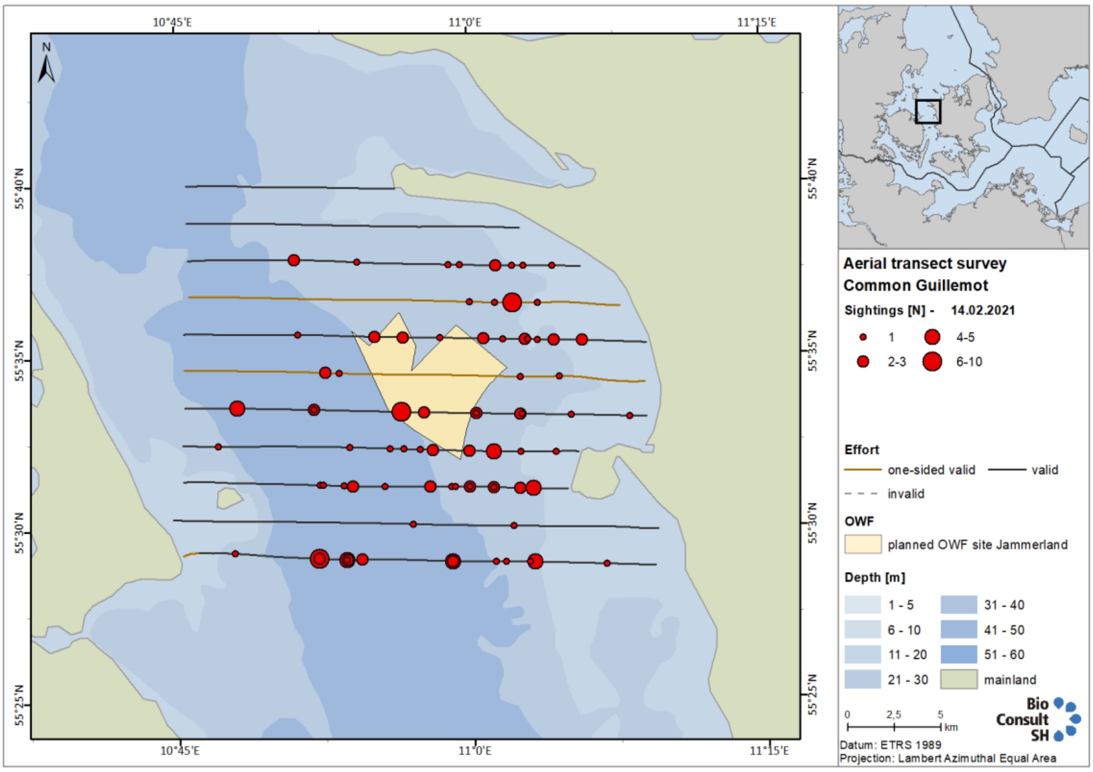

Figure A. 279 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

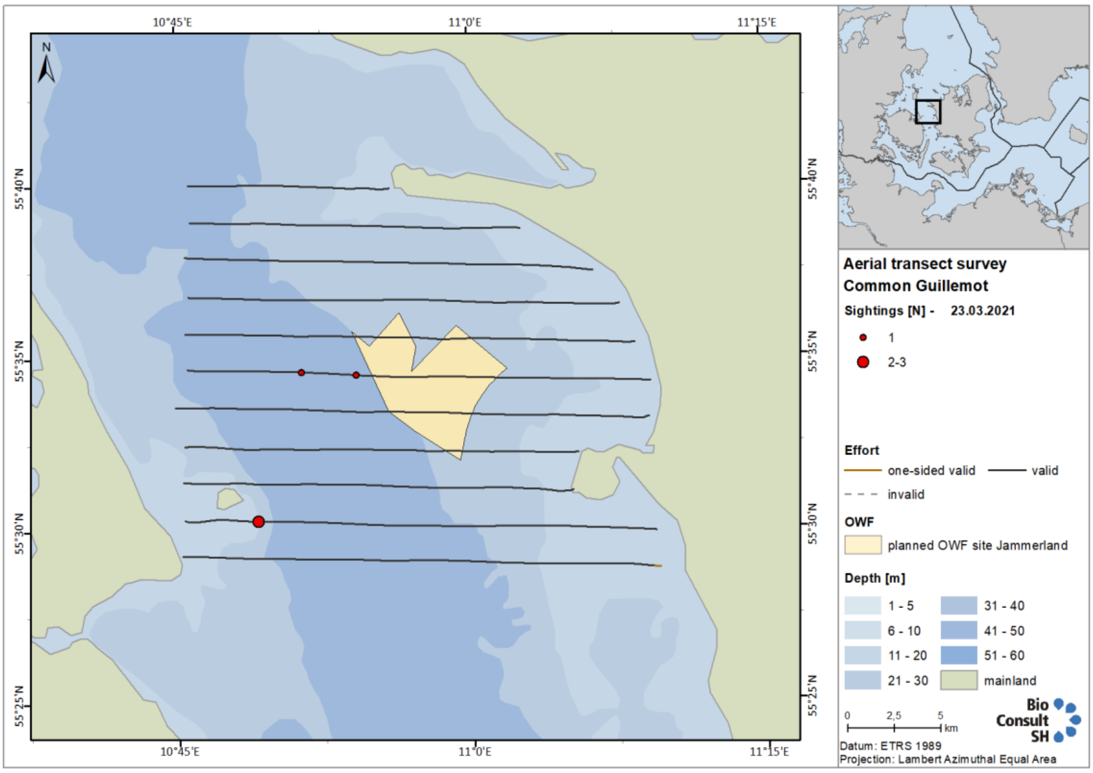

Figure A. 280 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

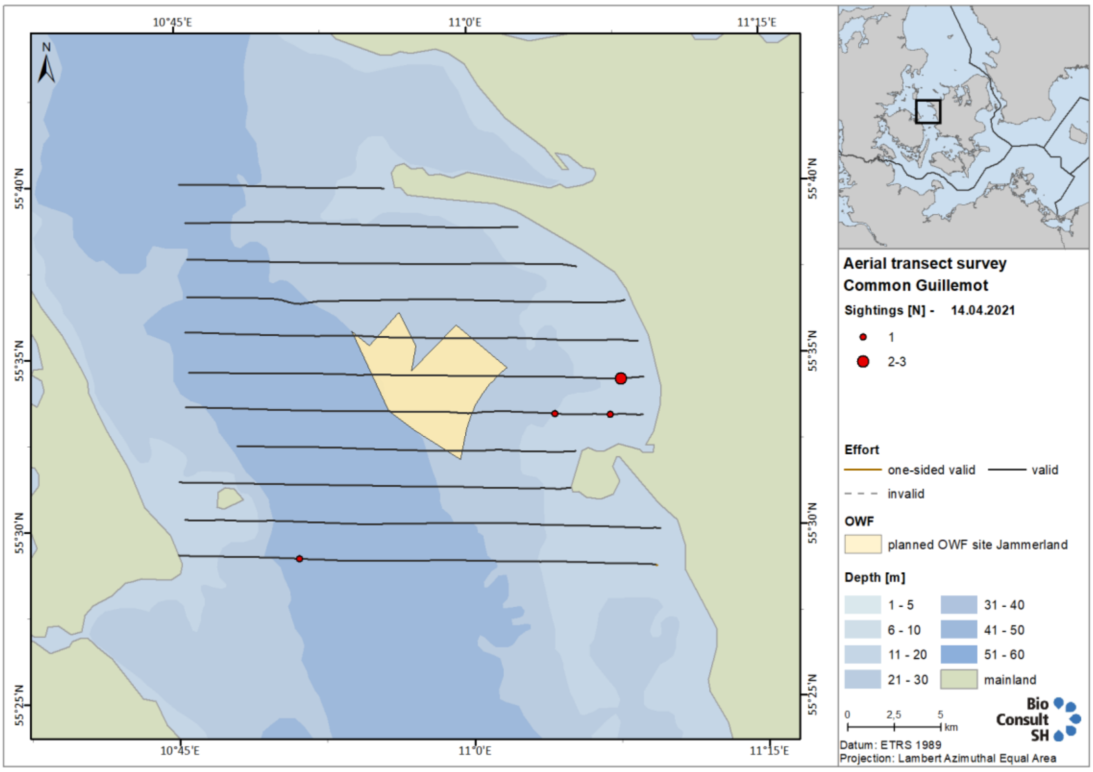

Figure A. 281 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 14th April 2021.

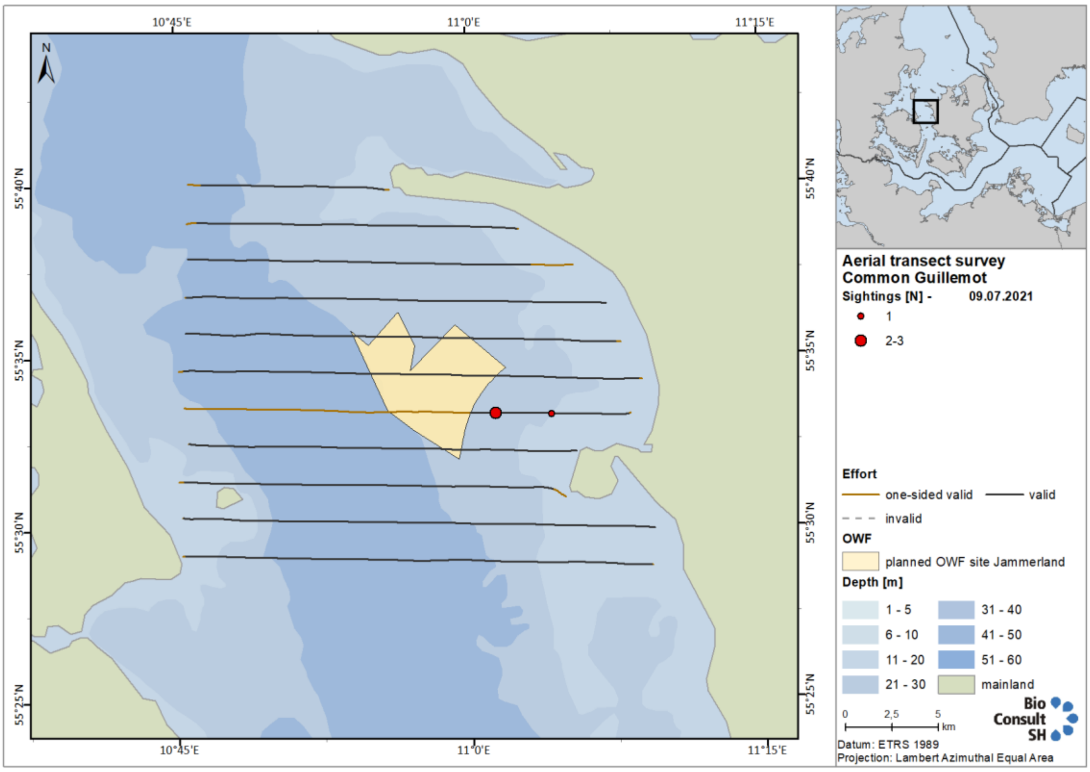

Figure A. 282 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

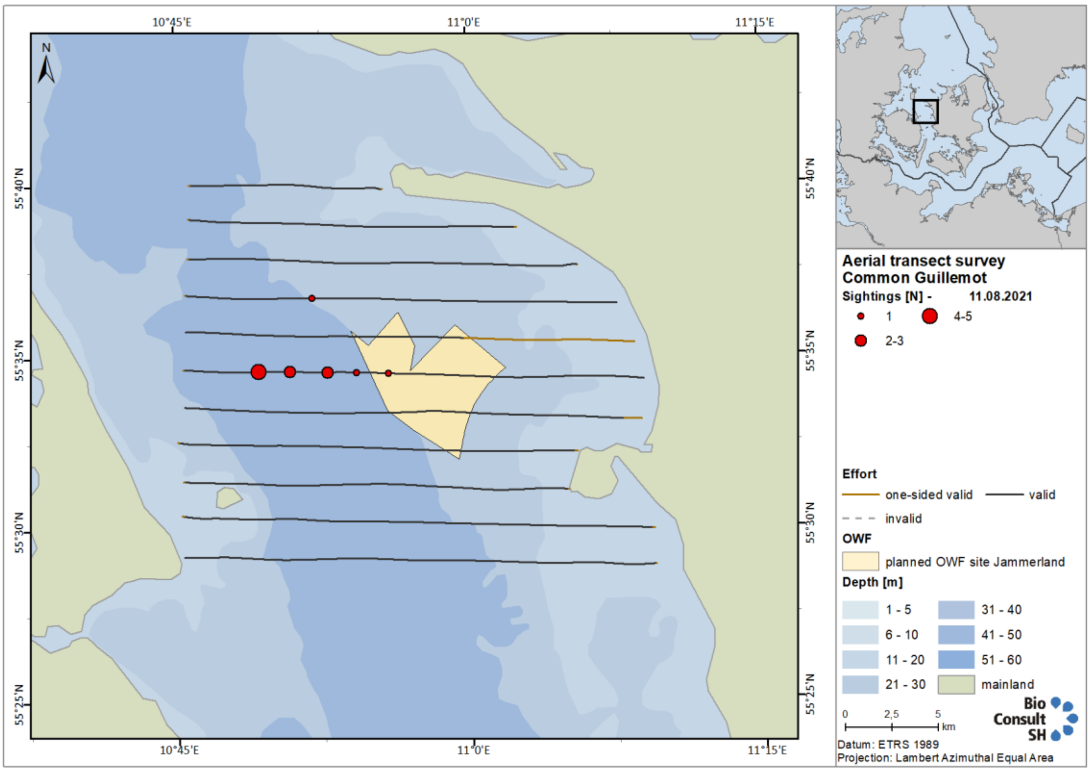

Figure A. 283 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 11th August 2021.

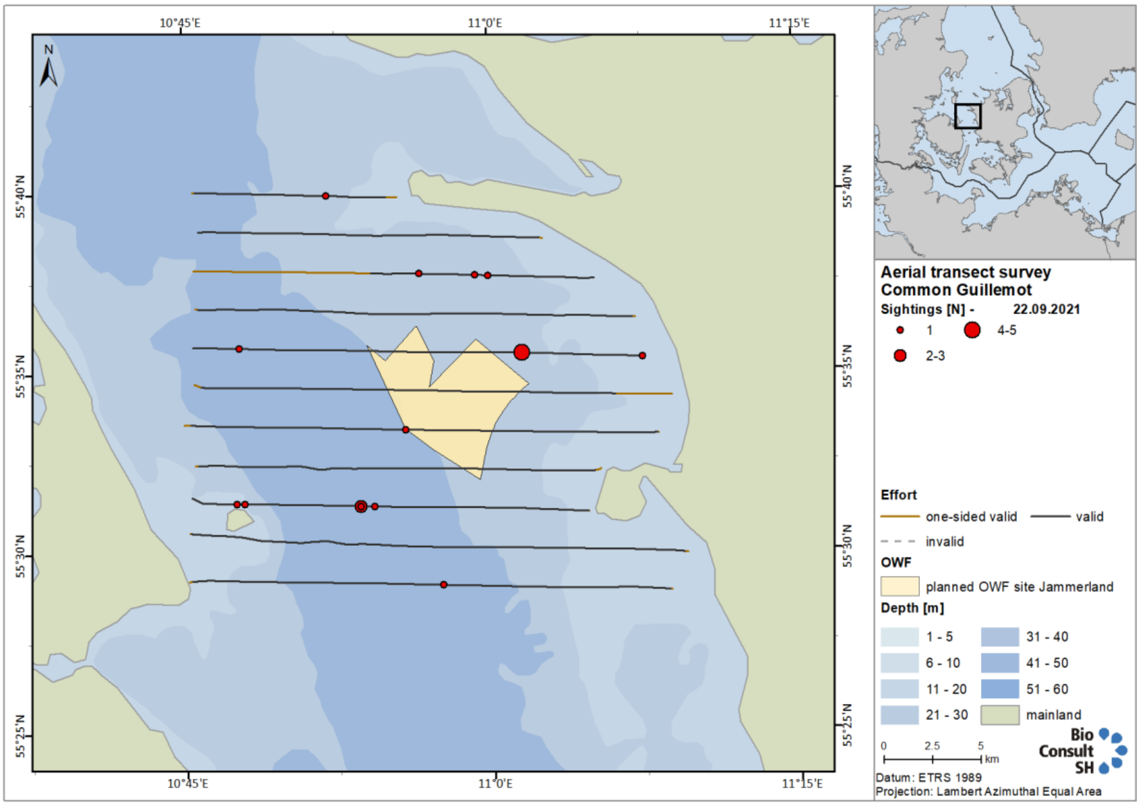

Figure A. 284 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

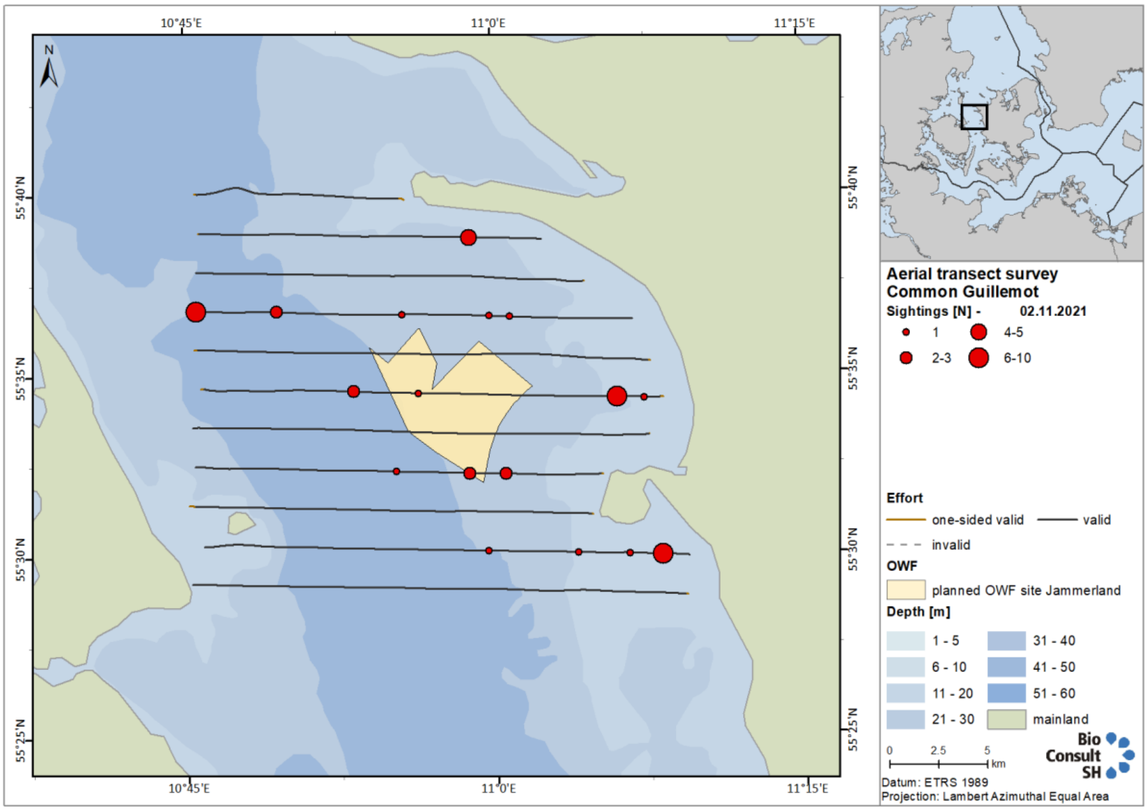

Figure A. 285 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

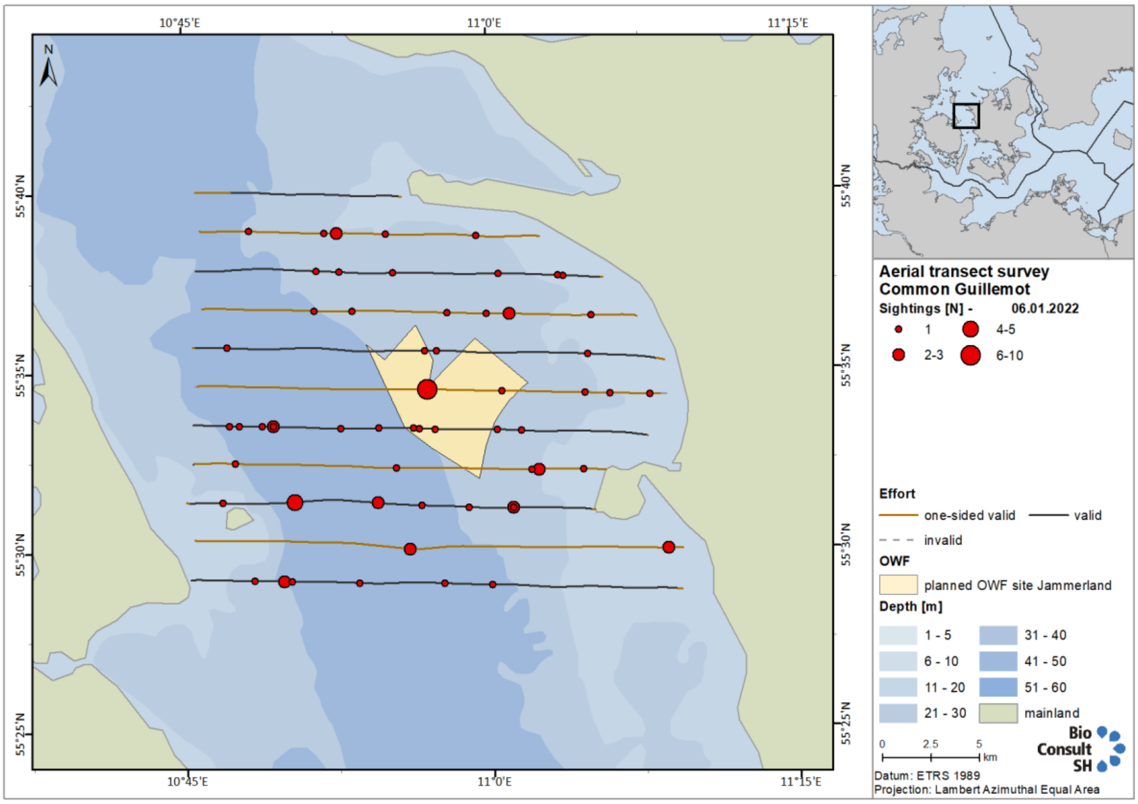

Figure A. 286 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

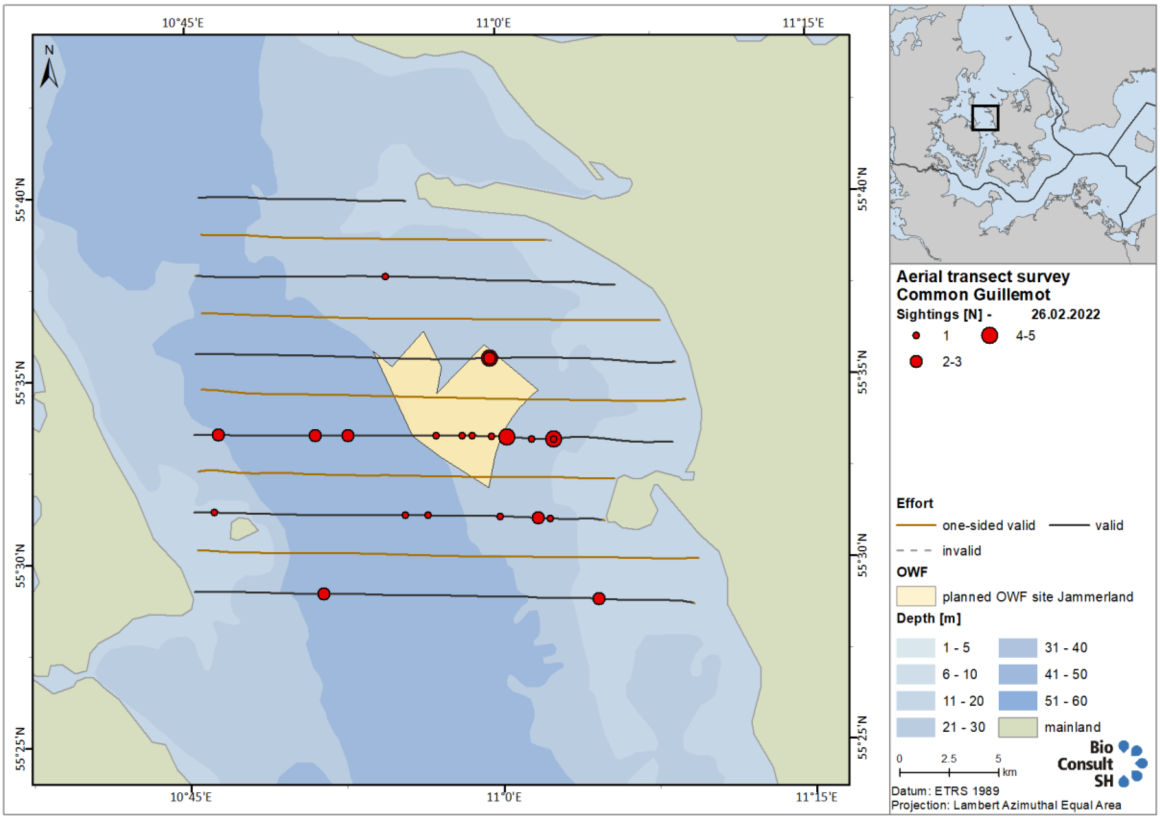

Figure A. 287 Common Guillemot distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

A.1.24 Razorbill

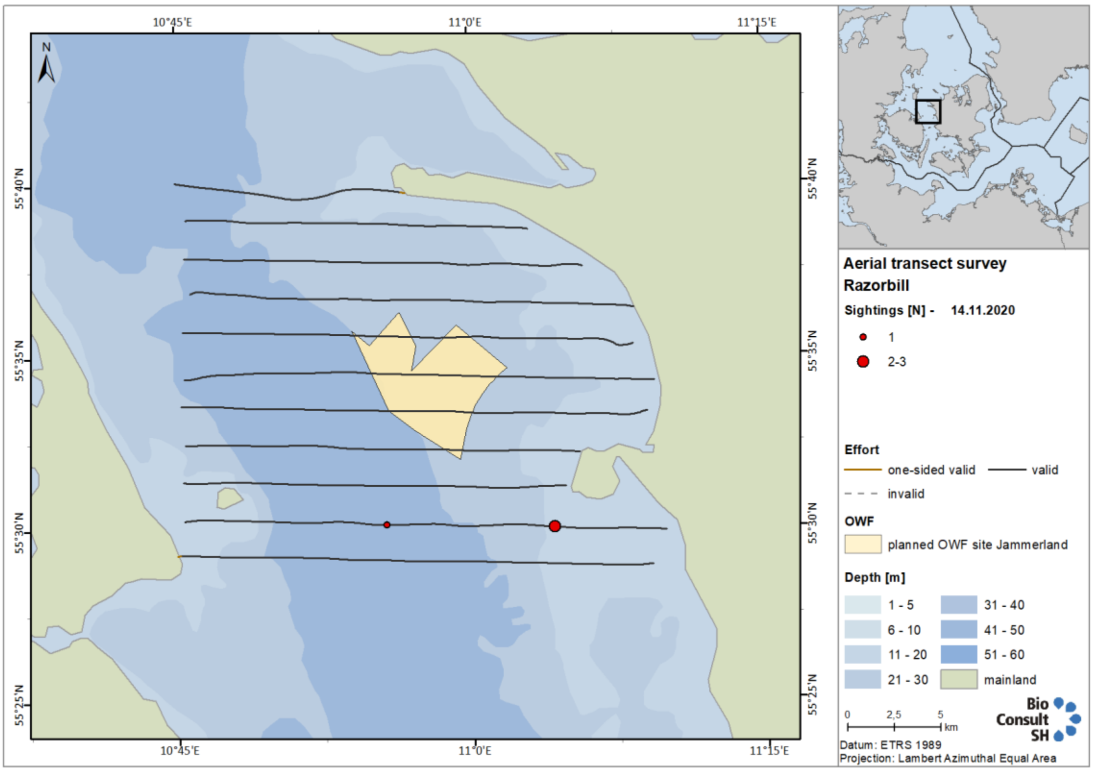

Figure A. 288 Razorbill distribution in the Jammerland area during the aerial survey flight on 14th November 2020.

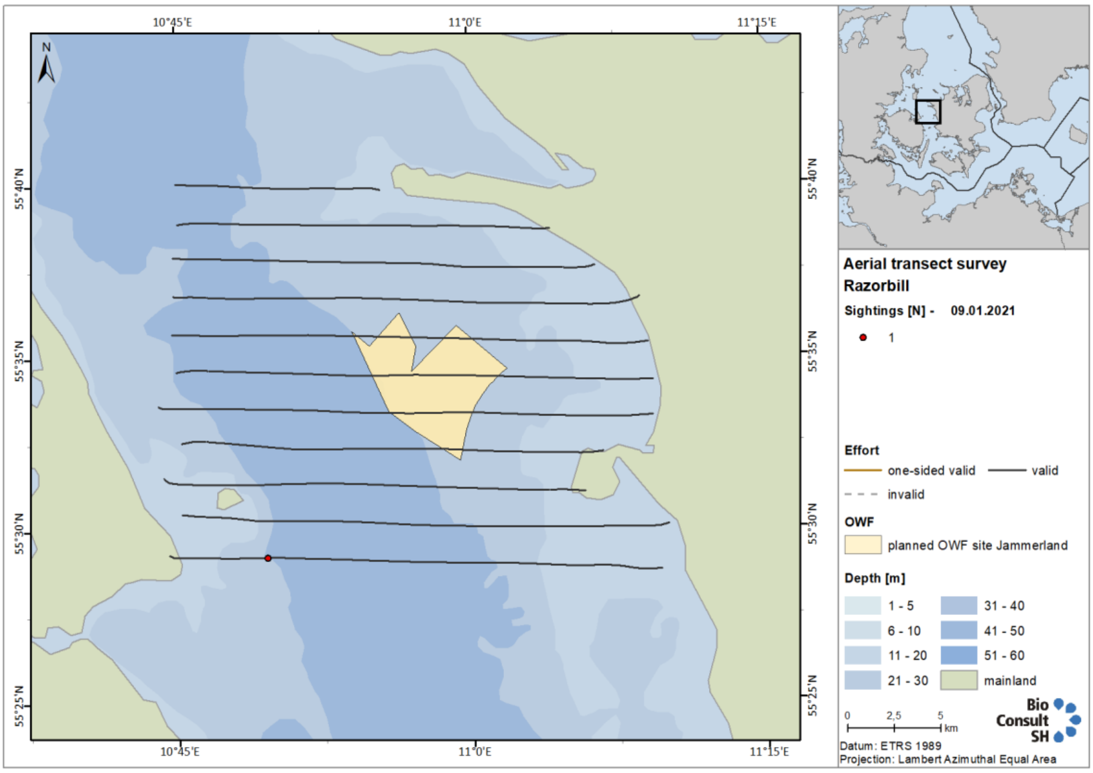

Figure A. 289 Razorbill distribution in the Jammerland area during the aerial survey flight on 9th January 2021.

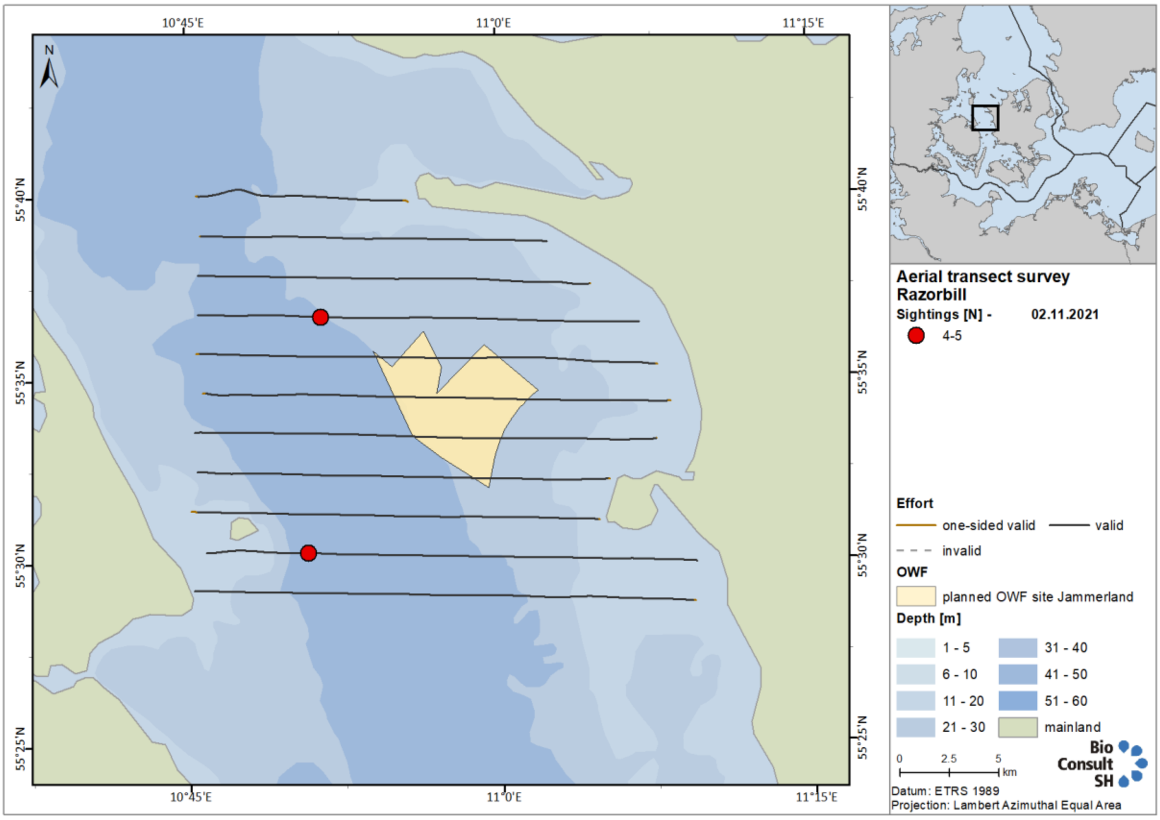

Figure A. 290 Razorbill distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

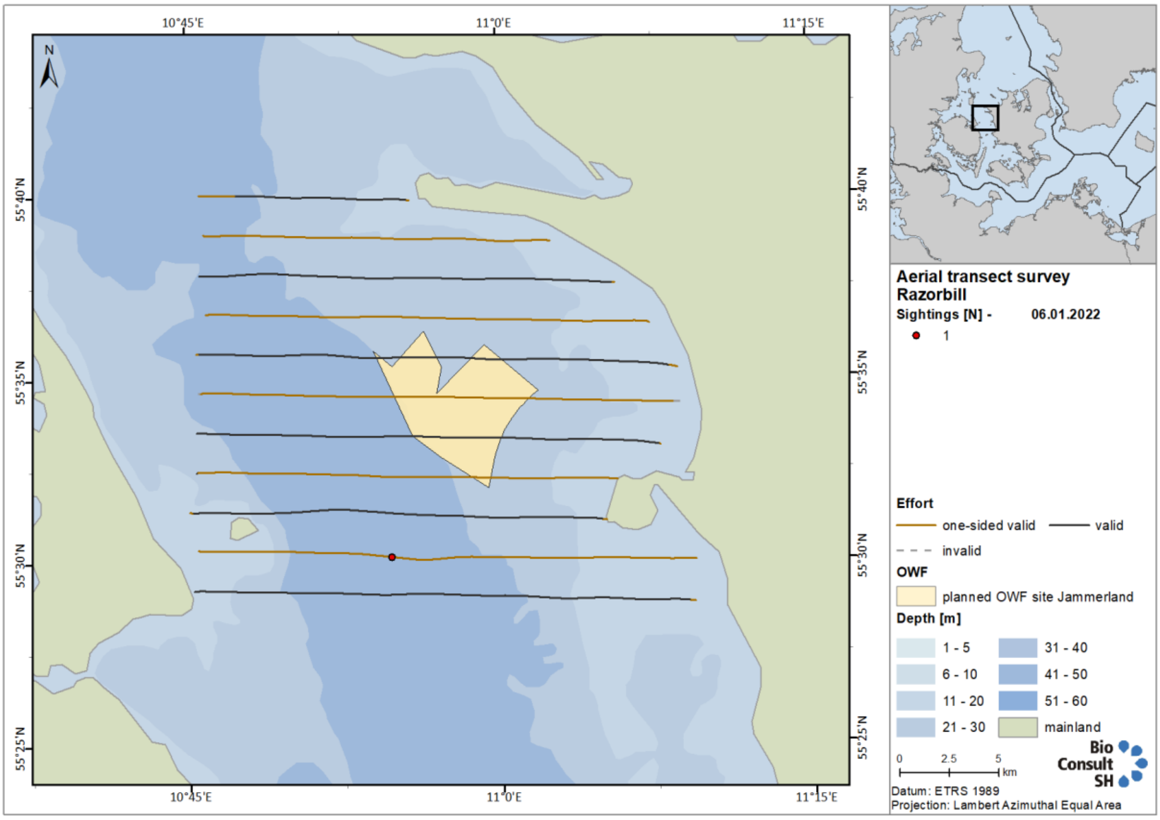

Figure A. 291 Razorbill distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

A.1.25 Black Guillemot

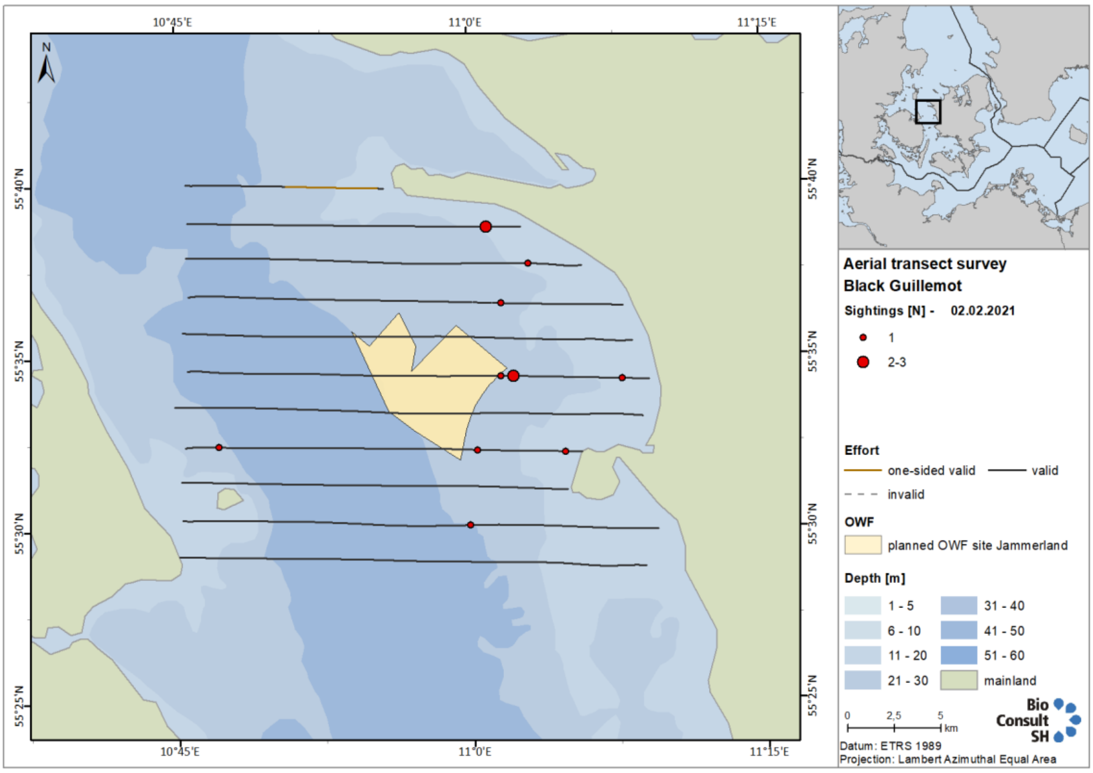

Figure A. 292 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 2nd February 2021.

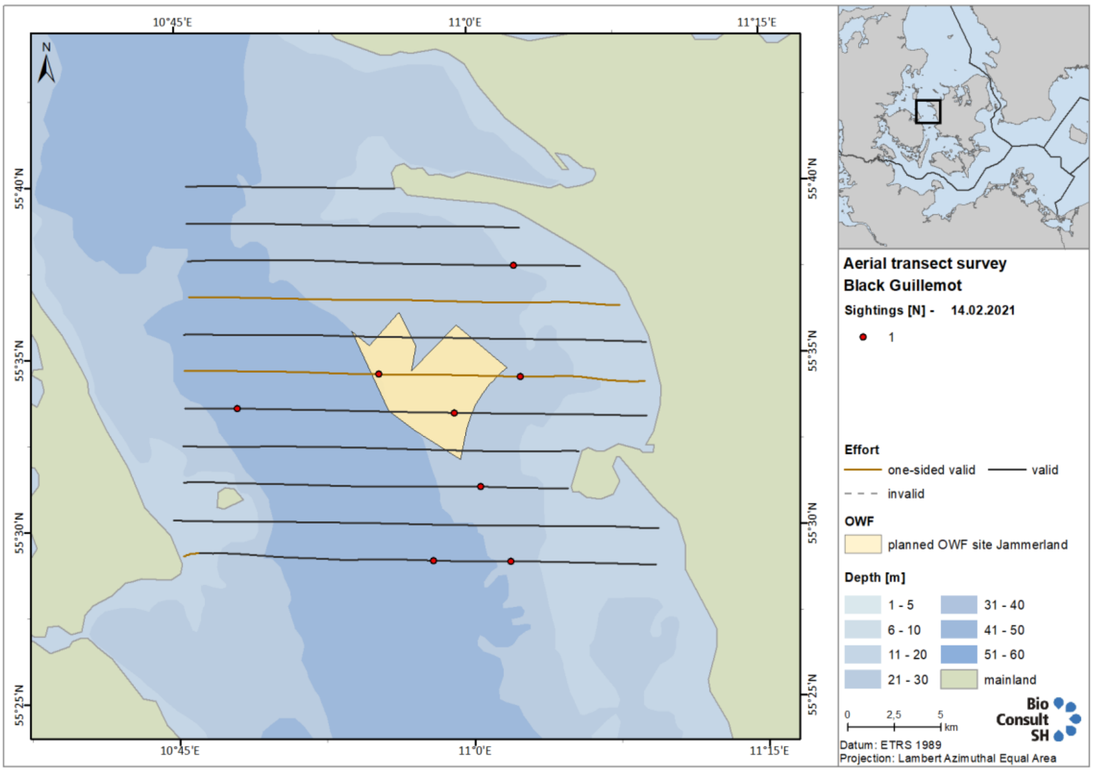

Figure A. 293 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

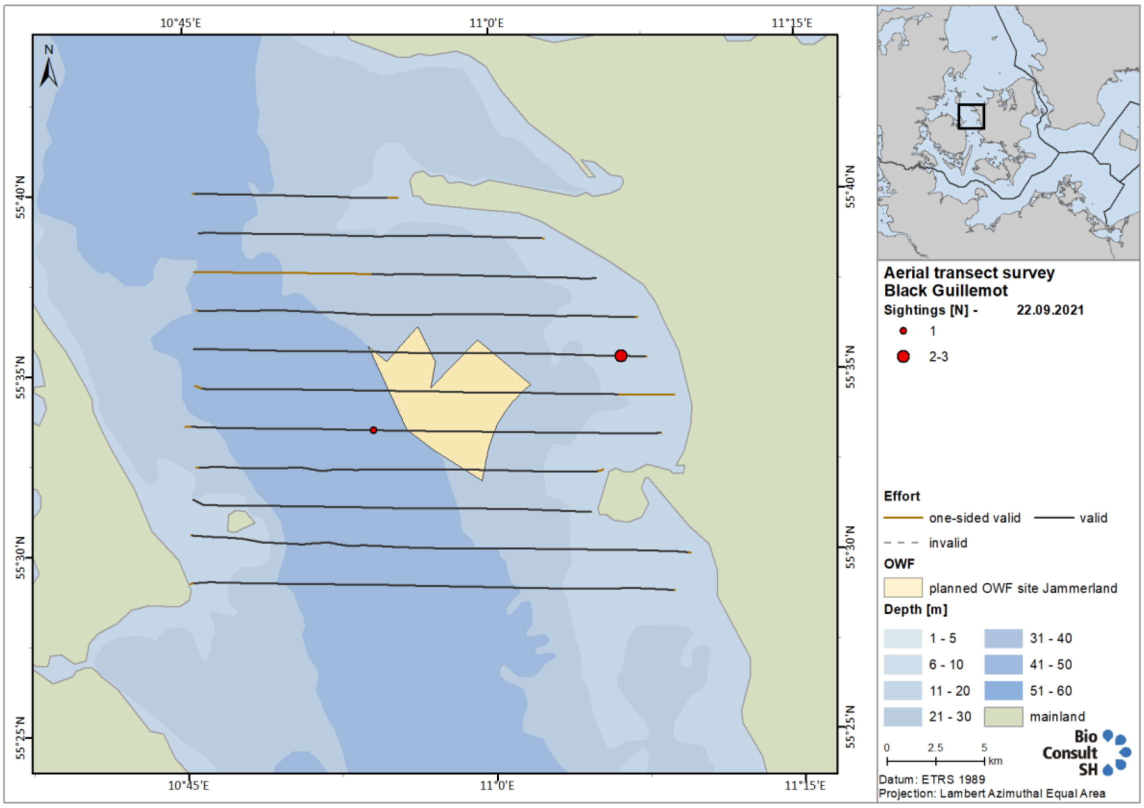

Figure A. 294 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

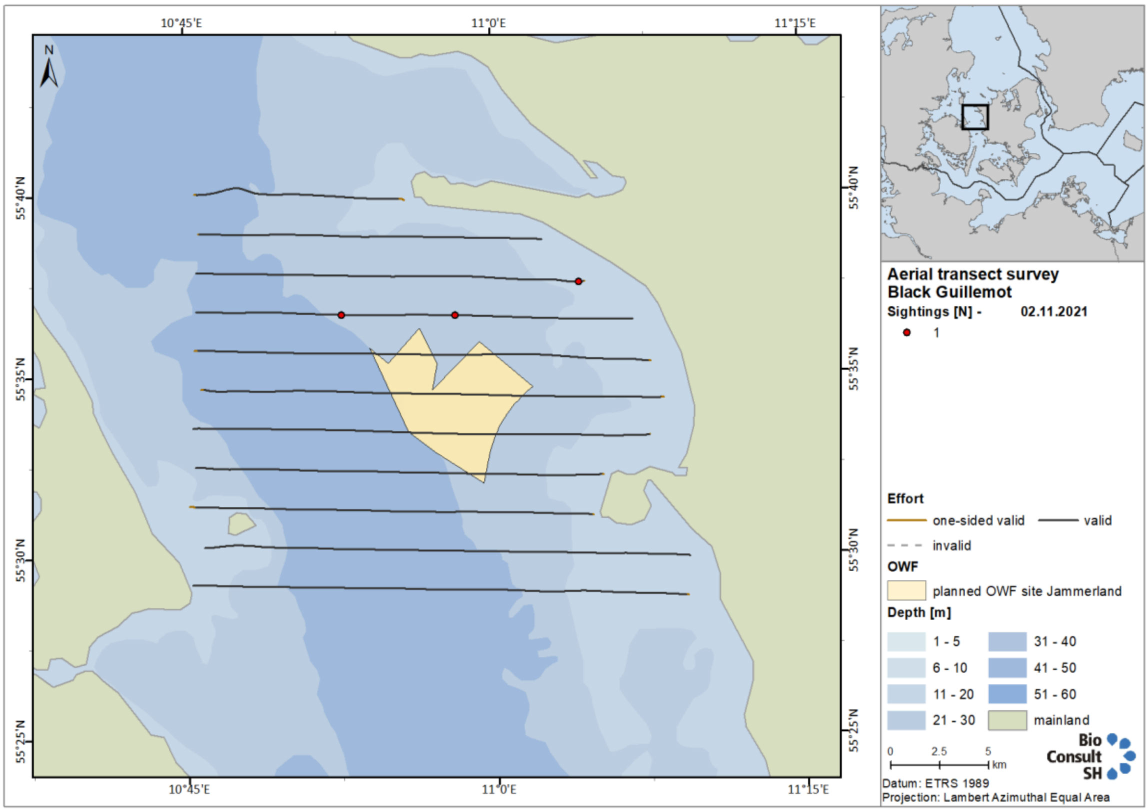

Figure A. 295 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

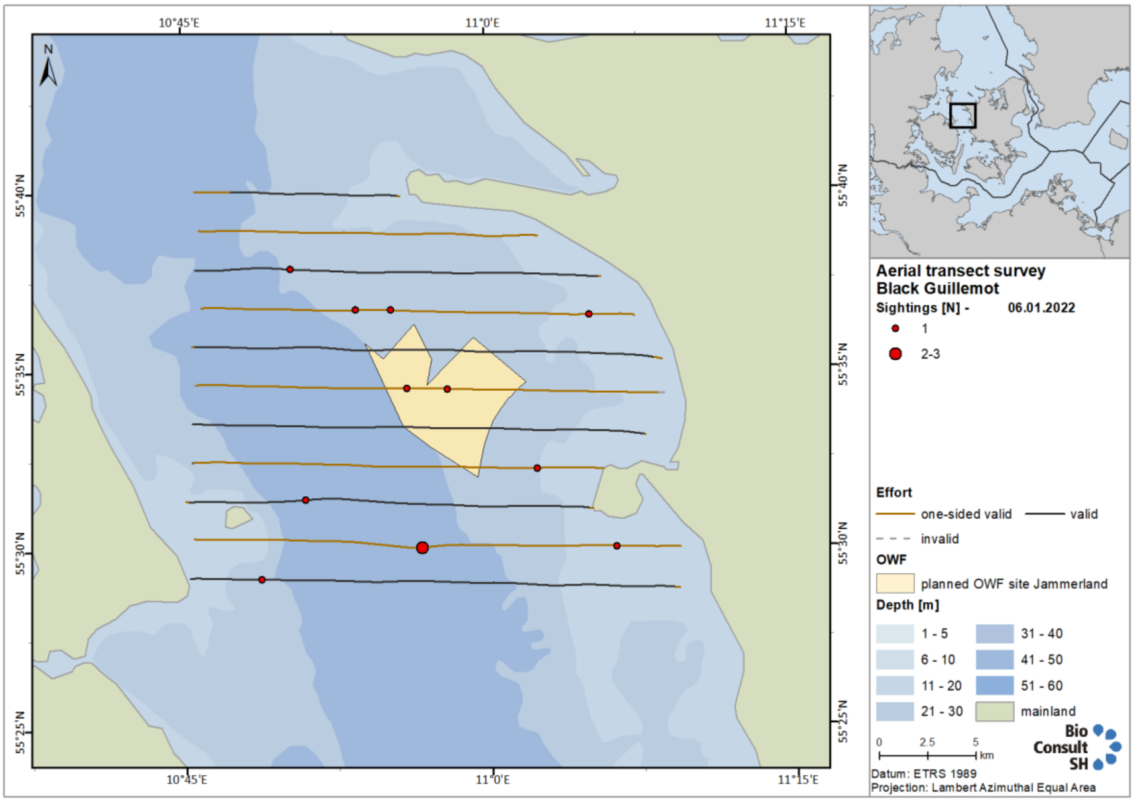

Figure A. 296 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 6th January 2022.

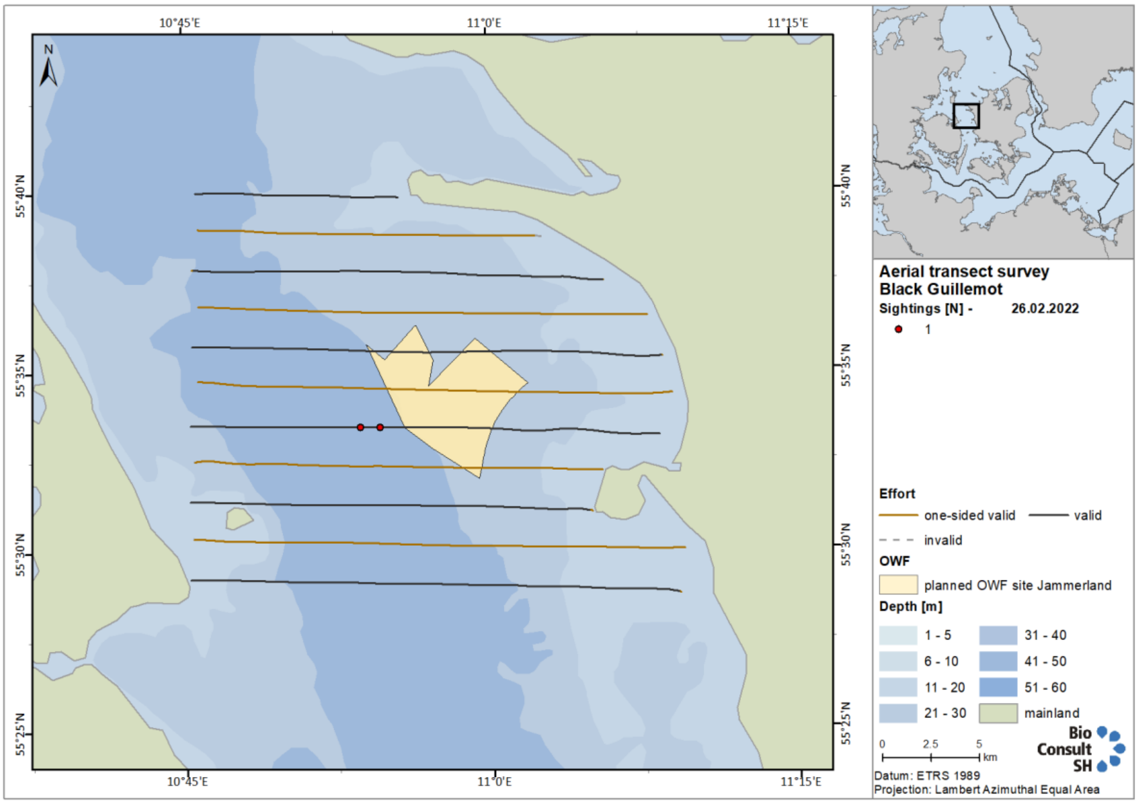

Figure A. 297 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

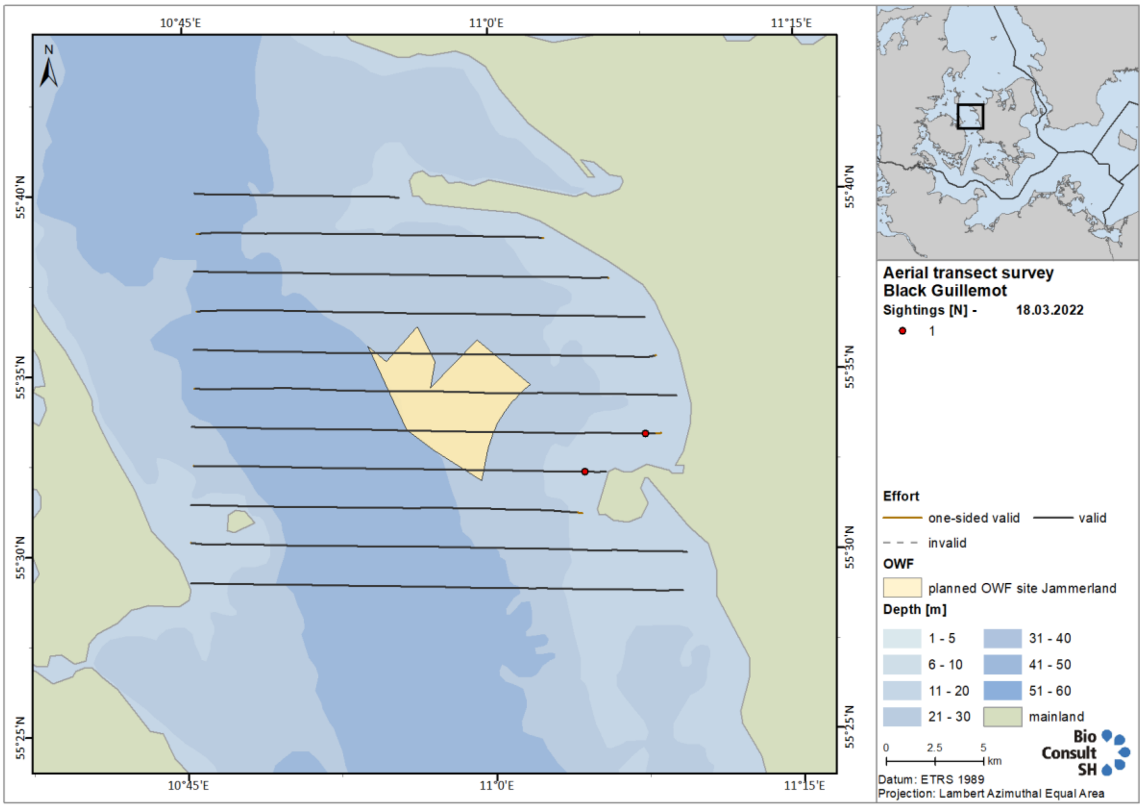

Figure A. 298 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

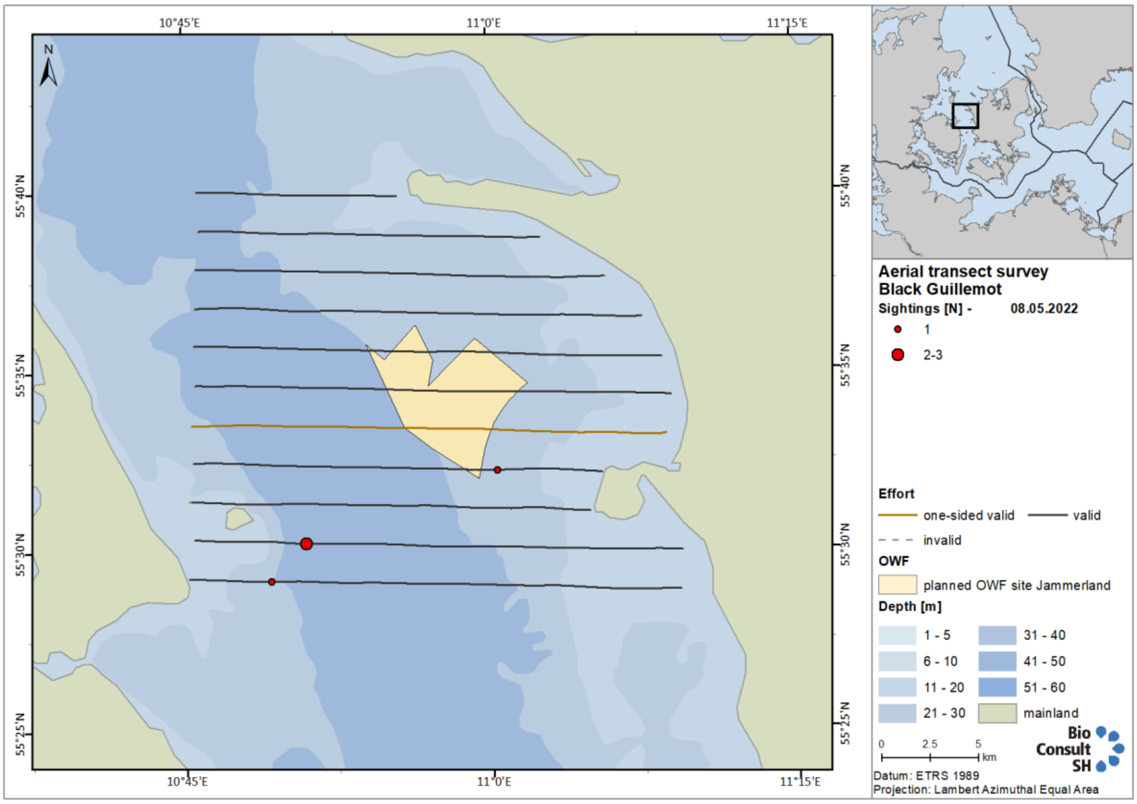

Figure A. 299 Black Guillemot distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.26 Harbour Porpoise

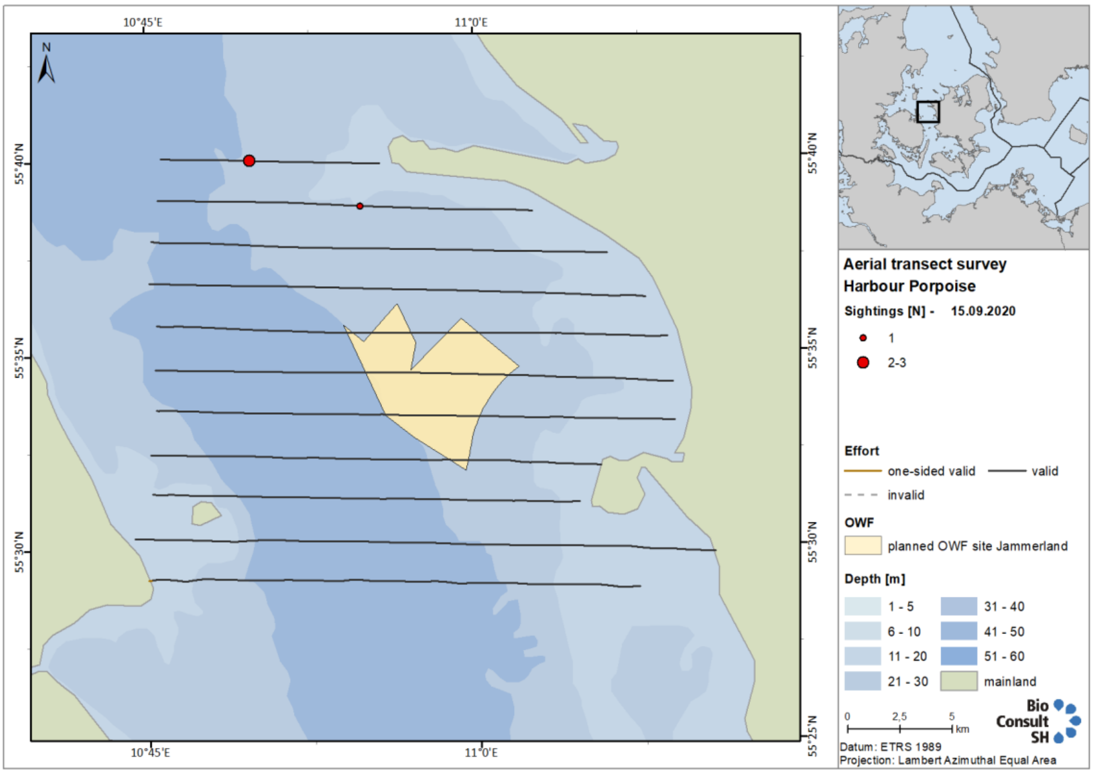

Figure A. 300 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

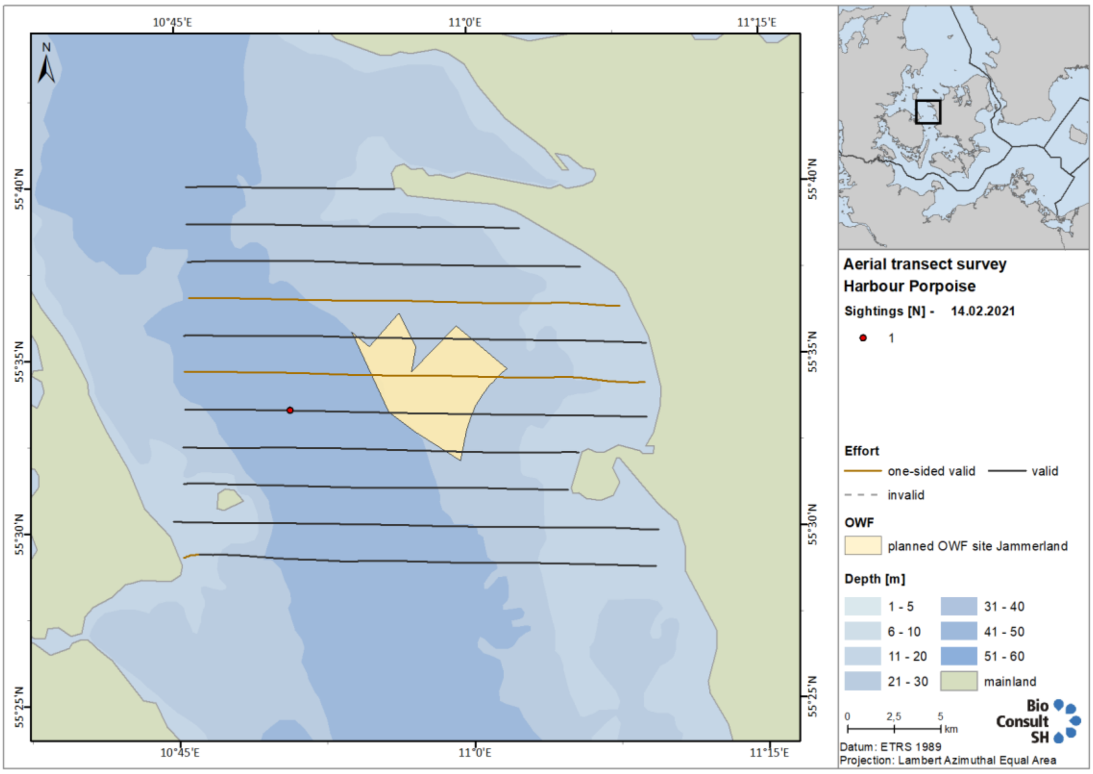

Figure A. 301 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 14th February 2021.

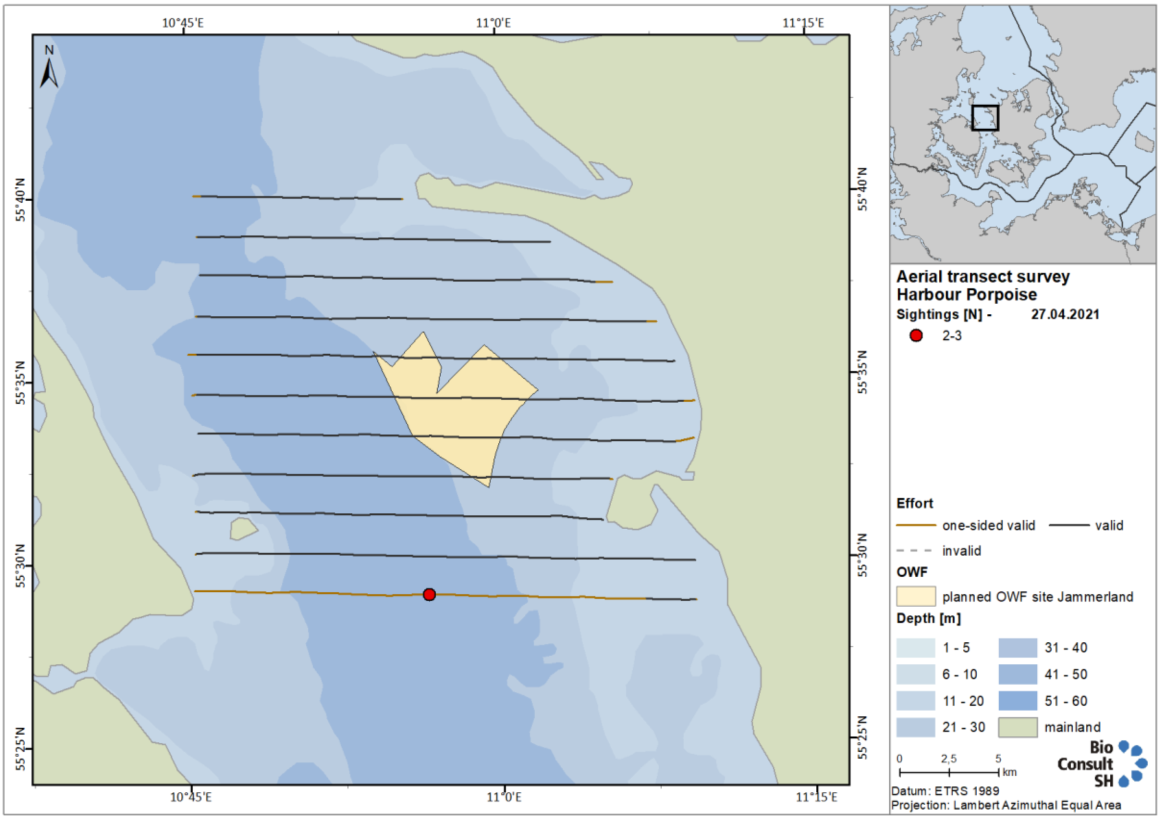

Figure A. 302 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 27th May 2021.

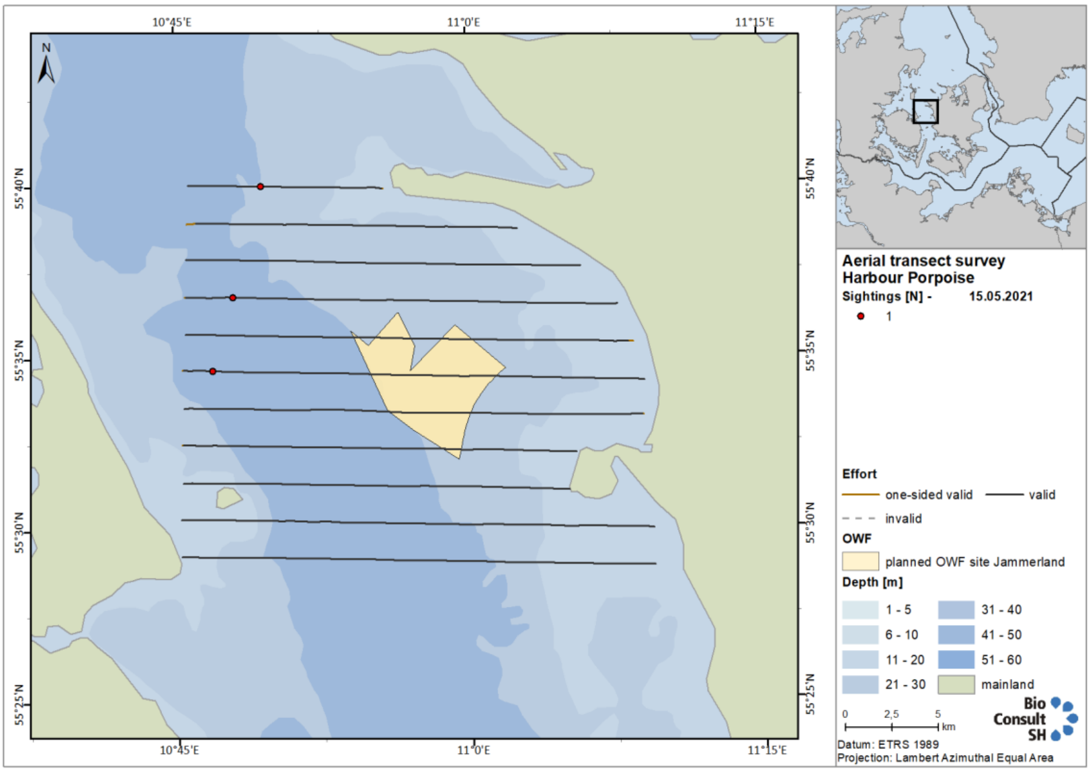

Figure A. 303 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

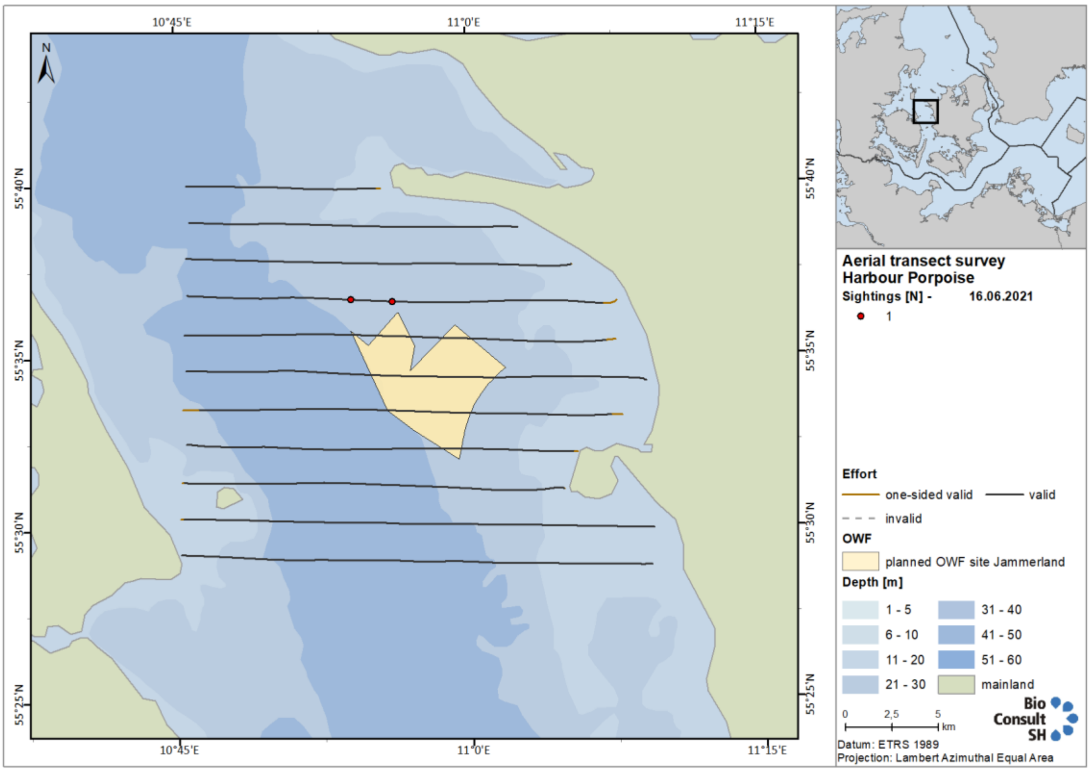

Figure A. 304 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

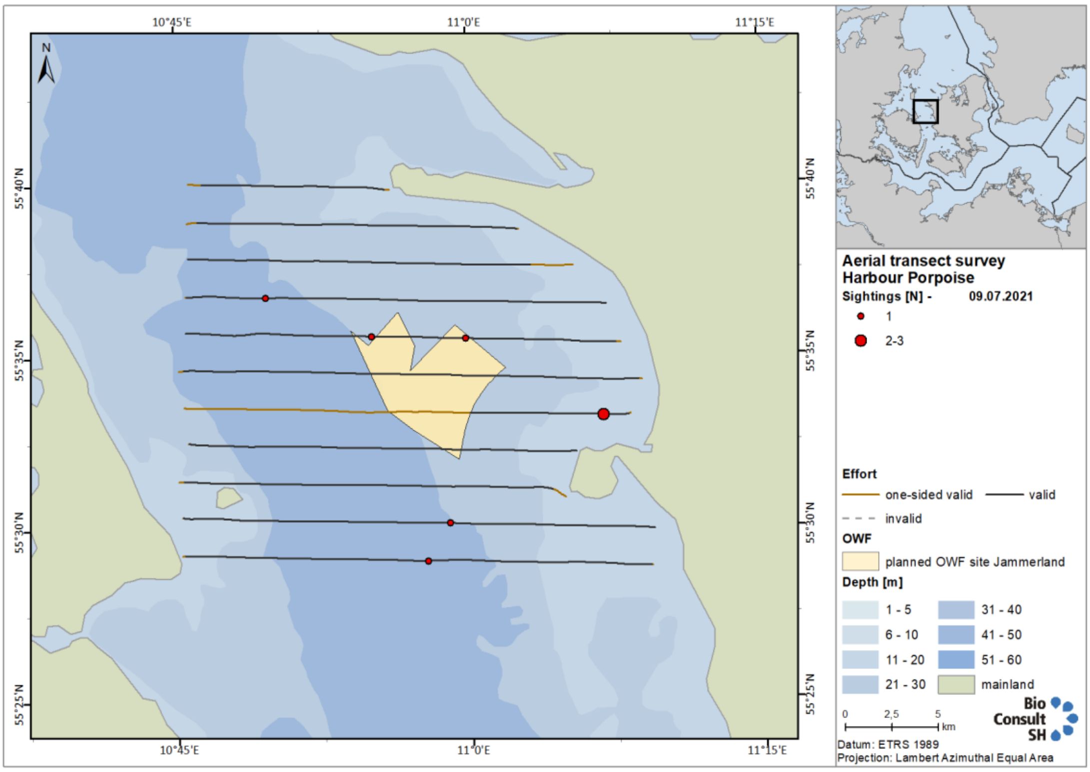

Figure A. 305 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

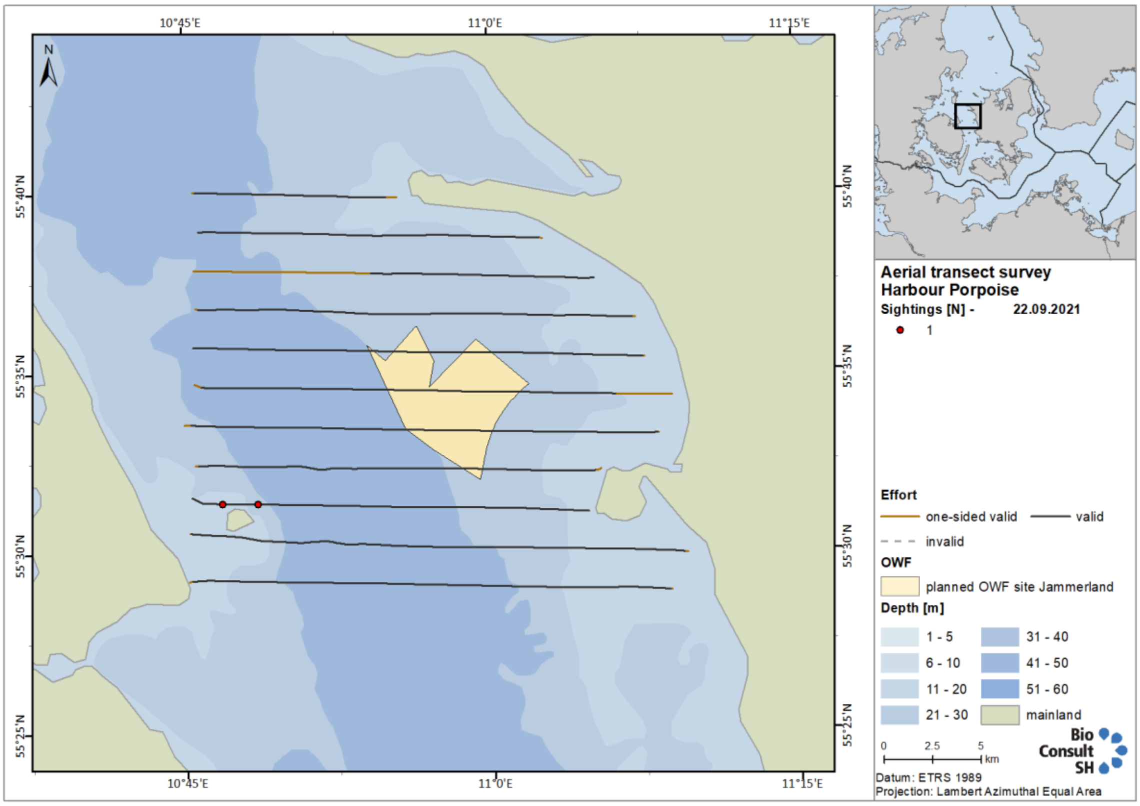

Figure A. 306 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

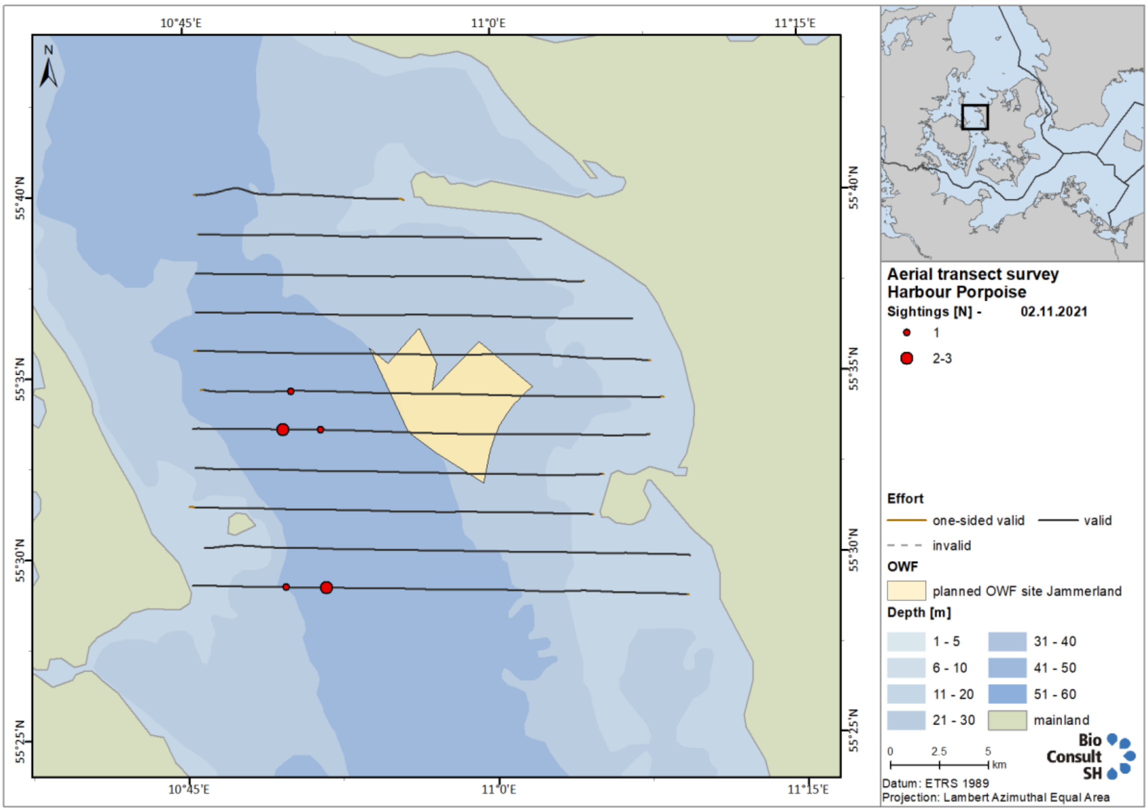

Figure A. 307 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

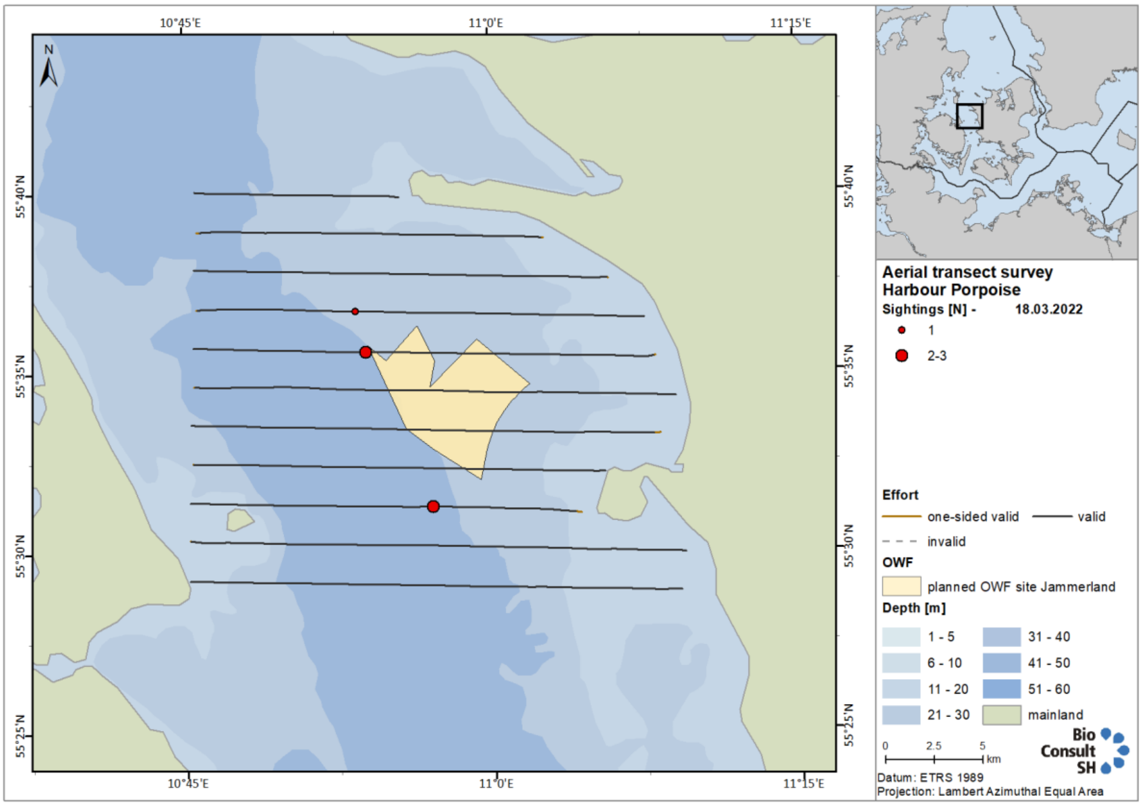

Figure A. 308 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

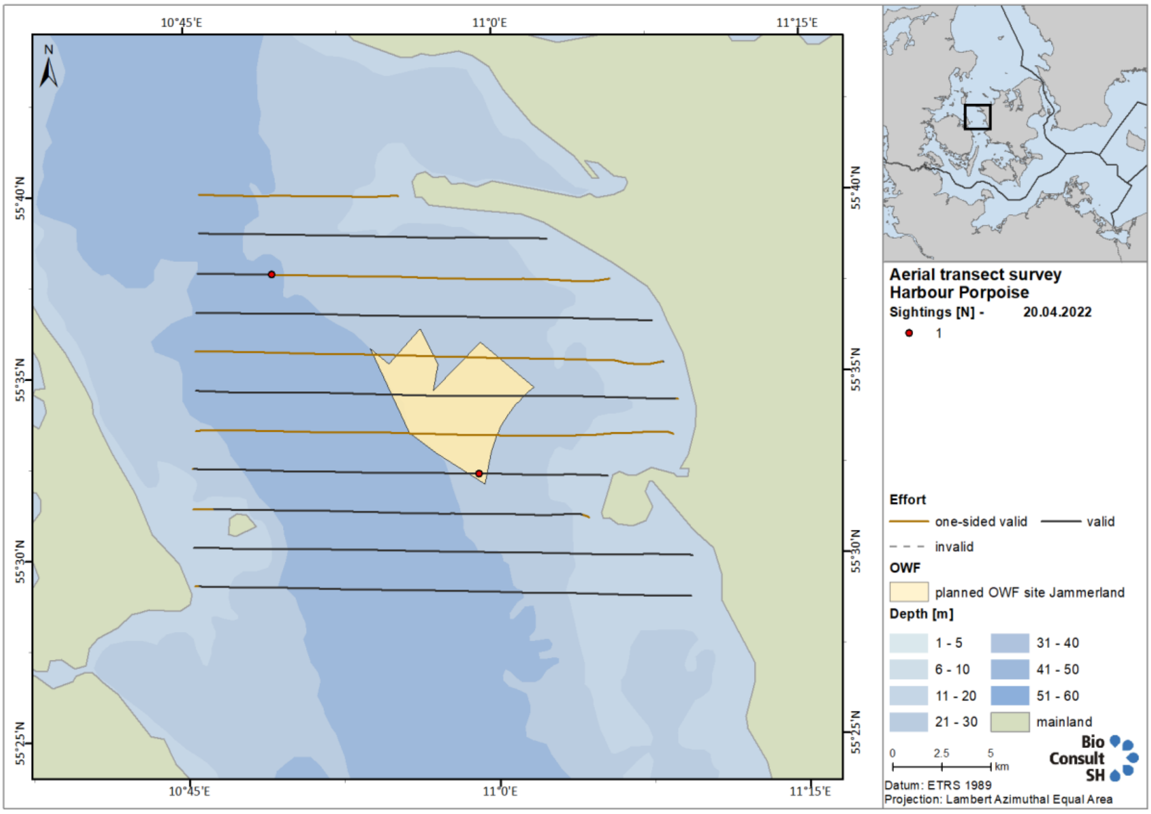

Figure A. 309 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

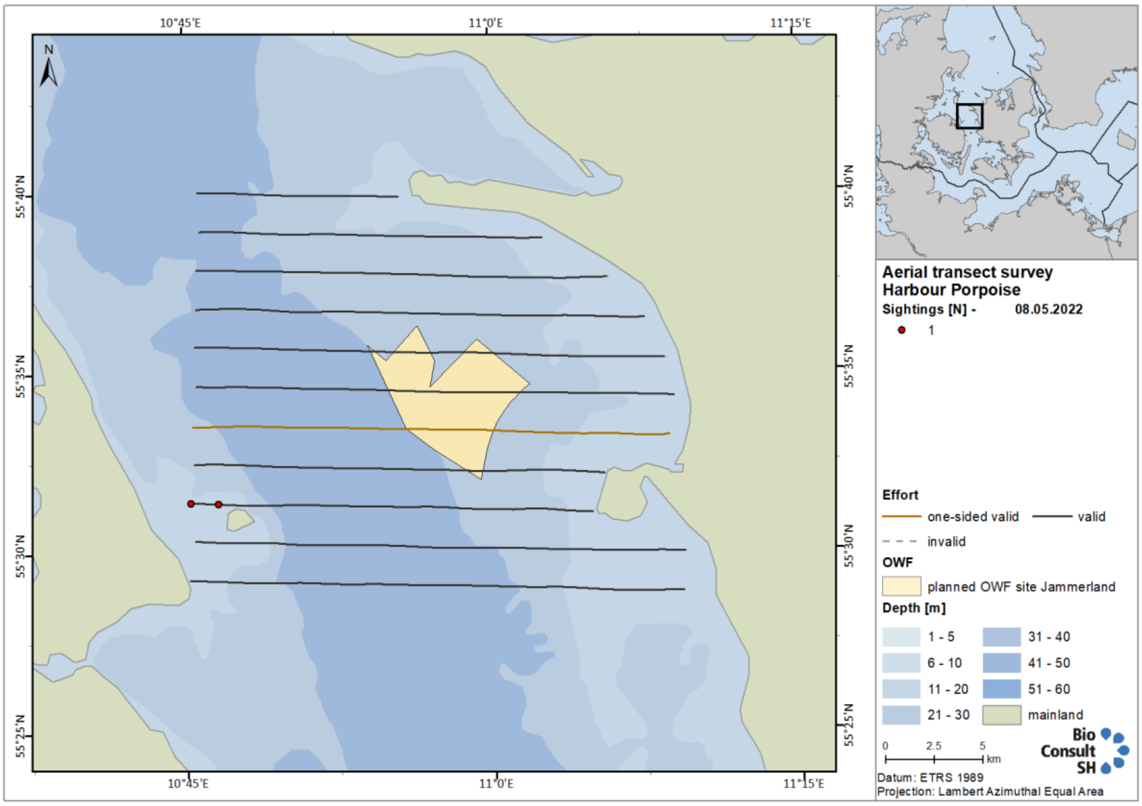

Figure A. 310 Harbour Porpoise distribution in the Jammerland area during the aerial survey flight on 8th May 2022.

A.1.27 Harbour Seal

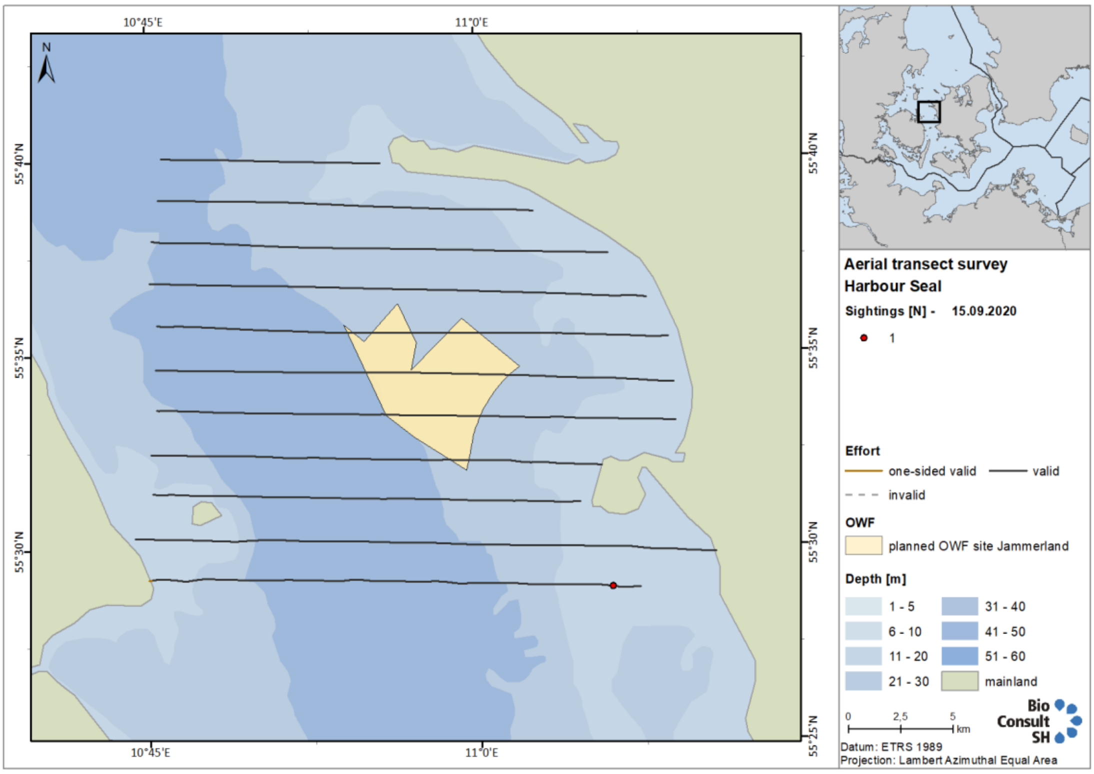

Figure A. 311 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 15th September 2020.

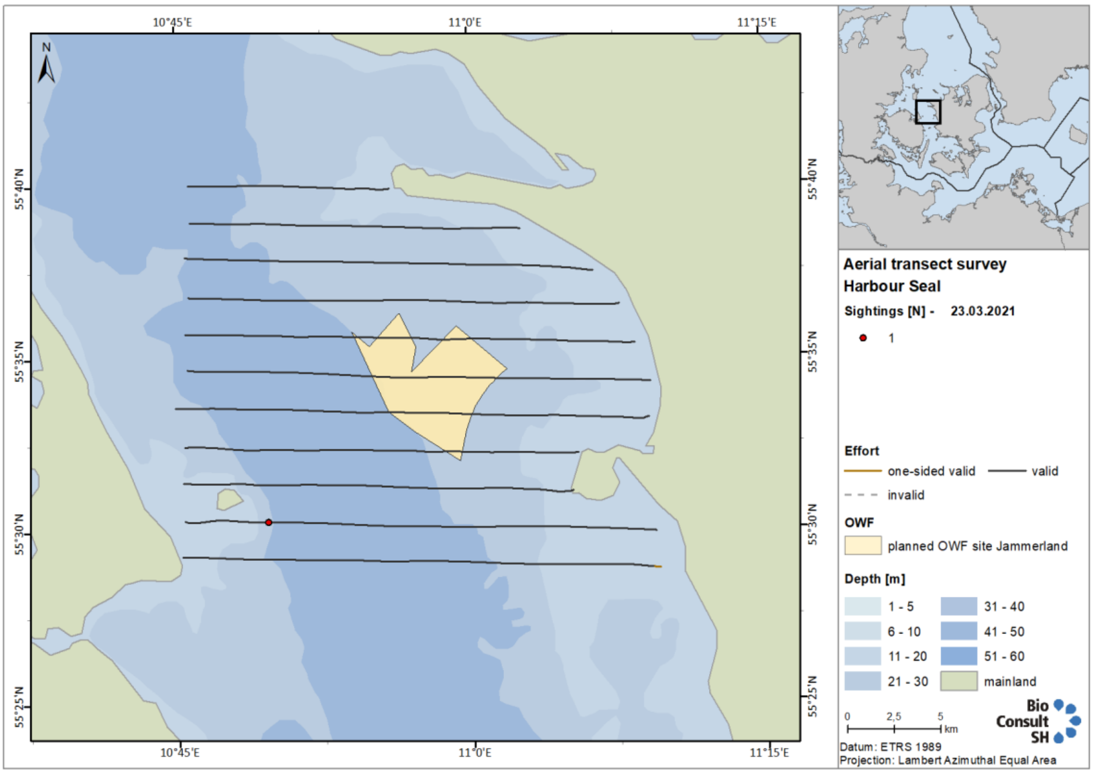

Figure A. 312 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 23rd March 2021.

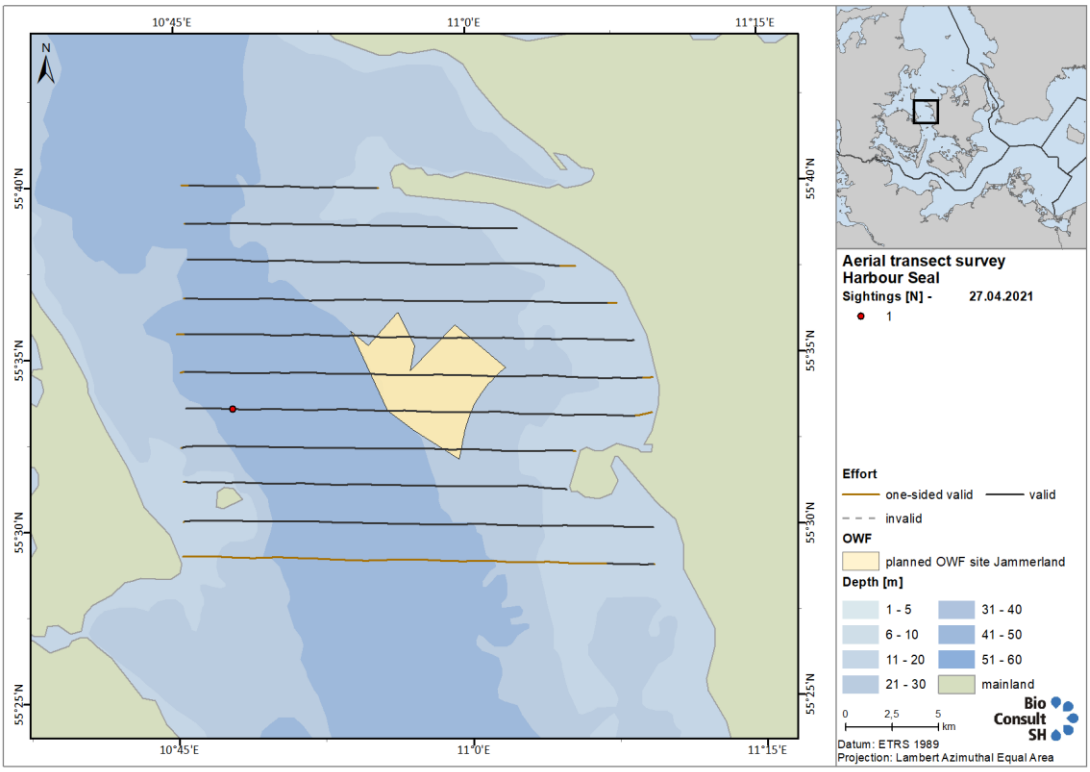

Figure A. 313 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 27th April 2021.

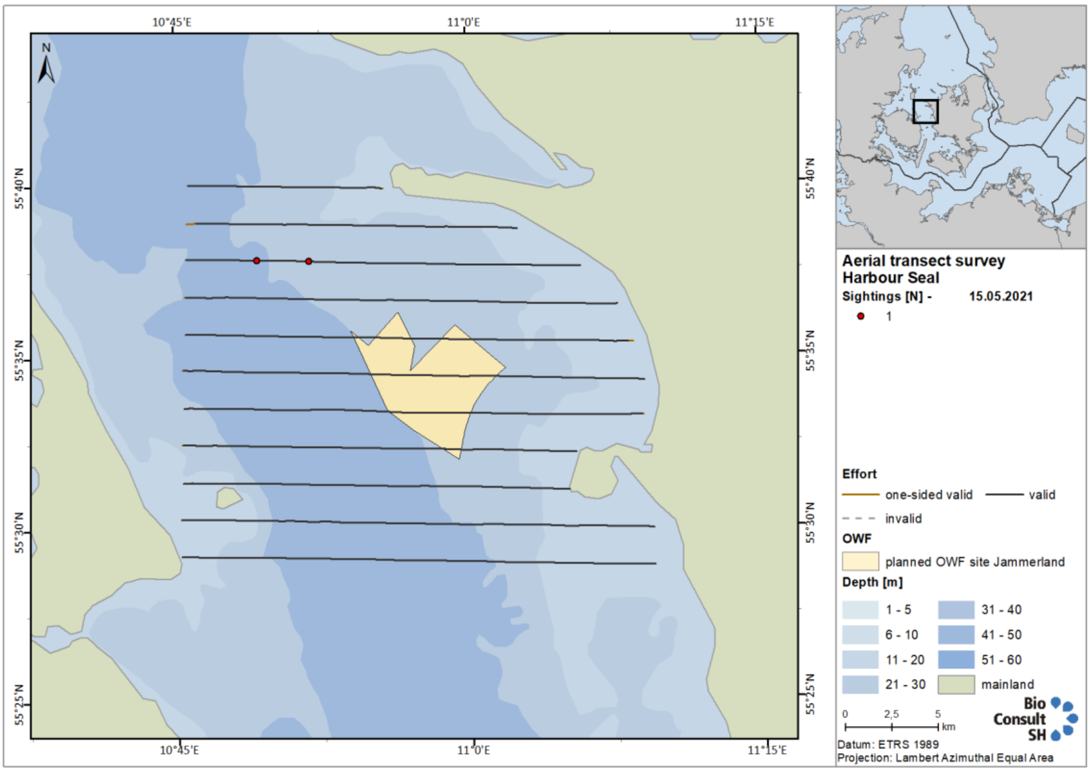

Figure A. 314 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 15th May 2021.

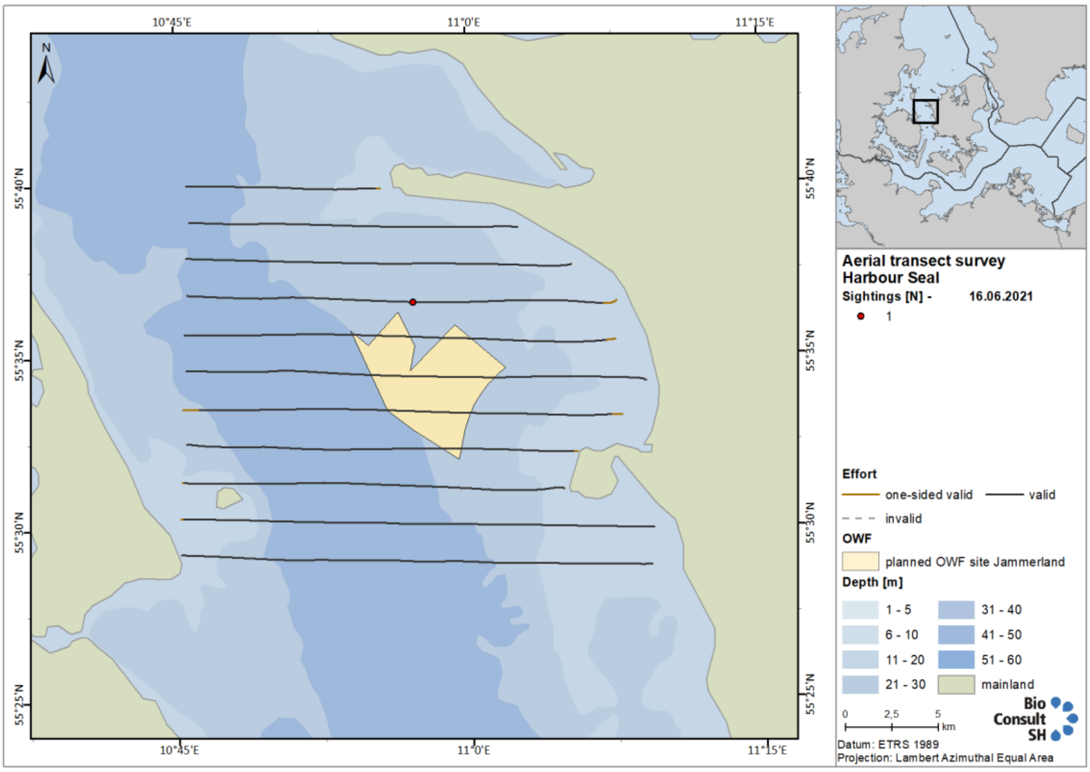

Figure A. 315 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 16th June 2021.

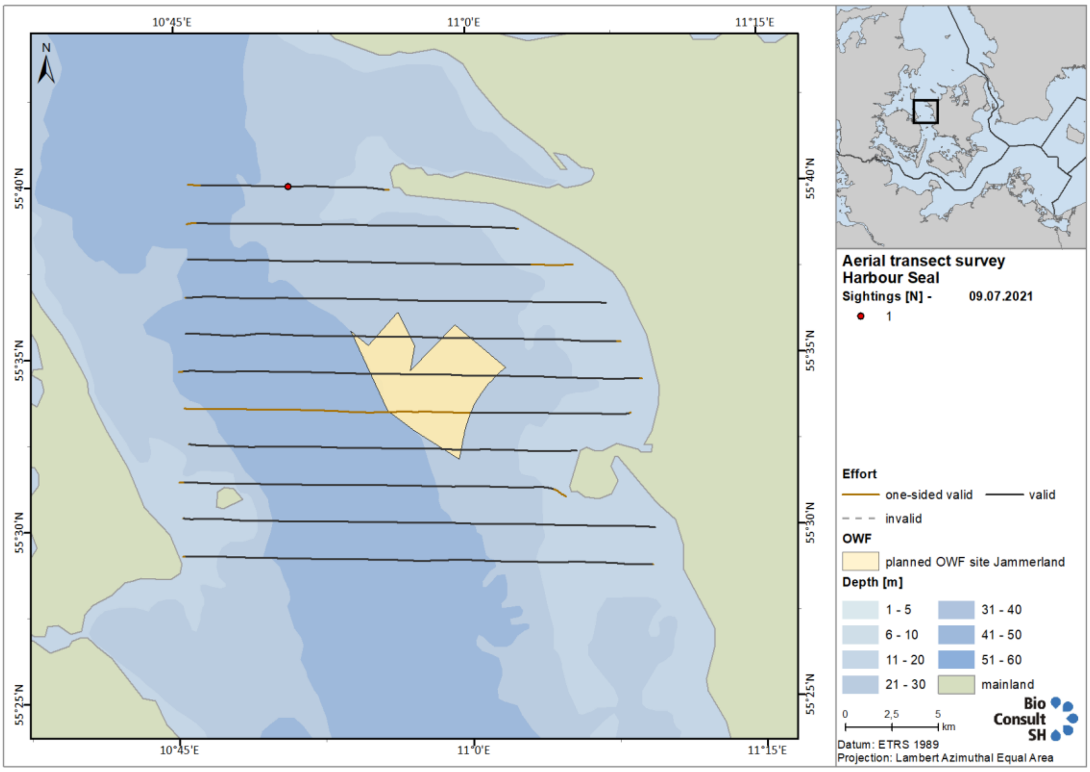

Figure A. 316 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 9th July 2021.

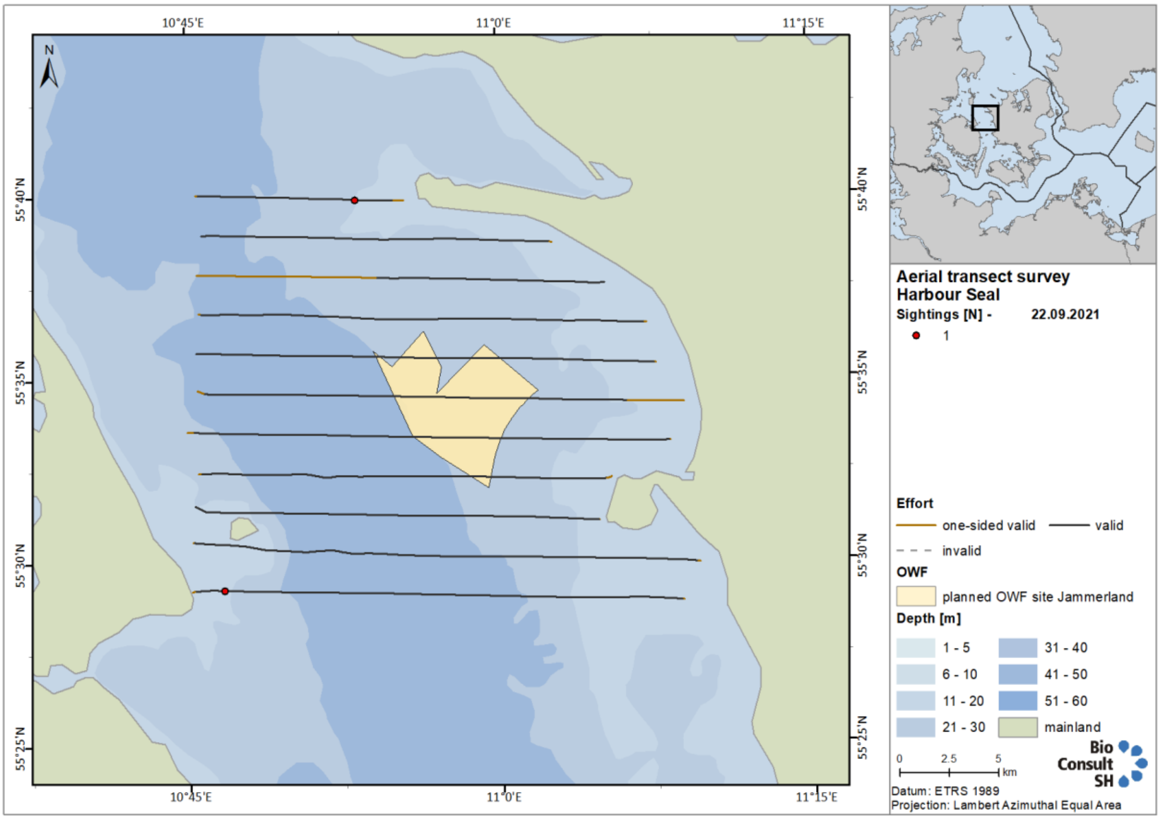

Figure A. 317 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 22nd September 2021.

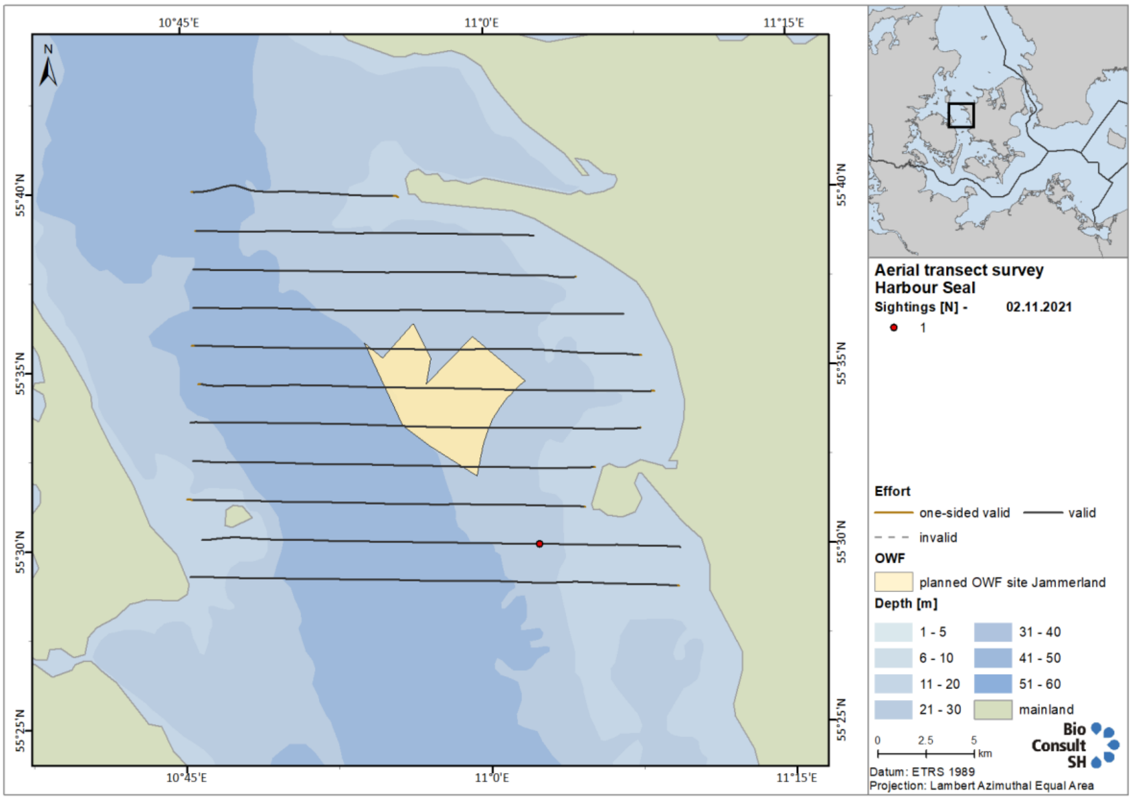

Figure A. 318 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 2nd November 2021.

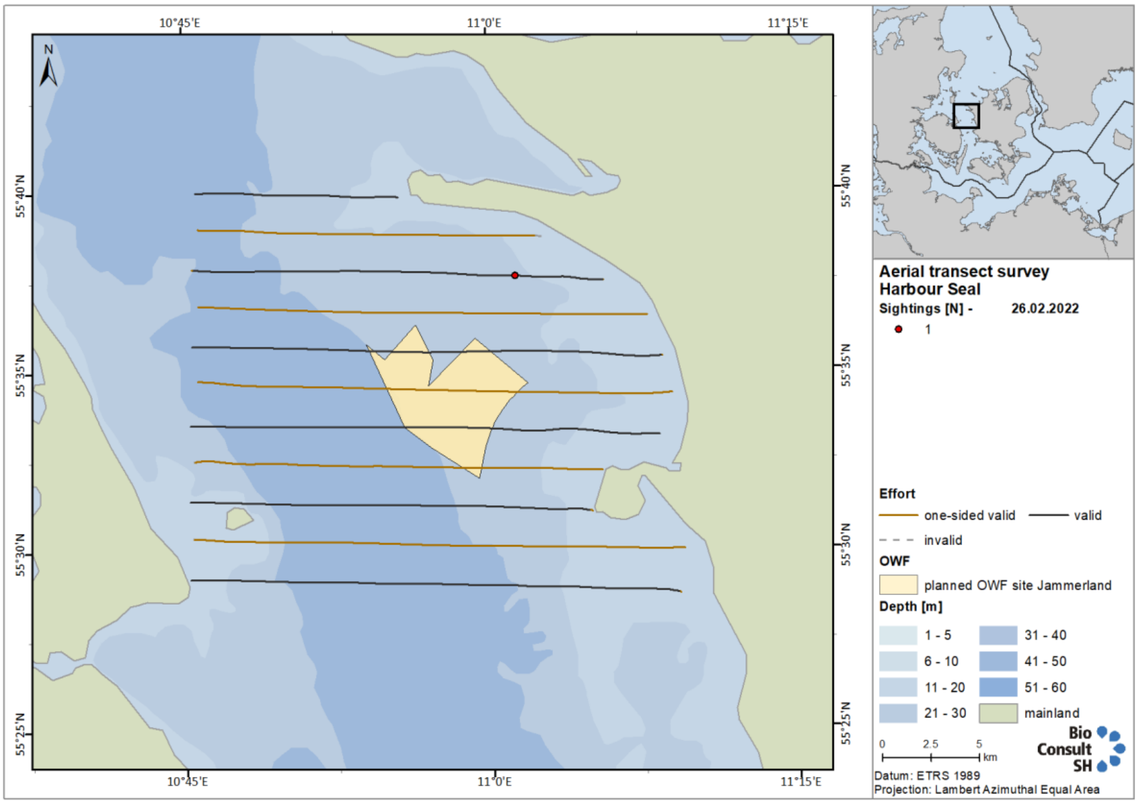

Figure A. 319 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 26th February 2022.

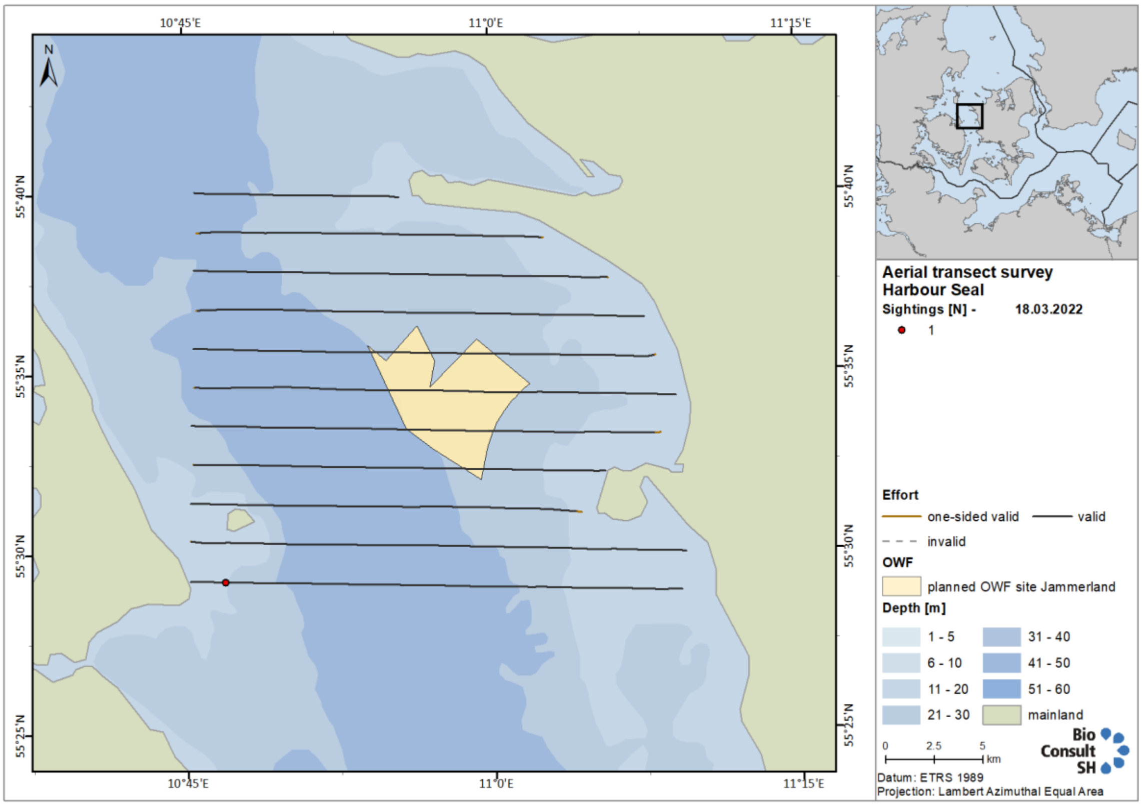

Figure A. 320 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 18th March 2022.

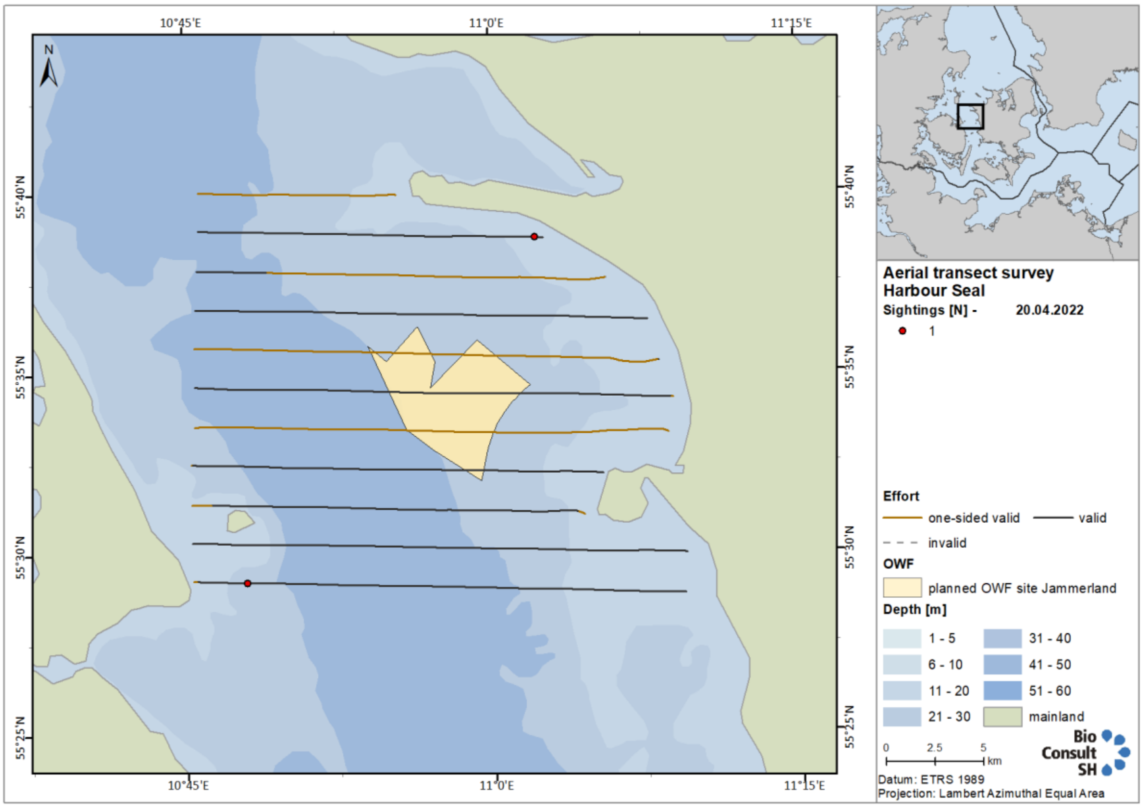

Figure A. 321 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 20th April 2022.

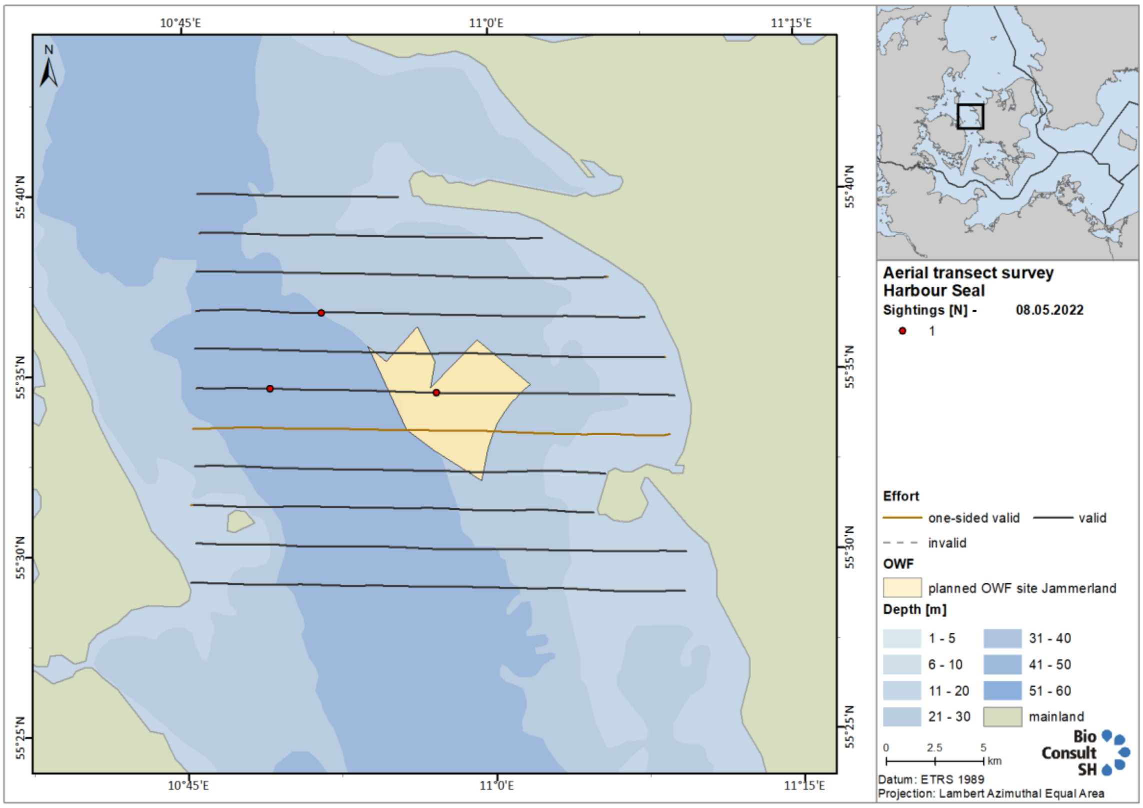

Figure A. 322 Harbour Seal distribution in the Jammerland area during the aerial survey flight on 8th May 2022.