



APPENDIX 11-7

AERIAL SURVEY TWO
YEAR REPORT

**Digital video aerial surveys of seabirds
and marine megafauna at Fuinneamh
Sceirde Teoranta:
2-Year Report
October 2021 to September 2023**

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Executive summary

In October 2021, GIG Ireland commissioned HiDef Aerial Surveying Limited (HiDef) to undertake a programme of high-resolution digital video aerial surveys for marine megafauna, ornithological and human activity over the proposed Fuinneamh Sceirde Teoranta Wind Farm Project. The proposed Fuinneamh Sceirde Teoranta Offshore Wind Farm Project is located along the west coast of County Galway, Ireland.

A total of 24 monthly surveys were flown between October 2021 and September 2023. HiDef designed a survey that placed 1km and 2km-spaced transects across the development area plus a 10km surrounding buffer ('the survey area'). The total survey area was approximately 947km².

Surveys were undertaken using an aircraft equipped with four HiDef Gen II series cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m width, separated from the next camera by ~25m, to provide a combined sampled width of 500m within a 575m overall strip. Two of the four cameras were analysed, achieving at least 12.5% coverage of the survey area in each flight. The remaining footage is available for analysis at a later stage if required.

Data analysis followed a two-stage process in which video footage was reviewed (with a 20% random sample used for audit) and detected objects were identified to species or species group level (again with 20% selected at random for audit). The audit of both stages requires 90% agreement to be achieved.

Density and abundance estimates were calculated using strip transect analysis and kernel density estimation (KDE) was used to create density surface maps. In addition, known diving rates of four species were used to estimate the proportion of diving animals that would be underwater at the time of survey for the correction of abundance and density estimates.

The surveys recorded a total of 46,973 birds of 48 species and 614 non-avian animals of 10 species. In addition five dead birds, one gannet in September 2022 and four unidentified bird species were observed over the whole survey period. A further 1,621 birds and 140 marine mammals were recorded which were not assigned to a species. An identification rate to species level of 96.43% was achieved throughout the 24-month period.

The primary observations from the surveys were:

- Barnacle goose (*Branta leucopsis*) was present in only six surveys across the 24-month period with a peak density of 5.47 birds/km² (95% CI 0.00 – 15.84) in November 2021. All birds were recorded as flying.
- Black-legged kittiwake (*Rissa tridactyla*) were the third most abundant species recorded, peaking in April 2023 with a peak density of 1.63 birds/km² (95% CI 0.37 – 3.79). During the survey period a similar number of birds were recorded flying and sitting on the water, indicating relative importance of the survey area for both foraging and passage birds;
- Common gull (*Larus canus*) was observed across all surveys with a marked peak in November 2021 (peak density of 0.73 birds/km² (95% CI 0.04 – 2.01)). During the survey period a similar number of birds were recorded flying and sitting on the water, suggesting the area may be used both for passage and foraging;
- Great black-backed gull (*Larus marinus*) numbers varied over the survey period, with a peak density of 0.25 birds/km² (95% CI 0.04 – 0.59) recorded in July 2022.
- Herring gull (*Larus argentatus*) were observed across all 24 surveys in varying numbers, with a peak density of 1.34 birds/km² (95% CI 0.08 – 3.57) in November 2021. The majority of the birds were observed sitting on the water, suggesting the area may be used for foraging;

- Lesser black-backed gulls (*Larus fuscus*) peaked in June 2023 (peak density of 0.38 birds/km² (95% CI 0.16 – 0.66)). They were not recorded during the winter months;
- Common tern (*Sterna hirundo*) were only recorded over the spring and summer months, with no observations recorded between October and March. Records peaked in July 2023 with a peak density of 0.56 birds/km² (95% CI 0.21 – 0.97).
- Arctic tern (*Sterna paradisaea*) were only recorded across eight of the 24 surveys and only in the summer months with the exception of October 2022. Records peaked in May 2023 with a peak density of 0.60 birds/km² (95% CI 0.24 – 1.05).
- Common guillemot (*Uria aalge*) were the second most abundant species recorded throughout the survey period, with higher densities observed between July 2022 and September 2022 as well as May 2023 and June 2023, with an absolute peak density of 26.62 birds/km² (95% CI 17.72 – 37.60) in August 2022;
- Razorbill (*Alca torda*) were recorded throughout the survey period, with an absolute peak density of 2.50 birds/km² (95% CI 1.38 – 3.84) recorded in July 2022. The majority of birds were recorded as sitting on the water, suggesting the area may be used for foraging;
- Black guillemot (*Cephus grylle*) were recorded across 21 of the 24 surveys; observations of black guillemot were higher in the second year of surveys, with a peak density of 0.63 birds/km² (95% CI 0.02 – 1.72) in February 2023;
- Atlantic puffin (*Fratercula arctica*) were observed in higher numbers during the summer months between May and August, with an absolute peak density of 2.02 birds/km² (95% CI 0.81 – 3.73) in July 2023;
- Red-throated diver (*Gavia stellata*) were recorded in lower numbers compared to other species across the survey period, with higher observations between October 2021 and March 2022, with a peak density of 0.21 birds/km² (95% CI 0.44 – 0.96) in November 2021.
- Great northern diver (*Gavia immer*) was observed in higher numbers in the winter and spring months between December and May; records were higher in the second year, with a peak density of 0.60 birds/km² (95% CI 0.29 – 0.97) in February 2023;
- Northern fulmar (*Fulmarus glacialis*) were recorded in 21 out of the 24 surveys, with a marked peak in December 2021 (peak density of 0.57 birds/km² (95% CI 0.33 – 0.83));
- Manx shearwater (*Puffinus puffinus*) were the most abundant bird recorded across the survey period with greater numbers recorded during the summer months from May to August, peaking in May 2022, with a peak density of 39.31 birds/km² (95% CI 13.30 – 72.03);
- Northern gannet (*Morus bassanus*) were recorded in varying numbers across the survey period with a peak density of 0.50 birds/km² (95% CI 0.12 – 1.10) in November 2021. One dead gannet was recorded in September 2022;
- Shag (*Gulosus aristotelis*) were recorded in all surveys across the 24-month period, peaking in February 2023 with a density of 0.40 birds/km² (95% CI 0.04 – 1.03);
- Common dolphins (*Delphinus delphis*) were the most abundant non-avian species present within the survey region, densities peaking in May 2023 with 0.41 animals/km² (95% CI 0.00 – 1.07).

Distribution maps for all bird species showed higher densities in the north-west and south-east of the survey area in some months such as September 2022, whereas in other months such as May 2022 higher densities were more widespread. Species-specific variations were also recorded. The distribution of non-avian animals was more widespread.

The work undertaken by HiDef collected 24 months of continuous data. The data collected works towards satisfying the survey requirements for the contract.

I Introduction

- 1 The Fuinneamh Sceirde Teoranta Project (hereafter 'Fuinneamh Sceirde Teoranta') is a proposed offshore wind farm, located along the south coast of County Galway, in west Ireland. The high intensity development area covers an area of approximately 29km².
- 2 In October 2021, GIG commissioned HiDef Aerial Surveying Limited (hereafter 'HiDef') to undertake a programme of high-resolution digital video aerial surveys of marine megafauna (defined within this report as cetaceans, pinnipeds or other large, non-avian marine fauna), ornithological and human activity in support of the development proposal. The survey design consisted of 1km-spaced transects within the Fuinneamh Sceirde Teoranta development area plus a 4km surrounding buffer (the "high intensity" area), as well as 2km-spaced transects throughout a surrounding 10km buffer (the "low intensity" area), together referred to as the 'survey area', with an area of approximately 947km².
- 3 HiDef designed the survey methodology to provide information suitable to support GIG's proposed development at Fuinneamh Sceirde Teoranta for which baseline surveys and an accurate assessment of abundance and distribution of seabirds and marine mammals is required to inform the Environmental Impact Assessment (EIA).
- 4 There are multiple important bird sites classified as Special Protection Areas (SPAs) under the European Council (EC) Directive 2009/147/EC on the Conservation of Wild Birds ('the Birds Directive') located in the vicinity of the survey area.
- 5 The Slyne Head to Ardmore Point Islands SPA is a collection of islands on the Connemara coast which partially sit within the north-west of the survey area and extend beyond (NPWS, 2022a). The site has qualifying interests for two key species - barnacle goose (*Branta leucopsis*) and Arctic tern (*Sterna paradisaea*), and two observed species - Sandwich tern (*Thalasseus sandvicensis*) and little tern (*Sternula albifrons*). The site is recorded as having an internationally important wintering ground for barnacle goose, whilst also hosting nationally important breeding sites for sandwich, arctic and little tern (NPWS, 2011a).
- 6 The Inishmore SPA encompasses over 17km of the eastern, southern and western coast of the island of Inishmore and a couple of surrounding islands (NPWS, 2022b). The SPA has many cliffs making it a nationally important breeding site for black-legged kittiwake (hereafter referred to as kittiwake, *Rissa tridactyla*), common guillemot (hereafter referred to as guillemot, *Uria aalge*), arctic tern and little tern. Other notable species on Inishmore include black guillemot (*Cepphus grylle*) which the Irish National Parks & Wildlife Service consider to be one of the greatest concentrations in the country (5%) (NPWS, 2014a). All species mentioned above, were recorded during surveys although little tern was not considered to be a key species.
- 7 Cruagh Island SPA sits approximately 15km to the northwest of the survey area and has two qualifying species, Manx shearwater (*Puffinus puffinus*) and barnacle goose (NPWS, 2022c). The island was discovered as a breeding site for Manx shearwater in the Seabird 2000 survey which indicated 3,286 pairs and it was deemed to be one of the most important colonies in the country and of international importance. The site's use by barnacle goose as a regular winter-feeding site also adds to the SPA's international importance (NPWS, 2010a).
- 8 Further north, approximately 25km, lies the Tralee Bay Complex SPA which comprises bays, islands and intertidal habitat that has qualifying interests of 22 bird species (NPWS, 2014b) such as common gull (*Larus canus*), shelduck (*Tadorna tadorna*), Eurasian wigeon (hereafter referred to as wigeon, *Anas penelope*), Eurasian teal (hereafter referred to as teal, *Anas crecca*), mallard (*Anas platyrhynchos*), Eurasian

oystercatcher (hereafter referred to as oystercatcher, *Haematopus ostralegus*), European golden plover (hereafter referred to as golden plover, *Pluvialis apricaria*), bar-tailed godwit (*Limosa lapponica*), Eurasian curlew (hereafter referred to as curlew, *Numenius arquata*), ruddy turnstone (hereafter referred to as turnstone, *Arenaria interpres*), black-headed gull (*Chroicocephalus ridibundus*).

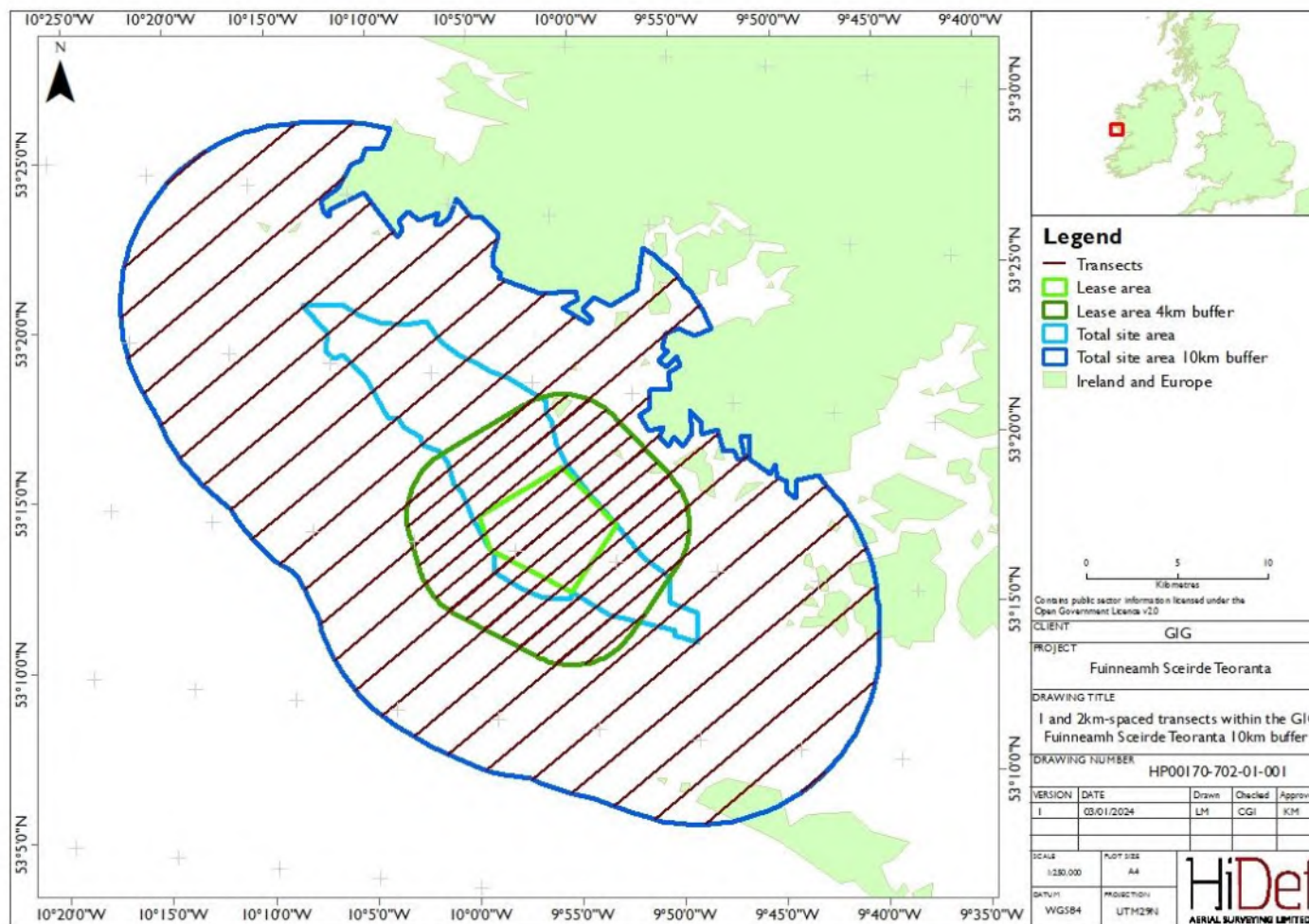
- 9 Approximately 30km to north of the site is the High Island, Inishark and Davillaun SPA, a series of islands that lie between 3 and 5km off the coast of County Galway (NPWS, 2022d). The site includes qualifying interests for three species, northern fulmar (hereafter referred to as fulmar, *Fulmarus glacialis*), Arctic tern, and barnacle goose, with the two former present in nationally important numbers, and an ornithologically important wintering ground for the latter (NPWS, 2010b).
- 10 Approximately 30km south-east of the survey area in County Claire is the Cliffs of Moher SPA, one of the most important seabird colonies in the country (NPWS, 2015a). The site has qualifying interests for six species; fulmar, kittiwake, guillemot, razorbill (*Alca torda*) and Atlantic puffin (hereafter referred to as puffin, *Fratercula arctica*), Red-billed chough (hereafter referred to as chough, *Pyrrhocorax pyrrhocorax*) (NPWS, 2022e).
- 11 There are many other important SPA sites within approximately 100km of the proposed development site, such as; the Inner Galway Bay SPA approximately 30km to the east (SPA designated: great northern diver (*Gavia immer*), common gull, common tern (*Sterna hirundo*)), Claire Island SPA situated approximately 60km to the north (SPA designated: fulmar, European shag (hereafter referred to as shag, *Phalacrocorax aristotelis*), common gull, kittiwake, guillemot and razorbill) and the Inishkea Island SPA approximately 100km to the north (SPA designated: shag, barnacle goose, common gull, European herring gull (hereafter referred to as herring gull, *Larus argentatus*), arctic tern).
- 12 Marine mammals also occur within the survey area year-round. The Irish National Parks and Wildlife Service (NPWS) has designated Special Areas for Conservation (SACs) for all Annex II listed marine mammal species: bottlenose dolphin (*Tursiops truncatus*), harbour porpoise (*Phocoena phocoena*), harbour seal (hereafter referred to as harbour seal, *Phoca vitulina*) and grey seal (*Halichoerus grypus*). There are seven SACs within the vicinity of the survey area for the two seal species; Slyne Head Islands SAC (grey seal, within the survey area (NPWS, 2012)), Kilkieran Bay and Islands SAC (harbour seal, adjacent to the survey area (NPWS, 2014c)), Inishbofin and Inishshark SAC (grey seal, approximately 18km to the north (NPWS, 2015b)), Galway Bay Complex SAC (harbour seal, approximately 35km to the east of the survey area (NPWS, 2013a)), Clew Bay Complex SAC (harbour seal, approximately 60km northeast of the survey area (NPWS, 2011b)), Duvillaun Islands SAC (grey seal, approximately 65km north of the survey area (NPWS, 2013b)), and the Inishkea Islands SAC (grey seal, approximately 80km north of the survey area (NPWS, 2015c)).
- 13 This report ('the two-year report') provides the results from 24 surveys undertaken between October 2021 and September 2023. Observations and survey effort are summarised, and results presented as density surface distribution maps, density estimates with 95% confidence intervals (CIs) and summarised data on behaviour and age. A discussion is provided as to the representativeness of the results in relation to the wider region.

2 Methods

2.1 Survey flights

- 14 A series of strip transects were flown on a monthly basis between October 2021 and September 2023, following the protocol agreed in October 2021 (HP00170-001).
- 15 The survey design consisted of 1km-spaced transects across the Fuinneamh Sceirde Teoranta development area (29km²) and a surrounding 4km buffer, creating an overall area of approximately 163km², while 2km-spaced transects were flown over the entire 10km buffer (Figure 1). This created an overall survey area of 947km².
- 16 A total of 32 strip transects were flown extending roughly north-west to south-east, perpendicular to the depth contours along the coast. Such a design ensures that each transect samples a similar range of habitats (primarily relating to water depth) and will reduce the variation in bird and mammal abundance estimates between transects.
- 17 Surveys were undertaken using an aircraft equipped with four HiDef Gen II series cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m width, separated from the next camera by ~25m, thus providing a combined sampled width of 500m within a 575m overall strip.
- 18 A minimum target of 14.5% site coverage was agreed, with data from two out of the four cameras being processed. This ensured a survey with sufficient coverage and number of transects for precise abundance estimation, with the remaining unprocessed data archived.
- 19 The surveys were flown along the transect pattern shown in Figure 1 at a height of approximately 500 – 550m (~1,650 – 1,800ft) above sea level (ASL). Flying at this height ensures that there is no risk of flushing species that are easily disturbed by aircraft noise. Thaxter *et al.*, (2016) recommends a minimum flight altitude of 460 – 500m ASL for marine bird surveys. Hammond *et al.*, (2013) also highlight that an aerial survey flown at an altitude of 183m is not likely to result in a responsive reaction from any marine mammal.
- 20 Position data for the aircraft was captured from a Garmin GPSMap 296 receiver with differential GPS enabled to give 1m accuracy for the positions and recording updates in location at one second intervals for later matching to bird and marine mammal observations.

Figure 1 Fuinneamh Sceirde Teoranta survey design with 10km buffer and 1km and 2km-spaced transects flown between October 2021 and September 2023



2.2 Data review and object detection

- 21 Data were viewed by trained reviewers who marked any objects in the footage as requiring further analysis, as well as determining which were birds, marine megafauna or anthropogenic objects such as ships or buoys.
- 22 As part of HiDef's quality assurance (QA) process, an additional 'blind' review of 20% of the raw data was carried out and the results compared with those of the original review. If less than 90% agreement was attained during the QA process, then corrective action was initiated: the remaining data set was reviewed and where appropriate, the failed reviewer's data discarded and all the data re-reviewed. If required, additional training was given to the reviewer to improve performance.
- 23 Objects were only recorded where they reached a reference line (known as 'the red line') which defined the true transect width of 125m for each camera. By excluding objects that did not cross the red line, biases to abundance estimates caused by flux (movement of objects in the video footage relative to the aircraft, such as where the survey craft is buffeted by airflow) were eliminated.

2.3 Object identification

- 24 Images marked as requiring further analysis were reviewed by the ID Team; ornithologists¹ and marine mammal specialists² for identification to the lowest taxonomic level possible and for assessment of the approximate age and the sex of each animal, as well as any behaviour traits visible from the imagery.
- 25 At least 20% of all objects were selected at random and subjected to a separate 'blind' QA process. If less than 90% agreement was attained for any individual camera, then corrective action was initiated: if appropriate, the failed identifier's data were discarded, and the data re-identified. Any disputed identifications were passed to a third-party expert ornithologist/marine mammal specialist for a final decision. The level of agreement within the QA process is calculated as the final number of agreements as a percentage of all identifications subjected for QA for the entire survey.
- 26 All objects were assigned to a species group and where possible, each of these then further identified to species level. The species identifications were given a confidence rating of 'possible', 'probable' or 'definite'³.
- 27 It is important to note that confidence ratings are not standardised. The likelihood of achieving a definite or probable identification is not consistent for all component members of a species group. For example, someone undertaking identification of a large auk will find it easier to be confident of guillemot identification than razorbill. Confidence scores should not be used to filter or weight the probability of 'large auk' being one species or another in any analysis, as this will lead to biased results, particularly if the identification rate is low.
- 28 Any animals that could not be identified to species level were assigned to a category 'No ID' and only identified to group level. If, on occasion, the unidentified bird is suspected of belonging to two possible

¹ HiDef currently employs three current and former members of the British Birds Rarities Committee ('BBRC') as expert ornithologists.

² HiDef staff have long-standing experience in marine mammal identification, regularly undertaking boat surveys as part of ESAS (European Seabirds At Sea Partnership), SCANS and other programmes. They process thousands of cetacean images, hold regular internal training sessions and have access to marine specialists within our wider company BioConsult SH.

³ Definite: as certain as reasonably possible. Probable: very likely to be this species or species group. Possible: more likely to be this species or species group than anything else.

genera, then a broader group category may be used. For example, a bird would usually be assigned to the group category 'Shearwater species' if identified as a Manx shearwater, or to 'Large Auk species' if identified as a guillemot. However, if the bird has the potential to be either, then it would be assigned to a wider group category 'Shearwater / Auk species' and the species level recorded as 'No ID'.

- 29 In the case of birds, additional information was recorded on basic behaviour (i.e., whether the bird was sitting; loafing on other objects; flying; diving or taking off). Detail was recorded where possible on foraging behaviour, approximate age, sex and any other details of interest. Aging of birds was based on moults and was conducted where possible on species which show seasonal variation in plumage.
- 30 In the case of marine mammals, surfacing behaviour was also recorded as either 'surfacing', 'surfacing at red line', 'submerged' or 'unknown'. 'Surfacing at red line' (or snapshot surfacing) was defined as the animal's dorsal fin being above the water in the frame nearest to the 'red line' on the operator's screen and is required for calculation of availability bias (Section 2.5.3). 'Surfacing' was defined as any other surfacing behaviour that was not snapshot surfacing and included any part of the animal's body breaking the surface of the water in any frame. Sexing and aging of marine mammals was carried out where possible and are presented in the relevant sections where data are available.
- 31 Anthropogenic activity was recorded as either 'man-made object', 'fishing boat' or 'other boat'. Further details were noted in the comments of the observation Excel files, including further specifying the type of object (e.g., 'fishing buoy', 'marker buoy', 'wind turbine').

2.4 Final processing

- 32 All data were geo-referenced, taking into account the offset from the transect line of the cameras, and compiled into a single output; Geographical Information System (GIS) files for the Observation and Track data are issued in ArcGIS shapefile format, using UTM29N projection, WGS84 datum.

2.5 Data analysis

2.5.1 Data treatment

- 33 Raw count data were trimmed to the survey area prior to presentation in this report. After basic monthly presentation, data were processed to remove dead animals and estimate density, abundance and distribution of key species and species groups.
- 34 Records identified to species level were separated out from records of individuals identified to group level, and the following analyses undertaken on both datasets. All confidence levels of species identifications were used in the analysis.
- 35 Apportioning of 'unidentified' birds and marine mammals to species level was also undertaken for the purposes of calculating population estimates. The number of unidentified birds in each species group were assigned to species where appropriate, based on their respective abundance ratios. For example, if identified guillemots and razorbills occurred in a 4:1 ratio, then 80% of unidentified birds within the species group would be assigned to guillemot and 20% assigned to razorbill.

2.5.2 Population estimates

- 36 Population estimates were calculated for the Fuinneamh Sceirde Teoranta survey area (development area plus a 10km buffer).
- 37 Each strip transect was treated as a statistically independent random sample from the site. The length and breadth (i.e., the width of the field of view of the camera) of each transect were multiplied to give

the transect area; dividing the number of observations for each species on each transect by the transect area gives a point estimate of the density of that species for the transect. The estimated mean density of animals at the site (and hence the population size by multiplying by the area of the site), the standard deviation of the means (standard errors, SE), the 95% CIs and coefficient of variance (CV_{SE}) were then estimated using a non-parametric block bootstrap method with replacement (Buckland *et al.*, 2001), to ensure equal transect effort was sampled across each bootstrap iteration. A total of 1,000 bootstrap iterations were performed using transect ID as the sampling unit with replacement. A group of transects were randomly sampled until their total length equalled approximately the same length as the total survey length. Data were processed in the R programming language (version 4.3.2) and code can be provided on request.

- 38 The density estimate is expressed as the average number of animals per square km in the whole survey area. The population estimate is expressed as the estimated number of animals within the whole survey area. The upper and lower confidence limits (CLs) define the range that the population estimate falls within with 95% certainty. The CV is a measure of the precision of the population and density estimates.
- 39 For most species these abundance estimates relate to absolute abundance, but for diving species such as auks, the abundance relates to relative abundance due to a proportion of animals being submerged at the time of survey. In Section 2.5.3 we describe our method for taking account of species availability to generate estimates of absolute abundance for auks and harbour porpoise.

2.5.3 Availability bias

- 40 In wildlife surveys, a proportion of seabirds or marine mammals that spend any time underwater, especially while feeding, will not be detectable at the surface. This 'availability bias' leads to an under-estimate of their abundance during surveys. For species that make long dives underwater, this bias might be significant (for example, guillemot).
- 41 There are two main approaches to account for availability bias: by using double platform surveys (for example Borchers *et al.*, 2002) which can be logistically difficult to achieve and relatively expensive; and by using known data on time spent underwater to apply correction factors to abundance estimates (for example Barlow *et al.*, 1988).
- 42 Following Barlow *et al.*, (1988) the probability that an animal is available at the surface is calculated as:

$$\Pr(\text{being visible}) = \frac{(s + t)}{(s + d)}$$

Where s is the average time spent at the surface, t is the window of time that the animal is within view and d is the average time below the surface. In the case of digital video surveys, the value of t is negligibly small and is treated as 0.

- 43 Due to a lack of diving rate data for many species, availability bias corrections were only conducted on four species: guillemots, razorbills, puffins and harbour porpoise. When considering population estimates calculated for other diving species, it should be noted that population estimates for the survey area are likely to be underestimated.

2.5.3.1 Seabirds

- 44 Using Barlow's method, the proportion of time that an animal was available at the surface was calculated ($\Pr(\text{visible})$) for guillemot and razorbill. Absolute density, corrected for availability, was then obtained by dividing the density of birds observed by $\Pr(\text{visible})$.

- 45 For guillemots and razorbills, data obtained during the breeding season using data loggers were used to estimate availability bias. Thaxter *et al.* (2010) give mean times for these species engaged in flying, feeding and underwater per trip during the chick-rearing period.
- 46 Thus, the proportion of time that guillemots and razorbills are available at the surface ($\text{Pr}(\text{visible})$) was estimated at 0.7595 and 0.8182, respectively.
- 47 For puffins, the results from a study using data loggers reported in Spencer (2012) were used. The results show that puffins spend 14.16% of daylight time underwater. This infers that the proportion of time that puffins were available at the surface ($\text{Pr}(\text{visible})$) was 0.8584.
- 48 The estimates of $\text{Pr}(\text{visible})$ for guillemots, razorbills and puffins were used to correct relative abundance estimates of birds sitting on the sea. These corrected abundance estimates for sitting birds were then added to the abundance estimate of flying birds to give an overall absolute abundance for the species.

2.5.3.2 Marine mammals

- 49 Harbour porpoise abundance is also affected by availability bias, and further complicated because detections of animals are possible while they are submerged. The approach to correct for availability bias for this species applies a correction factor to the density of animals that were recorded surfacing only using data on the surfacing rates from tagged animals.
- 50 Teilmann *et al.*, (2013) provides detailed information which accommodates variation in time of year, geographical location and time of day in the proportion of time spent breaking the surface. All of these metrics relate to model outputs in Teilmann *et al.*, (2013) and are used to refine the predicted amount of time that harbour porpoise spend surfacing in the outputs.
- 51 The tagging study of Teilmann *et al.* (2013) did not extend to the area of Atlantic Ocean surrounding this project, but no other data are available on surfacing behaviour for this species in the relevant area. For our analysis, we therefore assumed that diving behaviour in the survey area was comparable to that of the North Sea data collection area of Teilmann *et al.*, (2013).
- 52 To estimate the density of surfacing harbour porpoise, we first calculated the proportion of animals snapshot surfacing. Snapshot surfacing indicates where the dorsal fin is clear of the water surface in the middle frame of the sequence in which the animal is present. By using the snapshot surfacing detections, we subsample the data to mimic the surfacing behaviour category in Teilmann *et al.*, (2013) which corresponds to periods when the transmitter on the dorsal fin of tagged animals is completely clear of the water. This was done using data from all months combined because sample sizes were too small to be accurate when calculating the surfacing proportions in individual months. We then multiplied the calculated density of all harbour porpoise by the proportion of snapshot surfacing encounters in our surveys to estimate the density of surfacing harbour porpoises. Finally, this was then divided by the proportion surfacing from Teilmann *et al.*, (2013) in Table 1, to derive the estimates of absolute density and abundance.

Table 1 **Correction factors used to account for availability bias for harbour porpoise at different times of the year and at different times of the day (after Teilmann et al., 2013)**

Month	Surface behaviour	
	09:00 – 15:00	15:00 – 21:00
January	0.0490	0.0476
February	0.0398	0.0384
March	0.0543	0.0529
April	0.0646	0.0632
May	0.0563	0.0549
June	0.0518	0.0503
July	0.0493	0.0479
August	0.0530	0.0516
September	0.0420	0.0406
October	0.0413	0.0399
November	0.0406	0.0392
December	0.0429	0.0415

2.5.4 Distribution mapping

- 53 Maps of the distribution of key species only, selected on the basis of their relatively high abundance or their significance at nearby special protected areas (SPA) or special areas of conservation (SAC) were generated using a Watson-Nadaraya type kernel density estimation (KDE) technique (Simonoff, 1996). For diving species (guillemot, razorbill, puffin and harbour porpoise), the KDE mapping represents a relative estimate of density only and does not take account of availability bias.
- 54 In KDE, a small ‘window’ function (the kernel) is used to calculate a local density at each point in the survey area. To evaluate the density at a given point, the kernel is centred on that point and all the observations within the window are summed to obtain a local count. The total area of the transect(s) intersecting the window is then summed to obtain a local measure of effort. By dividing the local count by the local effort, a local density estimate is obtained. To build a density map, the study area is covered with a fine mesh of study points and the density is calculated at each point in the mesh in turn.
- 55 Kernel techniques are robust and not as complex as other density estimation techniques because they have few parameters; as a result, they are arguably the easiest density surface technique to reproduce independently. The only variables are the size and shape of the kernel or window function. For these analyses, we have used a Gaussian window function, which has the advantages of being smooth,

rotationally symmetric and easy to compute. The shape of the Gaussian is determined by a single width parameter; the selection of this parameter is the only variable in the computation of the density maps.

- 56 Rather than set the width parameter arbitrarily, we have used a leave-one-out cross validation method. Cross validation estimates the predictive power of a model by removing some of the data from the data set and using the remainder of the data and the model to predict the values for the data that was removed. The closer the predicted values represent the removed data, the better the model performance and the width parameter used in the model.
- 57 To apply cross validation to the survey area, each transect was subdivided into 500m long segments. To evaluate a particular choice of kernel width, each segment was removed in turn, using the kernel and the remaining data to predict the density of the missing segment and subtract the known value from the prediction to obtain an error score. This process was repeated for every segment and the error scores for all segments were squared and summed to give a total performance score for that particular choice of kernel width. The kernel width was then varied and the process repeated; if the new score was lower than the old, the new kernel width was a better choice than the previous value. An exhaustive search over all kernel widths was then used to identify the best global choice. The result of the process was a smooth density estimate which has been derived without any manual parameter selection. The whole process was repeated from scratch for each map, as different kernel sizes are appropriate for different species.
- 58 It should be noted that several of the KDE maps are effectively 'flat' (i.e., they appear uniform in colour). These correspond to distributions where the density surface as obtained from a small local kernel was not effective at predicting missing data; this can happen with evenly distributed birds but can also happen for very sparse distributions. In the case of sparse distributions, the 'flat' map does not necessarily mean that the true underlying distribution is 'flat'; it could mean that the data doesn't contain enough evidence to determine what the underlying distribution is. It is therefore useful to refer back to the population estimates for the corresponding map when looking at these 'flat' densities; we have also overlaid aggregated observations per 500m segment of transect ("centroid") represented by "dots" at the centroid of each segment to help with interpretation of the maps. In extreme cases, the KDE maps were not included in the results section, and the data presented as dot maps instead.
- 59 For less abundant bird and non-avian species, as well as those identified to group level, distribution is illustrated by dot maps only.

2.5.5 Flight direction of seabirds

Wind rose diagrams were created to present the flying direction of seabirds, where each cardinal point (N, E, S, W) and intercardinal point (NE, SE, SW, NW) indicates the total number of birds recorded flying in that direction in a given survey.

3 Results

3.1 Survey effort

60 The date, number of transects and survey effort (i.e., length of transects) undertaken between October 2021 and September 2023 are shown in Table 2. The number of transects and the total length of transects are those used in subsequent analysis (see Figure 2 to Figure 5 for the aircraft flight pattern). Variation in presentation of track data is due to differing GPS records in the equipment, frequency of the GPS records can occasionally vary for the flight pattern. This does not affect location data for the observations recorded.

61 The same transect lines were used for each survey, although effort may have differed slightly between surveys. This can be caused by minor differences in the start and stop times for transects and minor deviations of the aircraft from the transect line.

Table 2 Survey effort across the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023 inclusive

Survey date	Survey number	Number of transects analysed	Total length of transects analysed (km)	Area covered (km ²)	Area covered (%)
28 October 2021	1	32	546.11	136.53	14.41%
27 November 2021	2	32	547.37	136.84	14.45%
10 December 2021	3	32	545.75	136.44	14.40%
21 January 2022	4	32	561.00	140.25	14.81%
01 March 2022	5	32	551.47	137.87	14.56%
19 March 2022	6	32	549.35	137.34	14.50%
01 April 2022	7	32	550.47	137.62	14.53%
27 May 2022	8	32	547.33	136.83	14.45%
18 June 2022	9	32	546.05	136.51	14.41%
11 July 2022	10	32	549.07	137.27	14.49%
06 August 2022	11	32	551.58	137.90	14.56%
01 September 2022	12	32	550.23	135.06	14.26%
17 October 2022	13	32	550.82	137.70	14.54%
29 November 2022	14	32	544.64	136.16	14.38%
22 December 2022	15	32	543.90	135.98	14.36%
19 January 2023	16	32	550.68	137.67	14.53%
09 February 2023	17	32	549.98	137.50	14.52%
04 March 2023	18	32	547.18	136.80	14.44%

Survey date	Survey number	Number of transects analysed	Total length of transects analysed (km)	Area covered (km ²)	Area covered (%)
18 April 2023	19	32	539.82	134.95	14.25%
02 May 2023	20	32	547.21	136.31	14.39%
03 June 2023	21	32	542.71	135.36	14.29%
19 July 2023	22	32	547.12	136.54	14.42%
17 August 2023	23	32	551.43	137.50	14.52%
16 September 2023	24	32	544.74	133.27	14.07%

Figure 2 Flight pattern for surveys flown between October 2021 and March 2022 over the Fuinneamh Sceirde Teoranta survey area

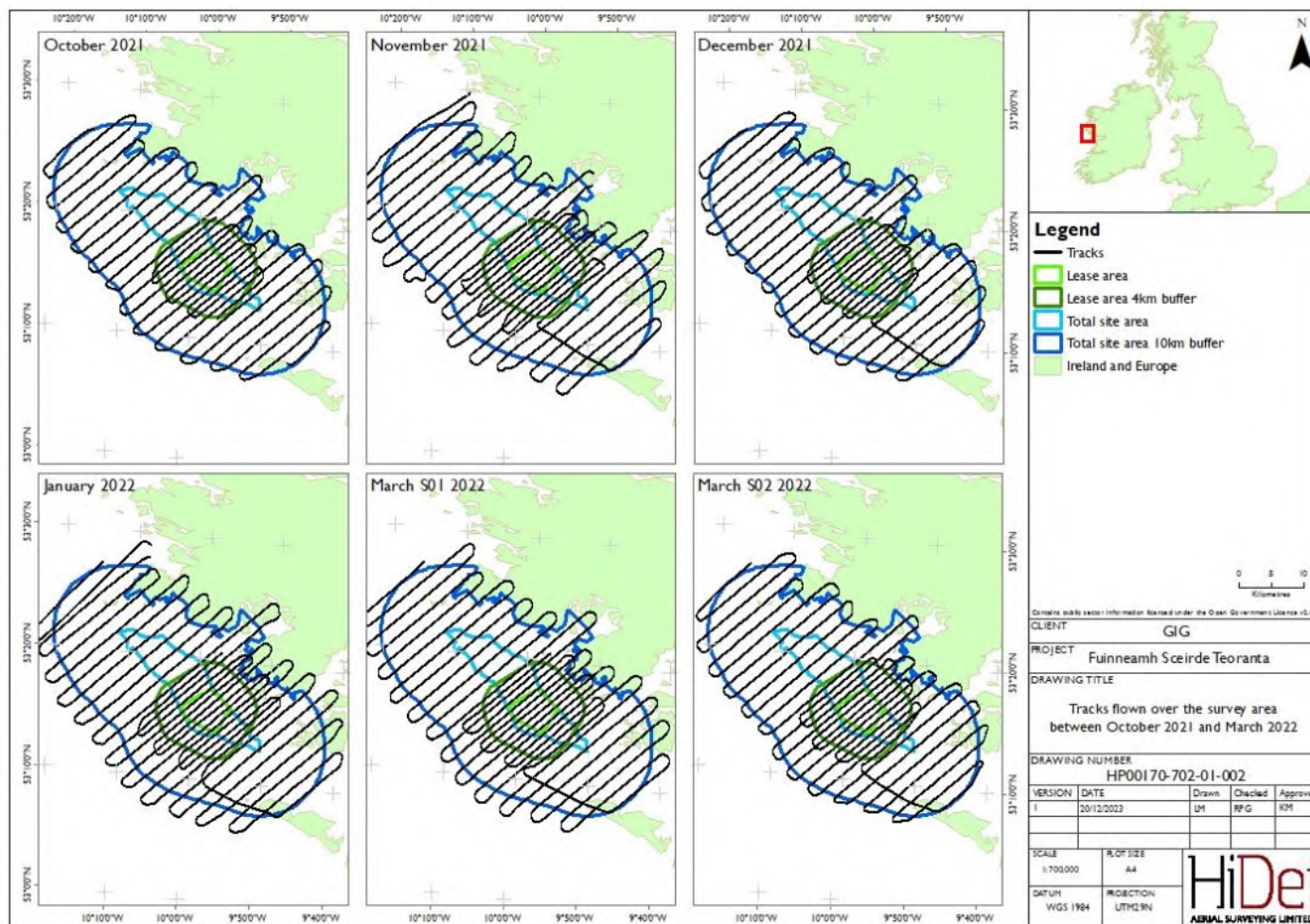


Figure 3 Flight pattern for surveys flown between April and September 2022 over the Fuinneamh Sceirde Teoranta survey area

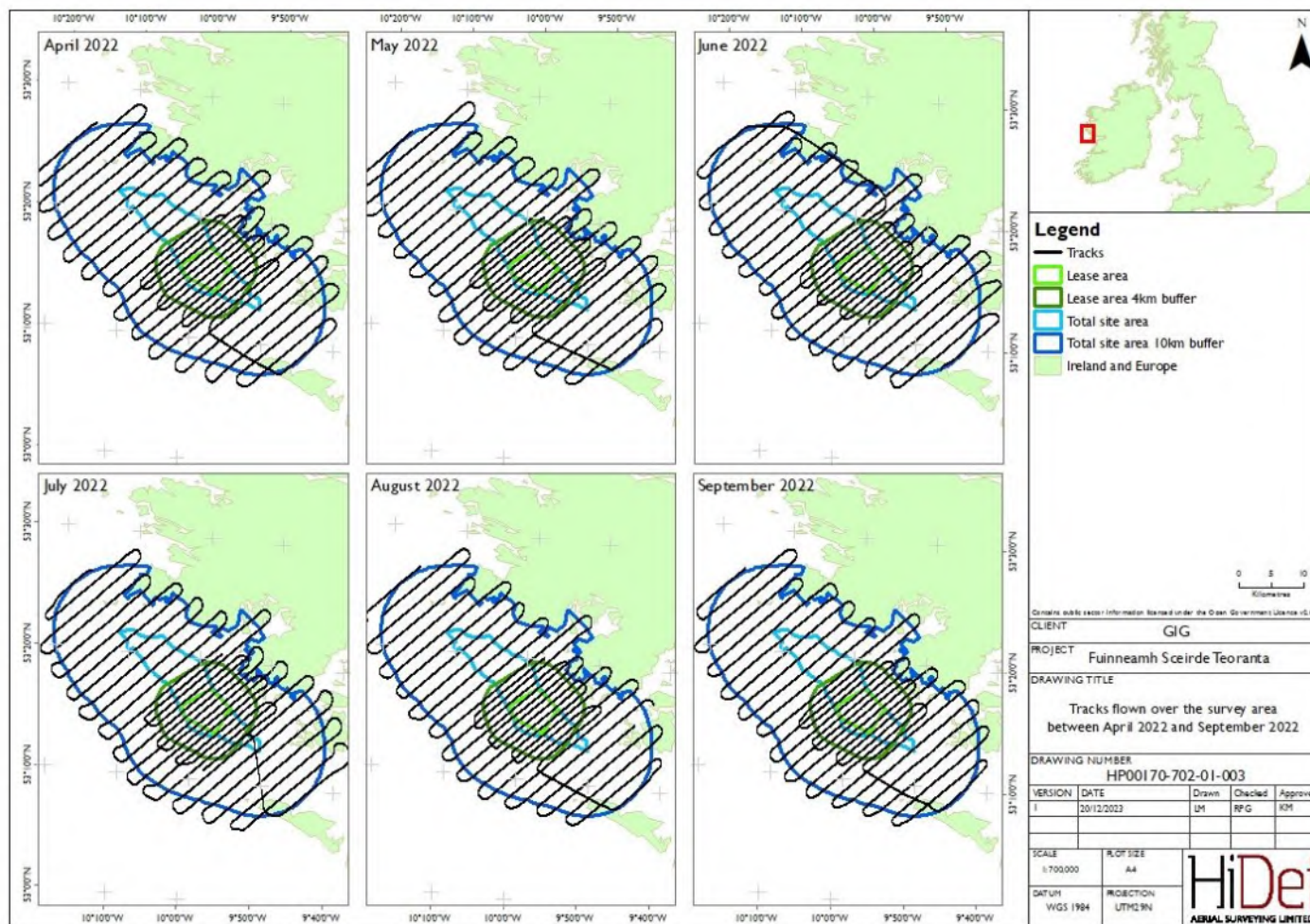


Figure 4 Flight pattern for surveys flown between October 2022 and March 2023 over the Fuinneamh Sceirde Teoranta survey area

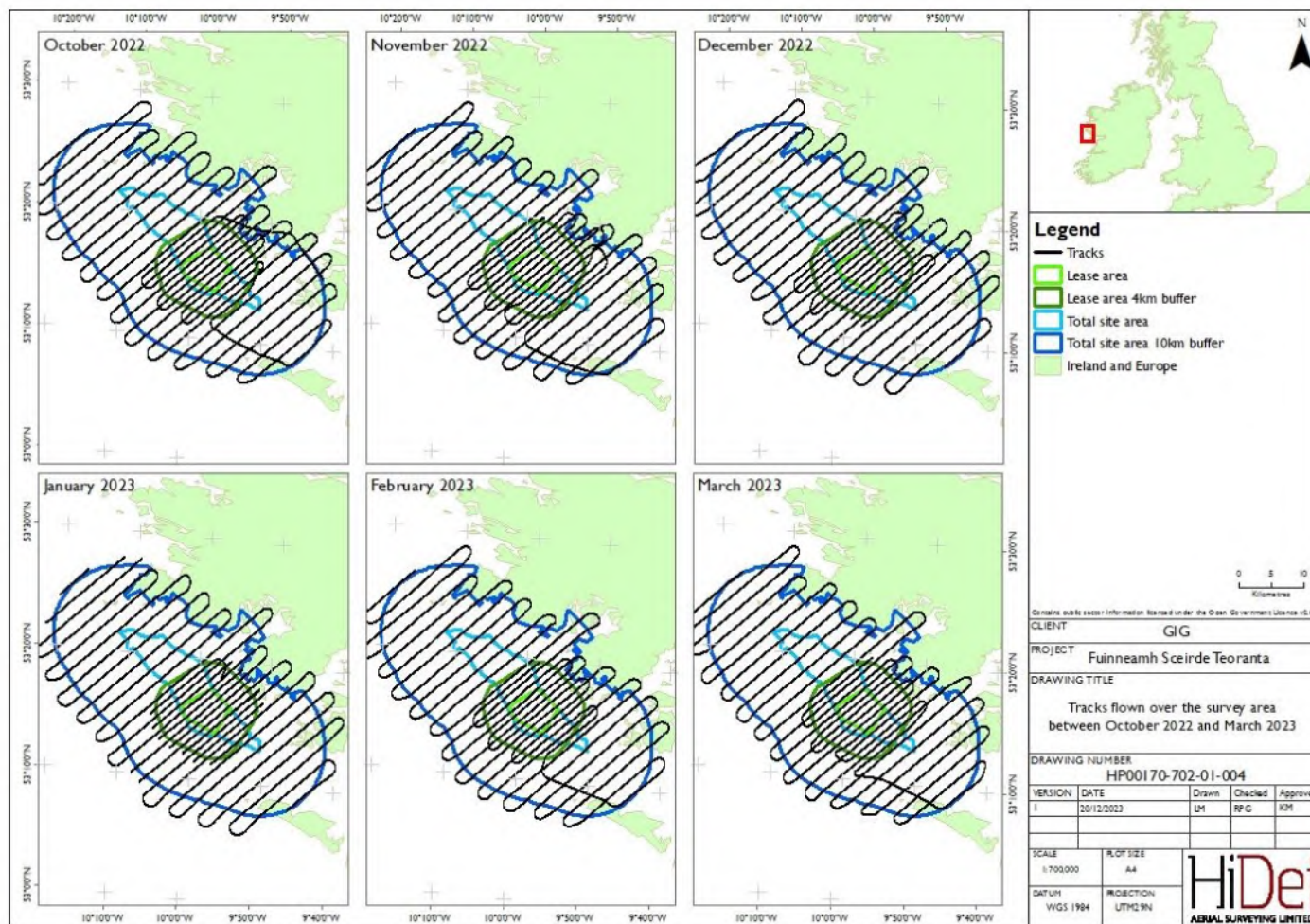
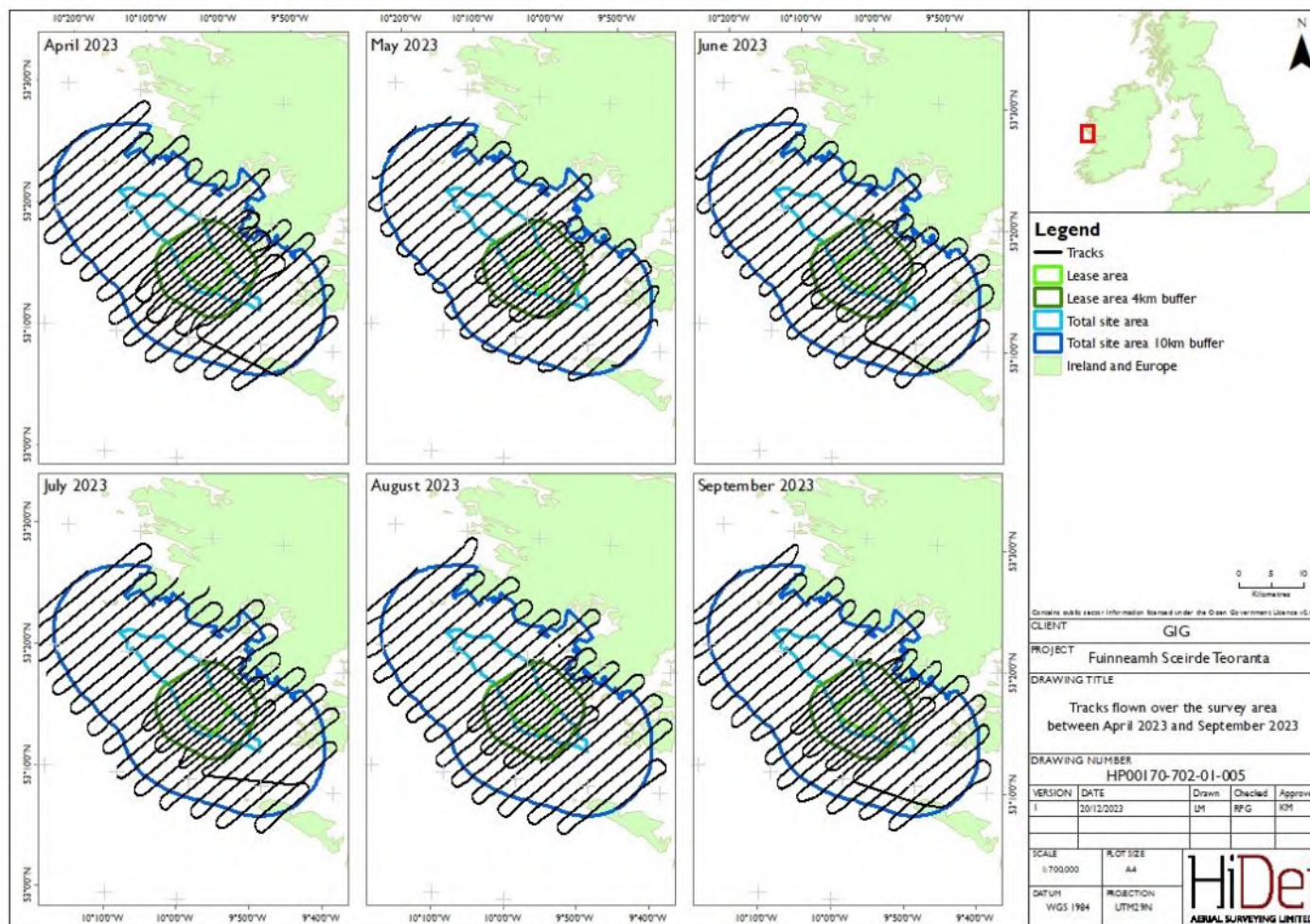


Figure 5 Flight pattern for surveys flown between April and September 2023 over the Fuinneamh Sceirde Teoranta survey area



3.2 Survey results

- 62 Each animal was assigned to a species group, and where possible these were also assigned a species identification with confidence levels of 'Possible', 'Probable' or 'Definite'. Any animals that could not be identified to species level were assigned to a category 'No ID'. The analysis of data to species level uses all levels of identification confidence. The overall identification rate of birds to species level (not including 'No ID's) for the 24 surveys are given in Table 3. In the table, 'marine megafauna' relates to pinnipeds, cetaceans and shark species.
- 63 The total number of objects detected in each survey flight, as well as numbers of species and species groups are presented in Table 4 to Table 7.
- 64 Dead animals were recorded during the survey period. These are excluded from the numbers present in Table 4 and Table 7, but are mentioned in the relevant species sections if observed.

Table 3 Fuinneamh Sceirde Teoranta survey identification rates between October 2021 and September 2023 inclusive

Survey date	Avian animals ID rate (%)	Marine megafauna ID rates (%)	Other non-avian species ID rates (%)
28 October 2021	96.65	66.67	-
27 November 2021	93.06	83.33	-
10 December 2021	96.19	88.89	-
21 January 2022	94.76	74.07	-
01 March 2022	97.84	42.86	-
19 March 2022	98.44	96.30	-
01 April 2022	97.08	69.23	-
27 May 2022	98.04	82.76	-
18 June 2022	91.55	68.00	-
11 July 2022	96.72	82.98	100.00
06 August 2022	96.45	84.09	100.00
01 September 2022	95.29	81.63	100.00
17 October 2022	94.70	91.67	-
29 November 2022	96.98	94.74	-
22 December 2022	93.71	75.00	-
19 January 2023	92.18	76.47	-
09 February 2023	97.84	22.22	0.00
04 March 2023	95.50	62.96	-
18 April 2023	93.90	50.00	-

Survey date	Avian animals ID rate (%)	Marine megafauna ID rates (%)	Other non-avian species ID rates (%)
02 May 2023	97.70	92.86	0.00
03 June 2023	97.60	71.88	100.00
19 July 2023	94.42	89.47	100.00
17 August 2023	98.68	77.27	100.00
16 September 2023	96.58	84.62	100.00
Average	96.55	80.45	95.45

Table 4 Number of objects detected during each survey assigned to species level in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2022. Survey dates presented in Table 3

Species	Scientific name	Month												Total
		Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Brent goose	<i>Branta bernicla</i>	0	0	1	2	0	1	0	0	0	0	0	0	4
Barnacle goose	<i>Branta leucopsis</i>	0	614	13	21	65	0	0	0	0	0	0	0	713
Mute swan	<i>Cygnus olor</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Shelduck	<i>Tadorna tadorna</i>	0	0	0	2	5	1	6	4	0	0	0	0	18
Wigeon	<i>Mareca penelope</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	<i>Anas platyrhynchos</i>	0	0	27	0	0	0	0	2	0	0	0	0	29
Teal	<i>Anas crecca</i>	0	0	17	0	8	0	0	0	0	0	0	0	25
Eider	<i>Somateria mollissima</i>	0	10	0	0	28	0	12	0	0	0	0	0	50
Red-breasted merganser	<i>Mergus serrator</i>	5	4	4	4	10	2	0	1	0	0	0	0	30
Feral pigeon	<i>Columba livia domestica</i>	0	0	0	0	0	0	0	0	0	0	0	1	1
Oystercatcher	<i>Haematopus ostralegus</i>	11	2	6	1	5	0	2	0	0	0	0	1	28
Golden plover	<i>Pluvialis apricaria</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Whimbrel	<i>Numenius phaeopus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0

Species	Scientific name	Month												Total
		Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Curlew	<i>Numenius arquata</i>	5	2	4	1	5	1	2	0	0	1	2	0	23
Bar-tailed godwit	<i>Limosa lapponica</i>	0	2	0	2	0	0	0	0	0	0	0	0	4
Turnstone	<i>Arenaria interpres</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Knot	<i>Calidris canutus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	79	74	83	53	137	61	16	46	68	119	19	9	764
Black-headed gull	<i>Chroicocephalus ridibundus</i>	26	12	5	5	0	13	0	0	2	9	2	1	75
Little gull	<i>Hydrocoloeus minutus</i>	0	0	0	0	0	0	0	0	0	0	0	2	2
Common gull	<i>Larus canus</i>	10	68	29	39	21	14	15	11	10	13	14	11	255
Great black-backed gull	<i>Larus marinus</i>	12	8	13	13	30	9	4	10	10	39	17	12	177
Herring gull	<i>Larus argentatus</i>	19	142	32	67	46	7	7	35	23	96	44	27	545
Lesser black-backed gull	<i>Larus fuscus</i>	1	5	0	0	0	9	1	11	7	41	15	6	96
Sandwich tern	<i>Thalasseus sandvicensis</i>	0	0	0	0	0	0	2	9	5	17	4	5	42
Little tern	<i>Sternula albifrons</i>	0	0	0	0	0	0	0	1	0	1	0	0	2
Common tern	<i>Sterna hirundo</i>	0	0	0	0	0	0	0	13	22	42	9	28	114
Arctic tern	<i>Sterna paradisaea</i>	0	0	0	0	0	0	0	9	11	24	16	0	60

Species	Scientific name	Month												Total
		Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Great skua	<i>Stercorarius skua</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Guillemot	<i>Uria aalge</i>	775	351	34	85	243	422	642	694	251	2716	2329	1467	10009
Razorbill	<i>Alca torda</i>	30	160	10	20	90	36	5	5	1	246	16	29	648
Black guillemot	<i>Cephus grylle</i>	8	8	3	36	8	10	1	0	1	3	1	5	84
Puffin	<i>Fratercula arctica</i>	19	1	0	0	0	1	5	108	24	7	20	16	201
Red-throated diver	<i>Gavia stellata</i>	11	20	13	6	20	10	4	1	2	0	0	4	91
Black-throated diver	<i>Gavia arctica</i>	0	0	0	1	0	0	0	0	0	0	0	0	1
Great northern diver	<i>Gavia immer</i>	14	4	2	47	35	34	49	11	0	0	0	0	196
European storm petrel	<i>Hydrobates pelagicus</i>	0	0	0	0	0	0	0	4	0	15	11	2	32
Fulmar	<i>Fulmarus glacialis</i>	5	9	72	1	0	33	4	33	26	21	27	8	239
Cory's shearwater	<i>Calonectris borealis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Sooty shearwater	<i>Ardena grisea</i>	0	0	0	0	0	0	0	0	0	0	3	0	3
Great shearwater	<i>Ardena gravis</i>	0	0	0	0	0	0	0	0	0	2	0	0	2
Manx shearwater	<i>Puffinus puffinus</i>	2	0	0	0	5	260	367	6458	345	2455	1405	243	11540
Gannet	<i>Morus bassanus</i>	56	75	1	1	8	4	13	14	16	7	2	17	214
Cormorant	<i>Phalacrocorax carbo</i>	0	0	0	0	0	2	1	2	1	0	3	1	10
Shag	<i>Gulosus aristotelis</i>	9	23	8	6	47	14	6	7	7	20	6	5	158

Species	Scientific name	Month												Total
		Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Grey heron	<i>Ardea cinerea</i>	1	1	0	3	0	1	1	0	2	0	0	1	10
Little egret	<i>Egretta garzetta</i>	0	0	0	0	0	0	0	1	0	0	0	1	2
Hooded crow	<i>Corvus cornix</i>	0	0	2	0	0	0	0	0	0	0	0	0	2
Lion's mane jellyfish	<i>Cyanea capillata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Basking shark	<i>Cetorhinus maximus</i>	0	0	0	0	0	0	1	0	0	0	1	0	2
Blue shark	<i>Prionace glauca</i>	0	0	0	0	0	0	0	0	0	0	0	7	7
Bluefin tuna	<i>Thunnus thynnus</i>	0	0	0	0	0	0	0	0	0	0	0	14	14
Ocean sunfish	<i>Mola mola</i>	0	0	0	0	0	0	0	0	0	9	7	1	17
Grey seal	<i>Halichoerus grypus</i>	1	0	0	18	2	52	0	0	0	0	1	0	74
Harbour seal	<i>Phoca vitulina</i>	5	0	3	0	0	0	0	2	1	9	10	0	30
Common dolphin	<i>Delphinus delphis</i>	0	4	5	2	3	0	3	21	16	27	25	33	139
Bottlenose dolphin	<i>Tursiops truncatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Harbour porpoise	<i>Phocoena phocoena</i>	0	1	0	0	1	0	5	1	0	3	0	0	11
Total		1104	1600	387	436	822	997	1174	7514	851	5942	4009	1957	26793

Table 5 Number of objects with no species ID detected during each survey assigned to species group in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2022. Survey dates presented in Table 3

Species group (No ID)	Month												Total
	Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Wader species	0	26	0	3	0	0	0	0	1	1	0	15	46
Small gull species	7	19	3	0	1	0	1	1	1	8	2	4	47
Black-backed gull species	0	0	0	0	0	0	0	0	1	0	0	0	1
Large gull species	0	6	0	0	0	0	1	0	0	1	8	2	18
Gull species	0	12	0	2	0	1	1	3	0	4	4	7	34
Arctic / common tern	0	0	0	0	0	0	0	17	19	41	26	15	118
Tern species	0	0	0	0	0	0	0	3	4	8	3	2	20
Tern / small gull	0	0	0	0	0	0	0	2	0	1	0	2	5
Large auk	16	18	5	2	8	0	4	10	12	20	29	26	150
Auk species	10	17	2	10	8	3	5	26	8	37	6	2	134
Auk / small gull	2	12	1	0	1	1	8	0	1	1	2	3	32
Large auk / diver species	0	2	0	0	0	0	0	0	0	0	0	0	2
Auk / shearwater species	2	0	0	0	0	10	12	84	27	74	61	15	285
Diver species	1	2	4	5	0	0	2	1	0	0	0	1	16
Fulmar / gull species	0	5	0	1	0	0	1	2	1	3	1	0	14
Great / Cory's shearwater	0	0	0	0	0	0	0	0	0	0	0	0	0

Species group (No ID)	Month												Total
	Oct-21	Nov-21	Dec-21	Jan-22	Mar-S01-22	Mar-S02-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	
Shearwater species	0	0	0	0	0	0	0	1	1	0	1	0	3
Cormorant / shag	0	0	0	0	0	0	0	0	0	0	0	0	0
Bird species	0	0	0	0	0	0	0	0	1	1	3	0	5
Jellyfish	0	0	0	0	0	0	0	0	0	0	0	0	0
Fish species	0	0	0	0	0	0	0	0	0	0	0	0	0
Seal species	3	1	1	7	8	2	4	5	8	7	7	9	62
Cetacean species	0	0	0	0	0	0	0	0	0	1	0	0	1
Seal / small cetacean species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	41	120	16	30	26	17	39	155	85	208	153	103	993

Table 6 Number of objects detected during each survey assigned to species level in the Fuinneamh Sceirde Teoranta survey area between October 2022 and September 2023 Survey dates presented in Table 3

Species	Scientific name	Month												Total
		Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Brent goose	<i>Branta bernicla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Barnacle goose	<i>Branta leucopsis</i>	0	0	202	0	135	0	0	0	0	0	0	0	337
Mute swan	<i>Cygnus olor</i>	0	0	0	0	0	1	0	0	0	0	0	0	1
Shelduck	<i>Tadorna tadorna</i>	0	0	0	0	2	2	4	0	1	0	0	0	9
Wigeon	<i>Mareca penelope</i>	0	0	0	4	0	0	0	0	0	0	0	0	4
Mallard	<i>Anas platyrhynchos</i>	0	6	4	0	0	2	0	1	3	0	0	0	16
Teal	<i>Anas crecca</i>	0	0	2	0	0	0	0	0	0	0	0	0	2
Eider	<i>Somateria mollissima</i>	0	7	9	5	0	26	7	0	0	0	0	0	54
Red-breasted merganser	<i>Mergus serrator</i>	0	4	2	0	3	2	0	0	0	0	0	0	11
Feral pigeon	<i>Columba livia domestica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	<i>Haematopus ostralegus</i>	2	2	2	1	0	35	2	2	2	75	5	1	129
Golden plover	<i>Pluvialis apricaria</i>	0	0	0	0	0	0	7	0	0	0	0	0	7
Whimbrel	<i>Numenius phaeopus</i>	0	0	0	0	0	0	11	25	0	0	0	0	36
Curlew	<i>Numenius arquata</i>	0	2	1	5	1	2	2	0	1	5	4	4	27

Species	Scientific name	Month												Total
		Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Bar-tailed godwit	<i>Limosa lapponica</i>	0	0	0	0	0	0	0	0	0	0	2	4	6
Turnstone	<i>Arenaria interpres</i>	0	0	0	0	0	3	0	0	0	0	0	0	3
Knot	<i>Calidris canutus</i>	0	0	0	0	0	0	0	0	0	0	0	13	13
Kittiwake	<i>Rissa tridactyla</i>	94	110	50	71	208	40	215	82	44	134	20	21	1089
Black-headed gull	<i>Chroicocephalus ridibundus</i>	0	0	2	2	7	2	0	0	0	1	3	1	18
Little gull	<i>Hydrocoloeus minutus</i>	0	0	0	0	0	0	1	0	0	4	0	0	5
Common gull	<i>Larus canus</i>	8	7	17	26	15	20	24	9	22	11	9	2	170
Great black-backed gull	<i>Larus marinus</i>	12	12	13	12	13	6	8	35	30	8	3	10	162
Herring gull	<i>Larus argentatus</i>	41	22	45	16	20	12	66	36	63	41	27	15	404
Lesser black-backed gull	<i>Larus fuscus</i>	0	0	0	0	0	0	16	28	50	6	5	2	107
Sandwich tern	<i>Thalasseus sandvicensis</i>	0	0	0	0	0	0	8	0	2	8	14	0	32
Little tern	<i>Sternula albifrons</i>	0	0	0	0	0	0	0	4	0	14	0	0	18
Common tern	<i>Sterna hirundo</i>	0	0	0	0	0	0	3	7	4	61	27	0	102
Arctic tern	<i>Sterna paradisaea</i>	1	0	0	0	0	0	0	44	9	48	0	0	102
Great skua	<i>Stercorarius skua</i>	0	0	0	0	0	0	1	0	0	0	3	0	4
Guillemot	<i>Uria aalge</i>	675	60	184	274	194	109	412	2118	1918	343	479	113	6879

Species	Scientific name	Month												Total
		Oct-22	Nov-22	Dec-22	Jan-23	Feb 23	Mar 23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Razorbill	<i>Alca torda</i>	4	165	170	98	83	24	29	122	40	3	17	12	767
Black guillemot	<i>Cephus grylle</i>	4	7	3	14	70	28	2	57	1	0	0	6	192
Puffin	<i>Fratercula arctica</i>	0	0	0	0	0	0	7	18	29	212	4	14	284
Red-throated diver	<i>Gavia stellata</i>	1	0	0	1	0	0	2	0	0	0	0	0	4
Black-throated diver	<i>Gavia arctica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Great northern diver	<i>Gavia immer</i>	2	13	54	45	71	72	57	54	3	0	0	0	371
European storm petrel	<i>Hydrobates pelagicus</i>	0	0	0	0	0	0	0	11	3	1	6	0	21
Fulmar	<i>Fulmarus glacialis</i>	3	0	4	0	21	1	8	12	9	8	31	2	99
Cory's shearwater	<i>Calonectris borealis</i>	0	0	0	0	0	0	0	0	0	0	777	0	777
Sooty shearwater	<i>Ardenna grisea</i>	0	0	0	0	0	0	0	0	0	0	7	0	7
Great shearwater	<i>Ardenna gravis</i>	0	0	0	0	0	0	0	0	0	0	146	0	146
Manx shearwater	<i>Puffinus puffinus</i>	1	0	0	1	0	1	135	3696	1924	957	869	5	7589
Gannet	<i>Morus bassanus</i>	33	10	7	1	6	5	6	29	21	1	69	16	204
Cormorant	<i>Phalacrocorax carbo</i>	0	0	2	2	4	0	1	2	7	1	0	1	20
Shag	<i>Gulosus aristotelis</i>	9	18	25	46	48	7	11	9	5	18	8	7	211
Grey heron	<i>Ardea cinerea</i>	0	3	7	0	2	3	1	0	0	1	2	2	21
Little egret	<i>Egretta garzetta</i>	3	1	0	1	3	0	0	0	0	0	3	3	14
Hooded crow	<i>Corvus cornix</i>	0	0	0	0	0	0	0	0	0	0	0	0	0

Species	Scientific name	Month												Total
		Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Lion's mane jellyfish	<i>Cyanea capillata</i>	0	0	0	0	0	0	0	0	1	0	0	0	1
Basking shark	<i>Cetorhinus maximus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue shark	<i>Prionace glauca</i>	0	0	0	0	0	0	0	0	0	0	0	0	0
Bluefin tuna	<i>Thunnus thynnus</i>	0	0	0	0	0	0	0	0	0	2	0	0	2
Ocean sunfish	<i>Mola mola</i>	0	0	0	0	0	0	0	0	0	2	5	1	8
Grey seal	<i>Halichoerus grypus</i>	0	44	2	0	1	2	0	0	3	2	8	10	72
Harbour seal	<i>Phoca vitulina</i>	22	12	8	16	0	5	0	0	0	0	0	0	63
Common dolphin	<i>Delphinus delphis</i>	0	15	19	6	3	1	0	51	17	15	26	0	153
Bottlenose dolphin	<i>Tursiops truncatus</i>	0	0	0	0	0	9	0	1	0	0	0	0	10
Harbour porpoise	<i>Phocoena phocoena</i>	0	1	1	4	0	0	1	0	3	0	0	1	11
Total		915	521	835	651	910	420	1047	6453	4215	1982	2579	266	20794

Table 7 Number of objects with no species ID detected during each survey assigned to species group in the Fuinneamh Sceirde Teoranta survey area between October 2022 and September 2023. Survey dates presented in Table 3

Species group (No ID)	Month												Total
	Oct-22	Nov-22	Dec-22	Jan-23	Feb 23	Mar 23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Wader species	8	5	0	0	7	0	12	1	0	1	9	0	43
Small gull species	3	1	0	6	4	4	6	0	8	0	4	0	36
Black-backed gull species	0	0	0	0	0	0	0	0	0	0	0	0	0
Large gull species	2	2	0	0	0	0	1	0	4	0	0	0	9
Gull species	6	1	4	3	1	0	2	0	3	0	0	0	20
Arctic / common tern	0	0	0	0	0	0	4	37	9	37	1	0	88
Tern species	0	0	0	0	0	0	0	1	1	0	0	0	2
Tern / small gull	0	0	0	0	0	0	2	0	0	1	0	1	4
Large auk	23	4	16	25	4	1	9	24	15	2	2	2	127
Auk species	3	1	29	9	1	14	13	19	19	26	4	4	142
Auk / small gull	4	0	0	1	0	0	1	0	0	0	0	0	6
Large auk / diver species	0	0	0	1	0	0	0	0	0	0	0	0	1
Auk / shearwater species	0	0	0	0	0	0	16	66	42	46	2	0	172
Diver species	0	0	4	4	3	0	0	3	1	0	0	0	15
Fulmar / gull species	0	0	1	3	0	0	2	0	1	1	0	1	9
Great / Cory's shearwater	0	0	0	0	0	0	0	0	0	0	12	0	12
Shearwater species	0	0	0	0	0	0	0	0	0	1	0	0	1

Species group (No ID)	Month												Total
	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	
Cormorant / shag	0	0	2	0	0	0	0	0	0	1	0	1	4
Bird species	1	0	0	1	0	0	0	0	0	0	0	0	2
Jellyfish	0	0	0	0	0	0	0	1	0	0	0	0	1
Fish species	0	0	0	0	1	0	0	0	0	0	0	0	1
Seal species	1	4	8	8	14	10	1	4	9	2	10	2	73
Cetacean species	1	0	0	0	0	0	0	0	0	0	0	0	1
Seal / small cetacean species	0	0	1	0	0	0	0	0	0	0	0	0	1
Total	52	18	65	61	35	29	69	156	112	118	44	11	770

3.3 Distribution patterns

- 65 The density, total estimated population and upper and lower 95% CLs are presented for key species only in this section. Estimates, including standard deviation and CV, for all species and species groups are presented in Appendix I: Density and population estimates. An explanation of these parameters is presented in Table 8.
- 66 For certain diving species (guillemot, razorbill, puffin and harbour porpoise), density and abundance estimates were adjusted to account for availability bias (Section 2.5.3). This adjusted (absolute) density and abundances provide the best estimates at the time of survey. No calculation of availability bias was carried out for any other diving species (e.g., northern gannet (hereafter referred to as gannet, *Morus bassanus*) and shag) due to a lack of information on dive times, and so estimates for such species should be considered low. Absolute density and abundance estimates for the relevant key species are presented within this result section, alongside the corresponding relative estimates.
- 67 Distribution patterns of the most abundant species are presented as density maps, in which a density surface depicts the estimated number of animals per km². Distributions of less abundant species, unidentified species and anthropogenic activity are presented as dot maps only.

Table 8 Terms used in population analysis

Term	Definition
Density estimate (<i>animals/km²</i>)	The average number of animals per square km surveyed over the whole area.
Population estimate (<i>number</i>)	The mean number of animals estimated within the survey area.
95% confidence interval (<i>CI</i>)	A measure of uncertainty in the mean value. If the analysis was repeated, 95% of the time the mean population estimate would fall within this range. The smaller the CI range the more confident we can be that the mean estimate is an accurate reflection of the true population size.
Confidence limit (<i>CL</i>)	The upper and lower values that define the range of the 95% confidence interval.
Standard deviation (<i>SD</i>) of population estimate	The amount of variation or dispersion of a set of values. A low SD indicates that the range of bootstrap values tend to be close to the mean of the set.
CV (%)	The coefficient of variation is a standard measure that describes the dispersion of data points around the mean. The lower the CV the more precise the estimate. This term is used interchangeably in scientific literature to define the standard deviation divided by the mean or the standard error (standard deviation of the sample means) divided by the mean. Given that both metrics are potentially relevant within an offshore survey and analysis setting, we use the terms "CV _σ " and "CV _{SE} " to define coefficients of variation applied to standard deviations and standard errors respectively.
Relative abundance	In the case of diving birds and mammals, this is the estimated population size based on animals recorded on or above the sea surface and does not account for any that may be diving and thus submerged at the time of survey.
Absolute abundance	The most accurate estimate of population size. In the case of diving birds and mammals, this includes an estimate for the number that are believed to be submerged at the time of survey.

3.3.1 All bird species

- 68 The total number of birds recorded across the Fuinneamh Sceirde Teoranta survey area is presented in Figure 6, whilst the distributions and densities of birds throughout the survey period are presented in Figure 7 to Figure 10.
- 69 The total number of birds varied between surveys, with the highest numbers recorded in May 2022, and the lowest observed in September 2023. Low numbers of birds were also recorded in December 2021, November 2022 and March 2023.
- 70 A total of five dead birds were observed over the whole survey period, one gannet in September 2022 and four unidentified bird species including one large auk species, one gull species and two small gull species in June, July and August 2023 respectively.
- 71 Birds were found in high densities across the survey area, such as in July 2022, May 2023 and August 2023 (Figure 7 to Figure 10). Many birds were distributed to the north-east and south-west of the survey area across the 24-month period.

Figure 6 Total number of birds recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

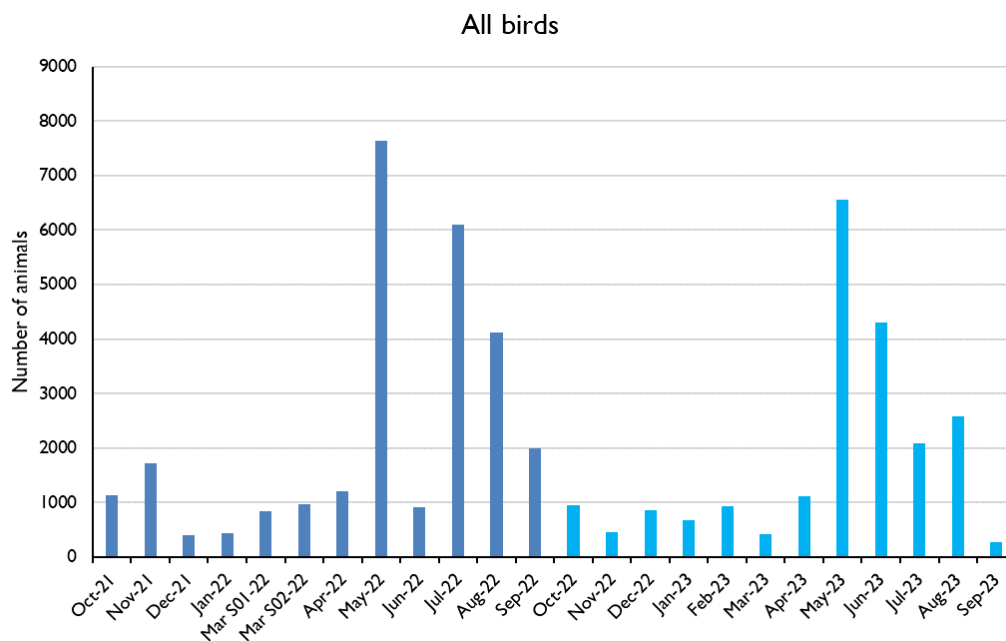


Figure 7 Density of all birds (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

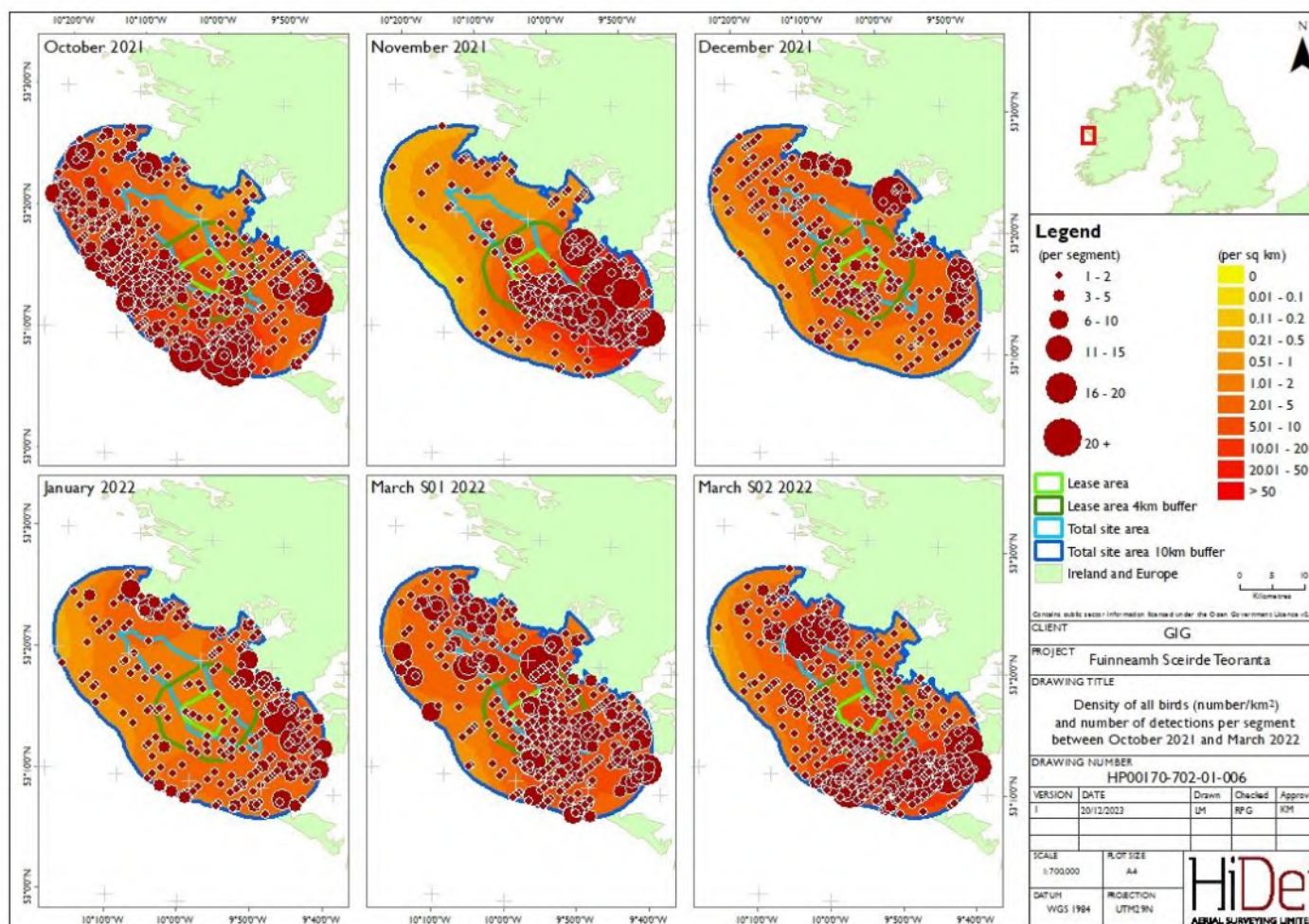


Figure 8 Density of all birds (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

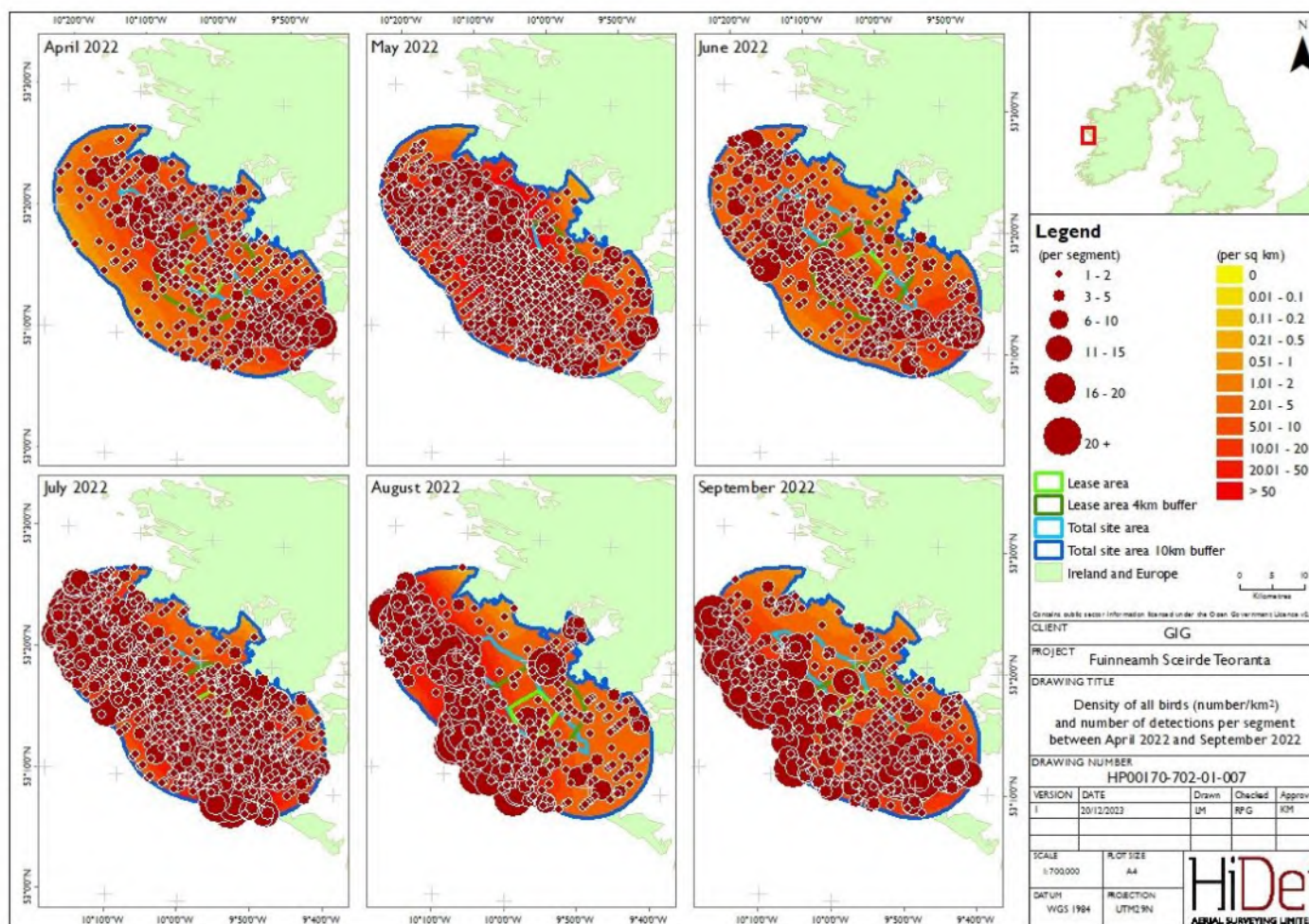


Figure 9 Density of all birds (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

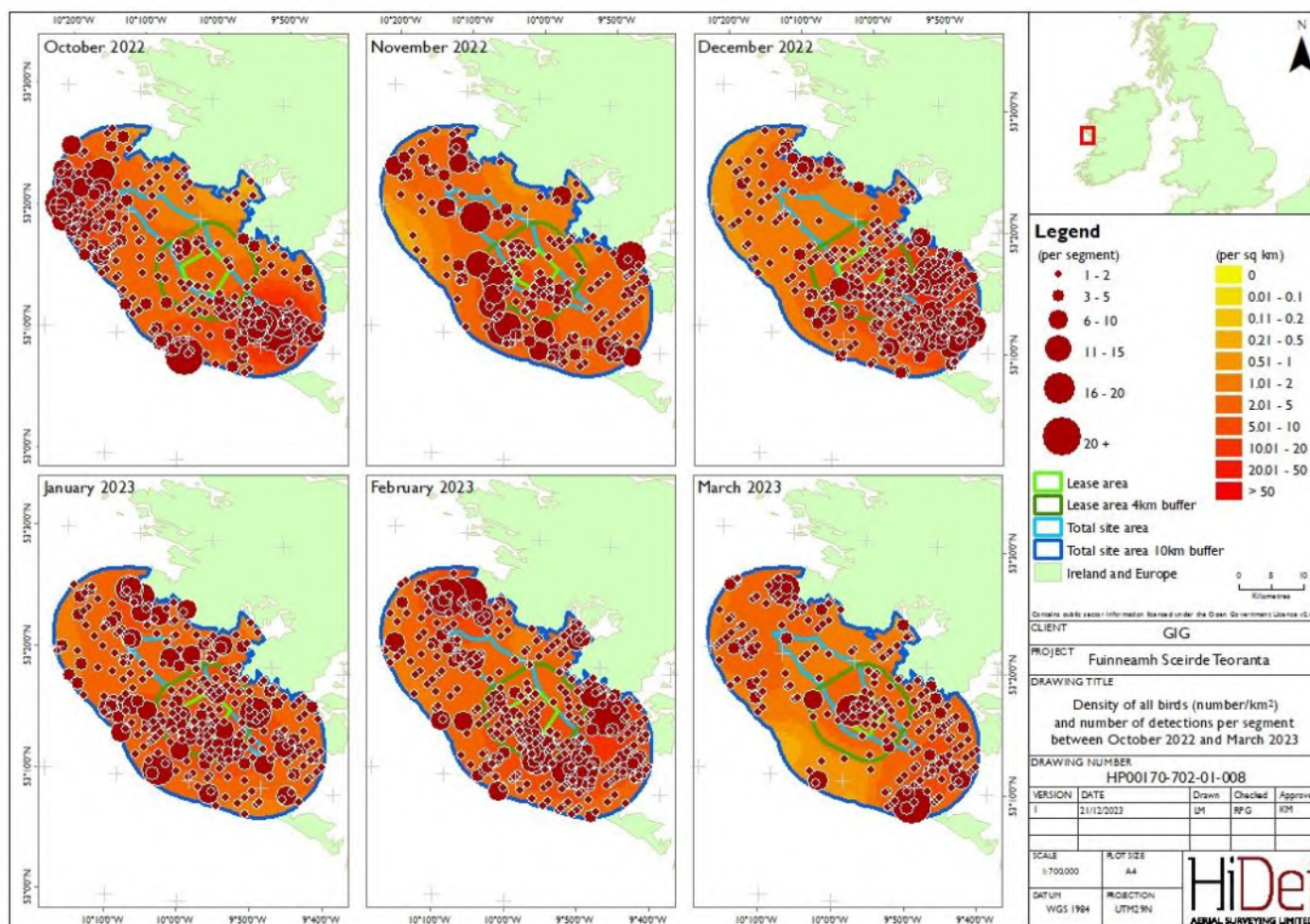
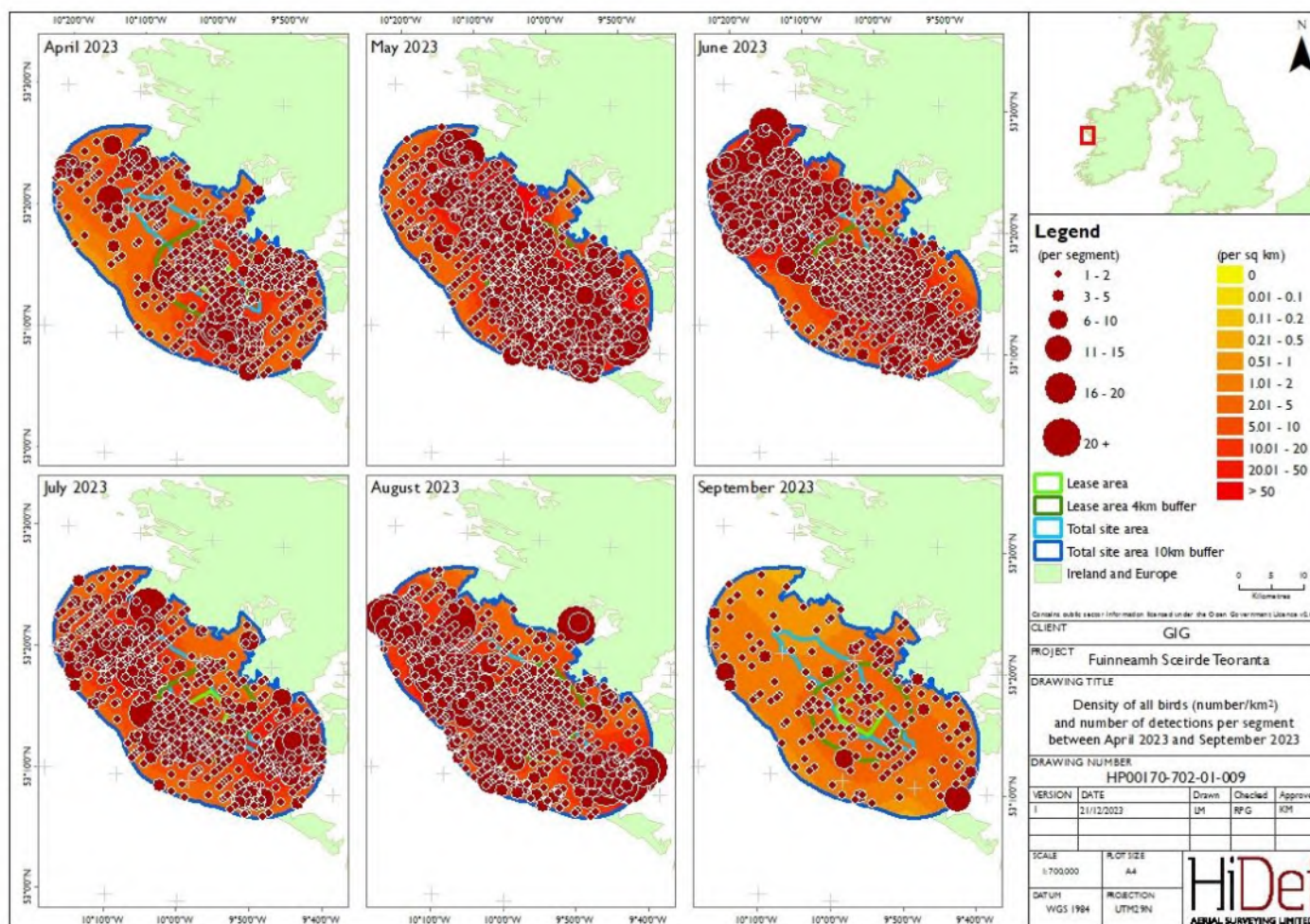


Figure 10 Density of all birds (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.2 Barnacle goose

- 72 Barnacle geese were recorded in 6 of the monthly surveys ranging from 624 observations in November 2022 to 13 observations in December 2022. In total, there were 1,050 records throughout the survey (
- 73 Figure 11).
- 74 Density estimates for the species ranged between 0.11 birds/km² (95% CI 0.00 – 0.34) in December 2021 and 5.47 birds/km² (95% CI 0.00 – 15.84) in November 2021 (Figure 12 and Table 9), equating to 105 birds (95% CI 0 – 317) and 5,161 birds (95% CI 0 – 14,950) respectively.
- 75 Barnacle geese were found mainly in the low intensity area, with higher densities generally observed towards the east and north, such as in November 2021 and January 2022 (Figure 13). In December 2022 and February 2023, the distribution of birds was recorded in the east (Figure 14). There were no observations between April and September 2022 and 2023, as such, no maps have been presented.
- 76 Over the survey period, 100% of birds were recorded flying (Table 10).
- 77 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 15). In November 2021, when numbers peaked, birds were mainly heading in south-westerly directions, while in December 2022 and February 2023 birds were mainly flying north-east and north-west respectively.

Figure 11 Number of barnacle geese recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

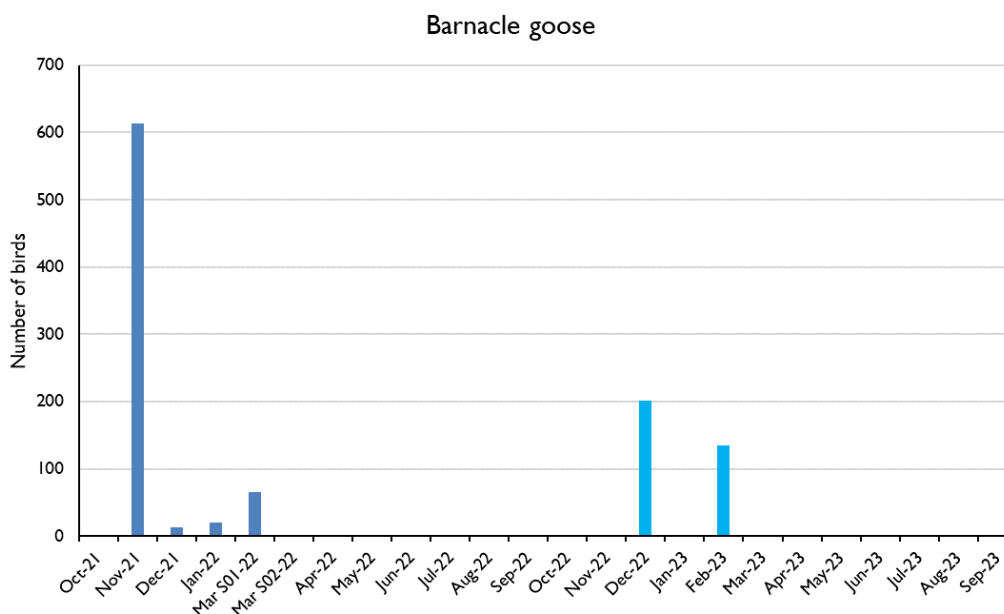


Figure 12 Barnacle goose density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

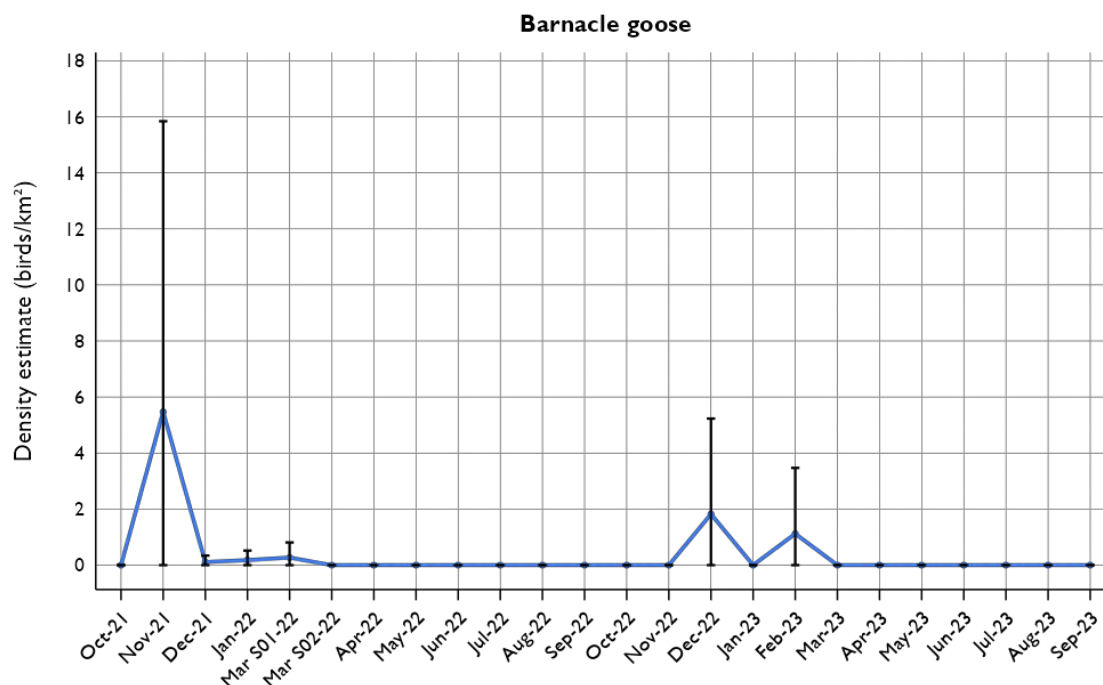


Table 9 **Density and population estimates of barnacle geese in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.00	0	0	0	0	0.00
27 November 2021	5.47	5161	0	14950	4704	91.15
10 December 2021	0.11	105	0	317	100	95.24
21 January 2022	0.18	166	0	493	158	95.18
01 March 2022	0.27	258	0	762	243	94.19
19 March 2022	0.00	0	0	0	0	0.00
01 April 2022	0.00	0	0	0	0	0.00
27 May 2022	0.00	0	0	0	0	0.00
18 June 2022	0.00	0	0	0	0	0.00
11 July 2022	0.00	0	0	0	0	0.00
06 August 2022	0.00	0	0	0	0	0.00
01 September 2022	0.00	0	0	0	0	0.00
17 October 2022	0.00	0	0	0	0	0.00
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	1.82	1720	0	4933	1570	91.28
19 January 2023	0.00	0	0	0	0	0.00
09 February 2023	1.12	1058	0	3272	998	94.33
04 March 2023	0.00	0	0	0	0	0.00
18 April 2023	0.00	0	0	0	0	0.00
02 May 2023	0.00	0	0	0	0	0.00
03 June 2023	0.00	0	0	0	0	0.00
19 July 2023	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00
16 September 2023	0.00	0	0	0	0	0.00

Table 10 Summary of barnacle geese behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	0	0	0	-	0
27 November 2021	0	614	0	0	100	614
10 December 2021	0	13	0	0	100	13
21 January 2022	0	21	0	0	100	21
01 March 2022	0	65	0	0	100	65
19 March 2022	0	0	0	0	-	0
01 April 2022	0	0	0	0	-	0
27 May 2022	0	0	0	0	-	0
18 June 2022	0	0	0	0	-	0
11 July 2022	0	0	0	0	-	0
06 August 2022	0	0	0	0	-	0
01 September 2022	0	0	0	0	-	0
17 October 2022	0	0	0	0	-	0
29 November 2022	0	0	0	0	-	0
22 December 2022	0	202	0	0	100	202
19 January 2023	0	0	0	0	-	0
09 February 2023	0	135	0	0	100	135
04 March 2023	0	0	0	0	-	0
18 April 2023	0	0	0	0	-	0
02 May 2023	0	0	0	0	-	0
03 June 2023	0	0	0	0	-	0
19 July 2023	0	0	0	0	-	0
17 August 2023	0	0	0	0	-	0
16 September 2023	0	0	0	0	-	0
Total	0	1050	0	0	100	1050

Figure 13 Density of barnacle geese (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

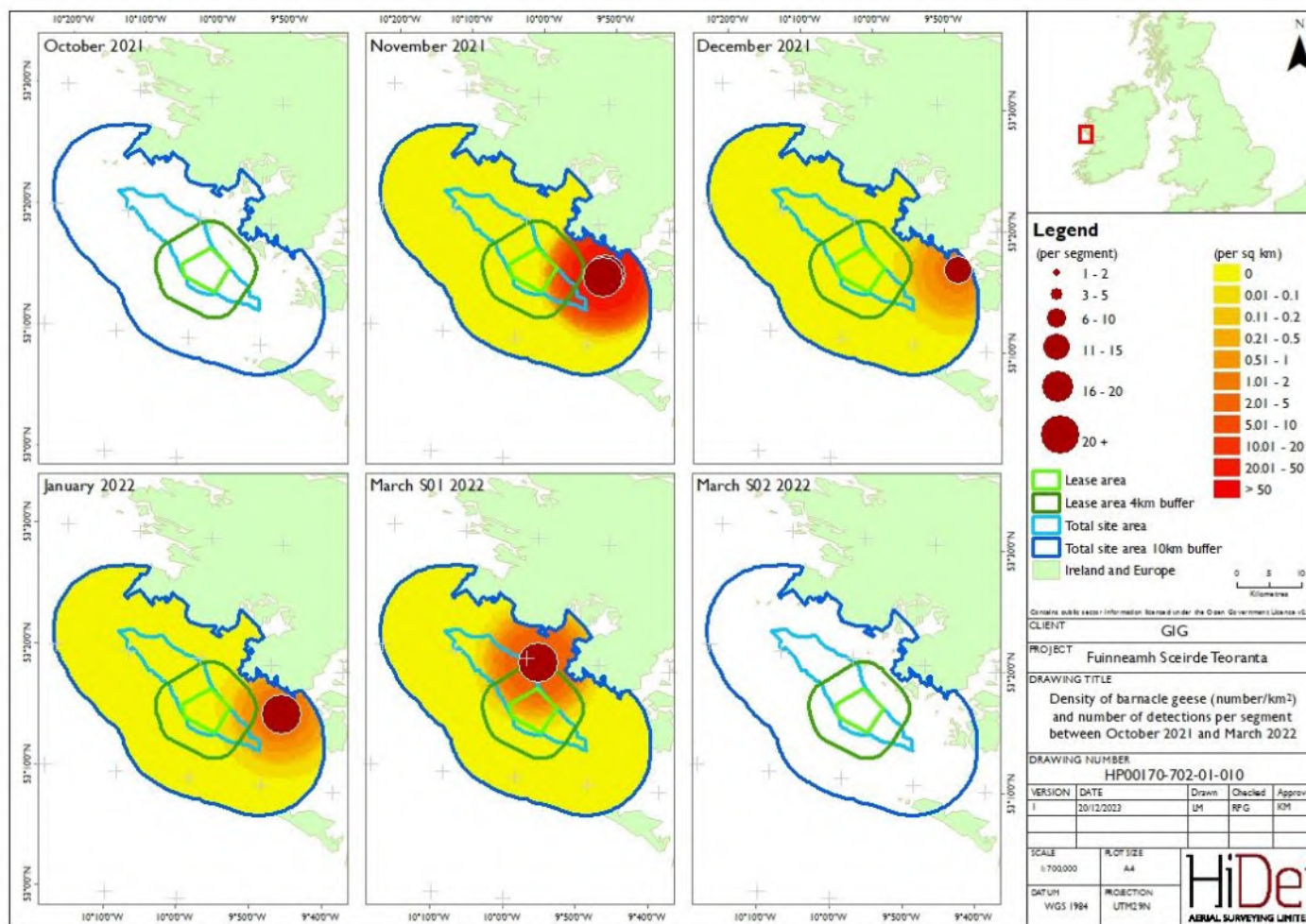


Figure 14 Density of barnacle geese (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

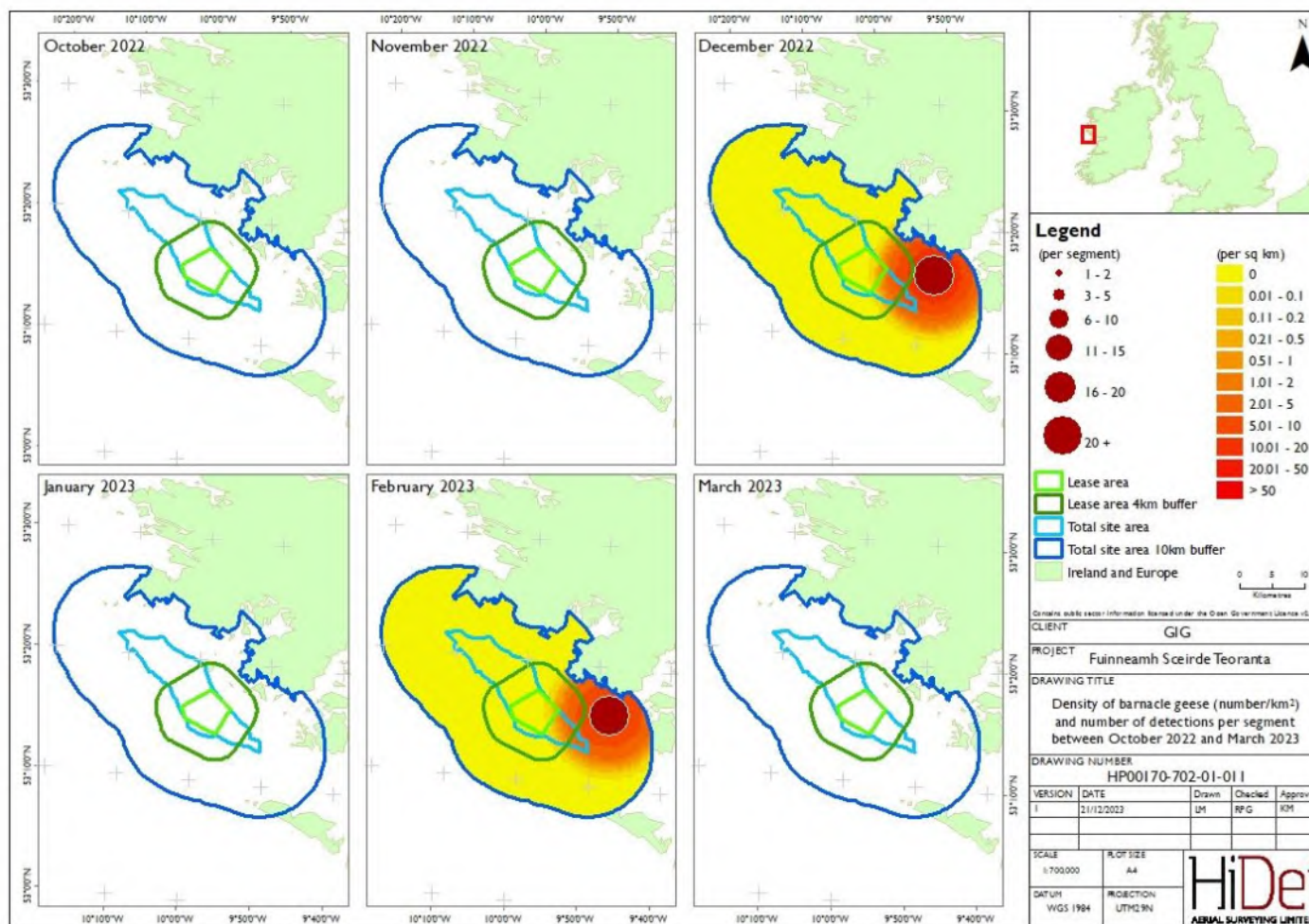
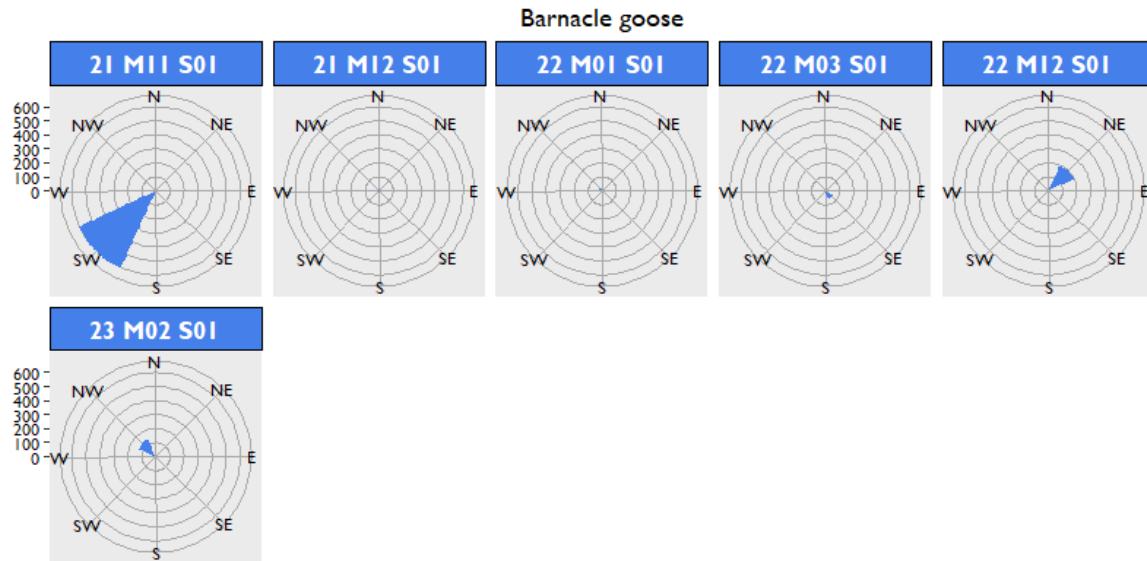


Figure 15 Summarised direction of movement of flying barnacle geese in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.3 Kittiwake

- 78 Kittiwake was recorded in relatively low numbers during the survey period, with peak observations in April 2023 of 215 birds (Figure 16).
- 79 Density estimates for the species ranged between 0.09 birds/km² (95% CI 0.03 – 0.17) in September 2022 and 1.63 birds/km² (95% CI 0.37 – 3.79) in April 2023 (Figure 17 and Table 11), equating to 87 birds (95% CI 33 – 157) and 1,534 birds (95% CI 348 – 3,579) respectively.
- 80 Kittiwakes were found throughout the survey area, with higher densities generally observed within the total site buffer area, particularly in the south and south-east, such as in March Survey 02 2022, July 2022, December 2022 and April 2023 (Figure 18 to Figure 21). In October and December 2021, higher densities were estimated in the lease area buffer than in other months.
- 81 Of the birds that could be aged, 91% were recorded as adults, with the only juvenile birds recorded between August and November 2022 and July and September 2023 and the highest number of immature birds recorded in March 2022 (Table 12).
- 82 Over the survey period, 58% of birds were recorded flying, with a large proportion of birds recorded sitting on the water at the end of the breeding season in August 2021 (79%) (Table 13).
- 83 Kittiwakes were recorded flying in every survey month flight direction data are displayed (Figure 22). In winter months for October to December 2021 and October and November 2022, flying birds were recorded heading in southerly directions. In April 2023, when numbers peaked, birds were mainly heading in north-easterly or south-easterly directions, while in February and July 2023 birds were mainly flying in north-westerly directions.

Figure 16 Number of kittiwakes recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

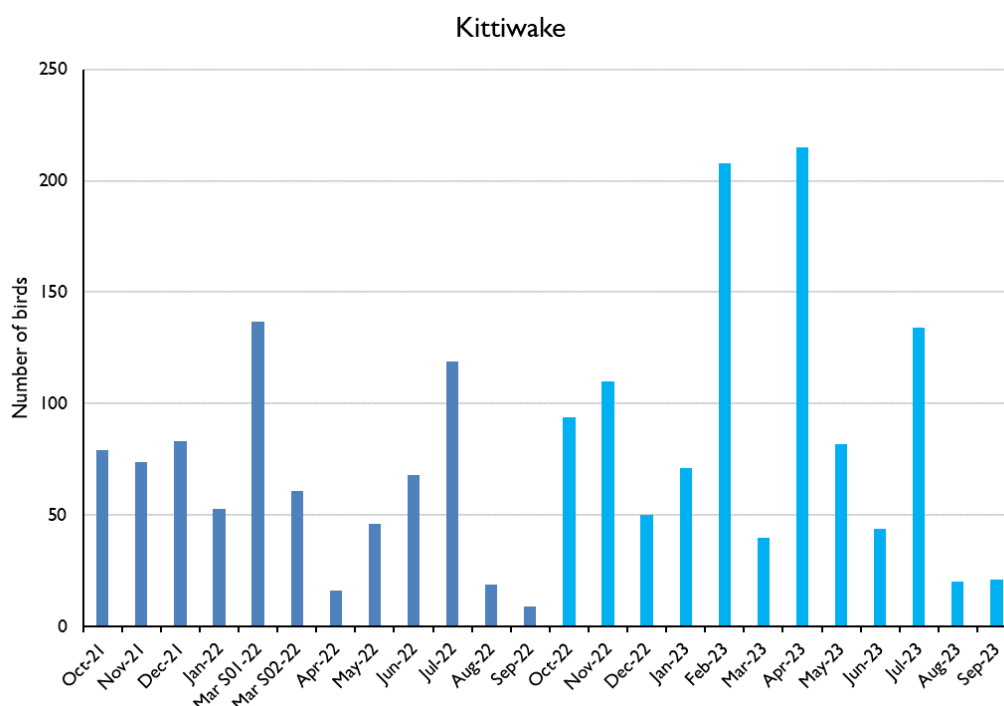


Figure 17 Kittiwake density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

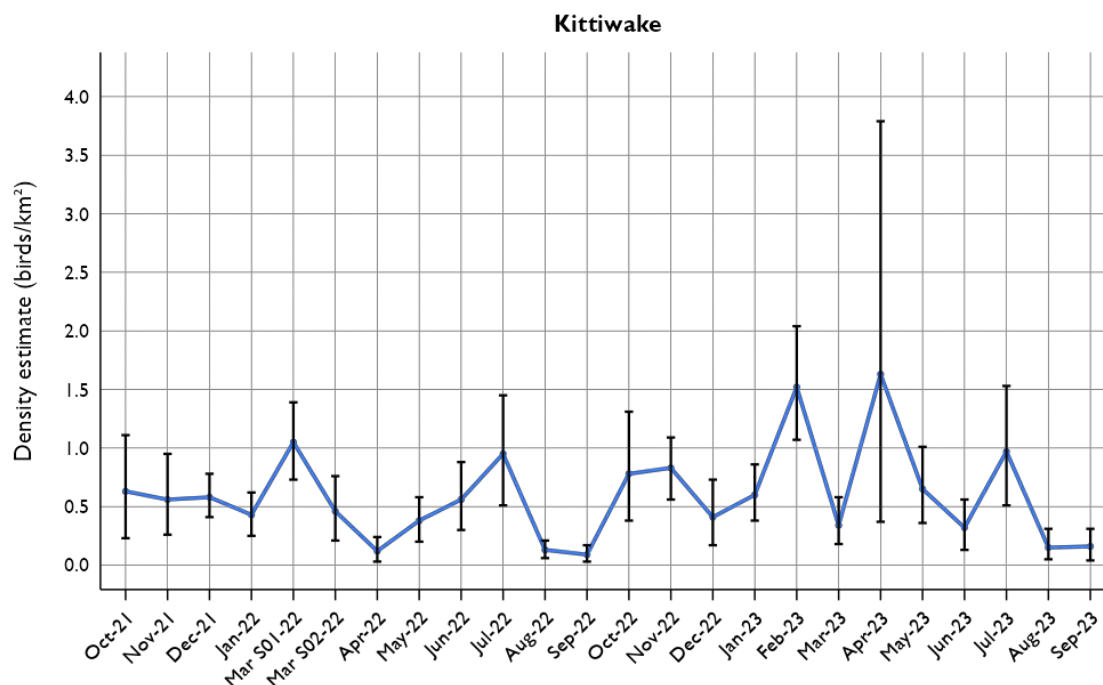


Table 11 Density and population estimates of kittiwakes in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.63	592	214	1045	170	28.58
27 November 2021	0.56	526	244	892	136	25.75
10 December 2021	0.58	552	388	738	70	12.56
21 January 2022	0.43	404	232	586	87	21.36
01 March 2022	1.05	987	685	1314	121	12.23
19 March 2022	0.46	434	200	721	115	26.48
01 April 2022	0.12	115	32	222	40	34.10
27 May 2022	0.38	354	189	551	87	24.49
18 June 2022	0.56	525	287	826	126	23.98
11 July 2022	0.95	895	484	1367	203	22.65
06 August 2022	0.13	121	52	200	30	24.02
01 September 2022	0.09	87	33	157	28	31.79
17 October 2022	0.78	732	356	1233	196	26.75
29 November 2022	0.83	780	526	1029	112	14.34
22 December 2022	0.41	383	158	688	121	31.54
19 January 2023	0.60	564	362	809	94	16.52
09 February 2023	1.52	1434	1006	1930	180	12.55
04 March 2023	0.34	325	171	545	85	26.11
18 April 2023	1.63	1534	348	3579	823	53.60
02 May 2023	0.65	615	340	952	145	23.58
03 June 2023	0.32	304	127	528	73	23.97
19 July 2023	0.97	911	486	1440	212	23.23
17 August 2023	0.15	142	43	292	57	39.97
16 September 2023	0.16	147	34	288	57	38.30

Table 12 Summary of kittiwake ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	54	4	10	11	79	79
27 November 2021	56	1	1	16	97	74
10 December 2021	76	0	6	1	93	83
21 January 2022	51	1	0	1	98	53
01 March 2022	90	6	0	41	94	137
19 March 2022	38	10	0	13	79	61
01 April 2022	12	0	0	4	100	16
27 May 2022	0	0	0	46	0	46
18 June 2022	55	0	0	13	100	68
11 July 2022	93	3	0	23	97	119
06 August 2022	12	0	5	2	71	19
01 September 2022	4	2	0	3	67	9
17 October 2022	51	0	12	31	81	94
29 November 2022	76	0	8	26	90	110
22 December 2022	21	1	0	28	95	50
19 January 2023	30	5	0	36	86	71
09 February 2023	114	6	0	88	95	208
04 March 2023	11	4	0	25	73	40
18 April 2023	46	9	1	159	82	215
02 May 2023	40	2	0	40	95	82
03 June 2023	16	0	0	28	100	44
19 July 2023	90	0	1	43	99	134
17 August 2023	10	0	3	7	77	20
16 September 2023	1	0	7	13	12	21
Total	1047	54	54	698	91	1853

Table 13 Summary of kittiwake behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	65	14	0	0	82	79
27 November 2021	0	56	18	0	0	76	74
10 December 2021	0	76	7	0	0	92	83
21 January 2022	0	44	9	0	0	83	53
01 March 2022	0	75	62	0	0	55	137
19 March 2022	0	36	25	0	0	59	61
01 April 2022	0	12	4	0	0	75	16
27 May 2022	0	31	15	0	0	67	46
18 June 2022	0	50	18	0	0	74	68
11 July 2022	0	55	63	1	0	46	119
06 August 2022	0	12	7	0	0	63	19
01 September 2022	0	5	4	0	0	56	9
17 October 2022	0	64	30	0	0	68	94
29 November 2022	0	86	24	0	0	78	110
22 December 2022	0	22	28	0	0	44	50
19 January 2023	0	29	39	2	1	41	71
09 February 2023	0	119	87	2	0	57	208
04 March 2023	0	8	32	0	0	20	40
18 April 2023	0	56	159	0	0	26	215
02 May 2023	0	50	32	0	0	61	82
03 June 2023	0	16	27	1	0	36	44
19 July 2023	0	90	36	0	8	67	134
17 August 2023	0	10	10	0	0	50	20
16 September 2023	0	8	13	0	0	38	21
Total	0	1075	763	6	9	58	1853

Figure 18 Density of kittiwakes (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

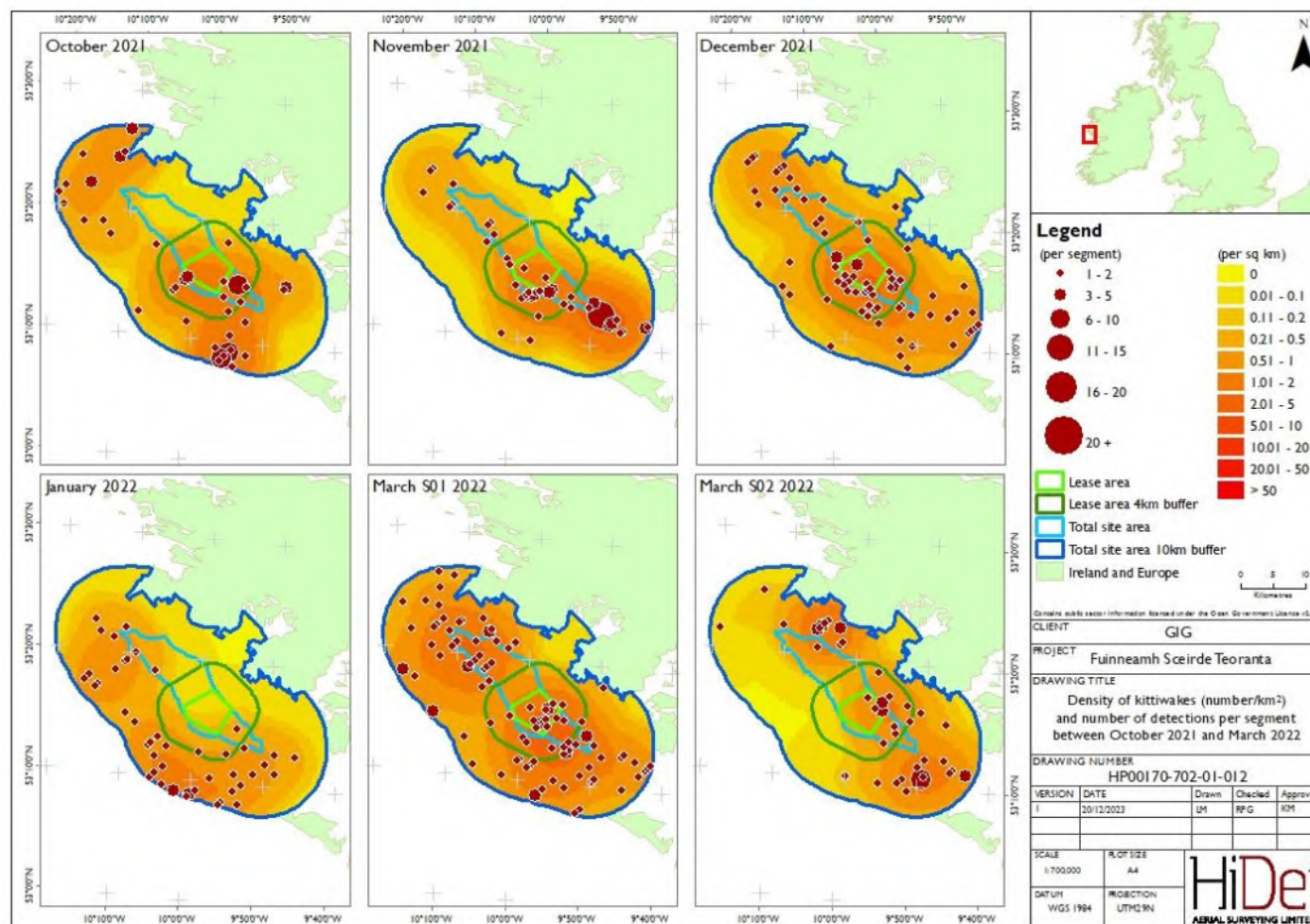


Figure 19 Density of kittiwakes (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

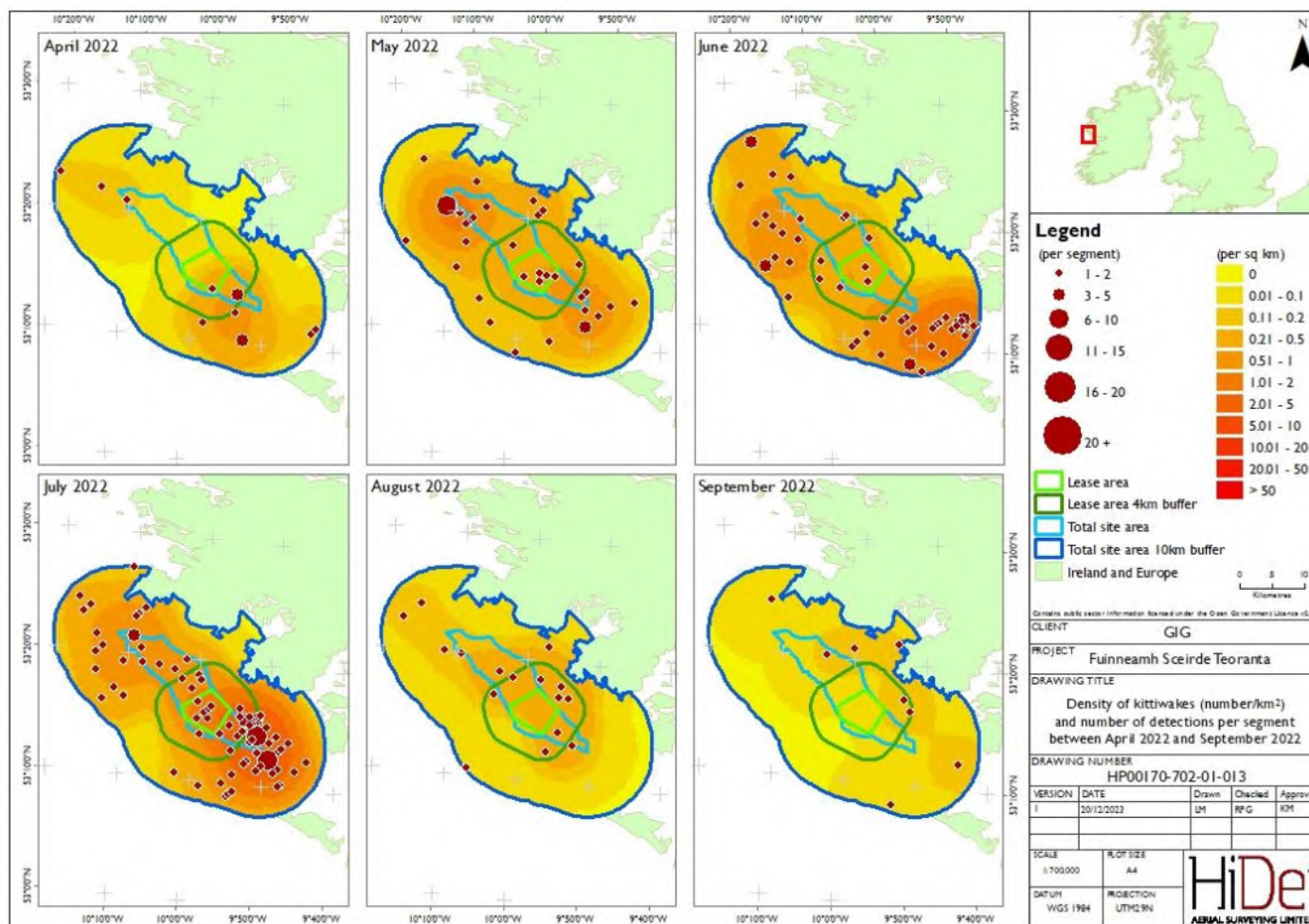


Figure 20 Density of kittiwakes (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

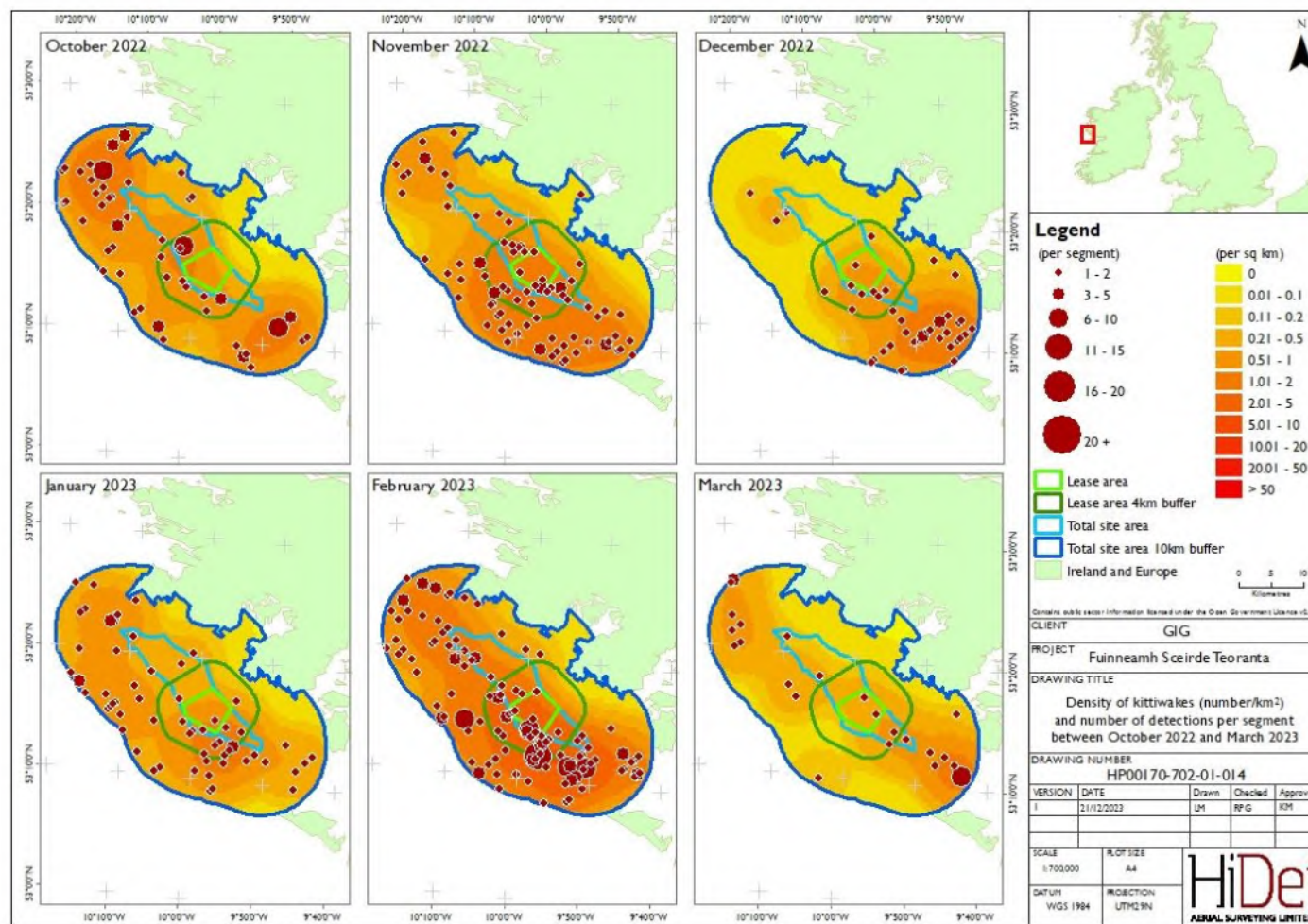


Figure 21 Density of kittiwakes (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

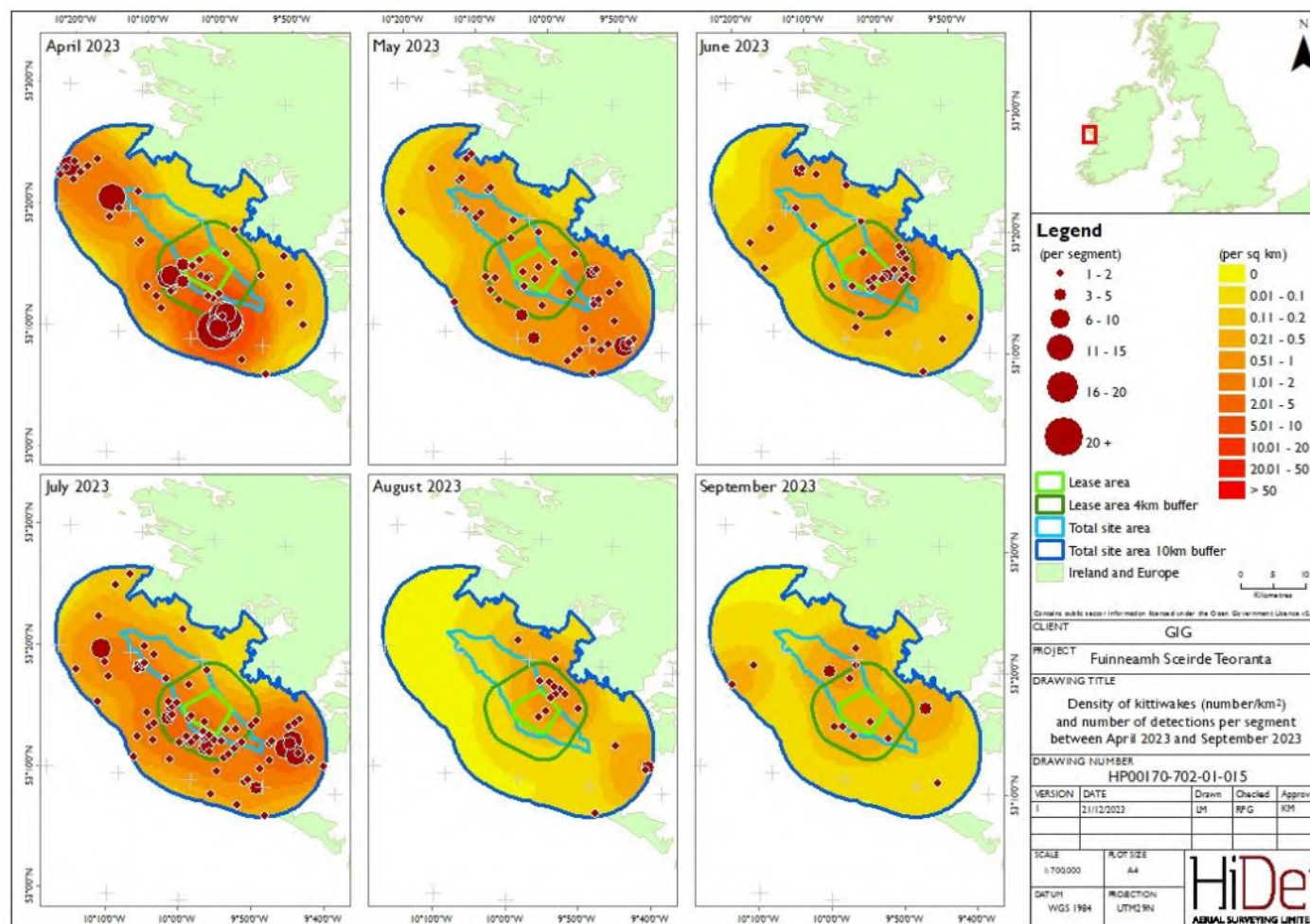
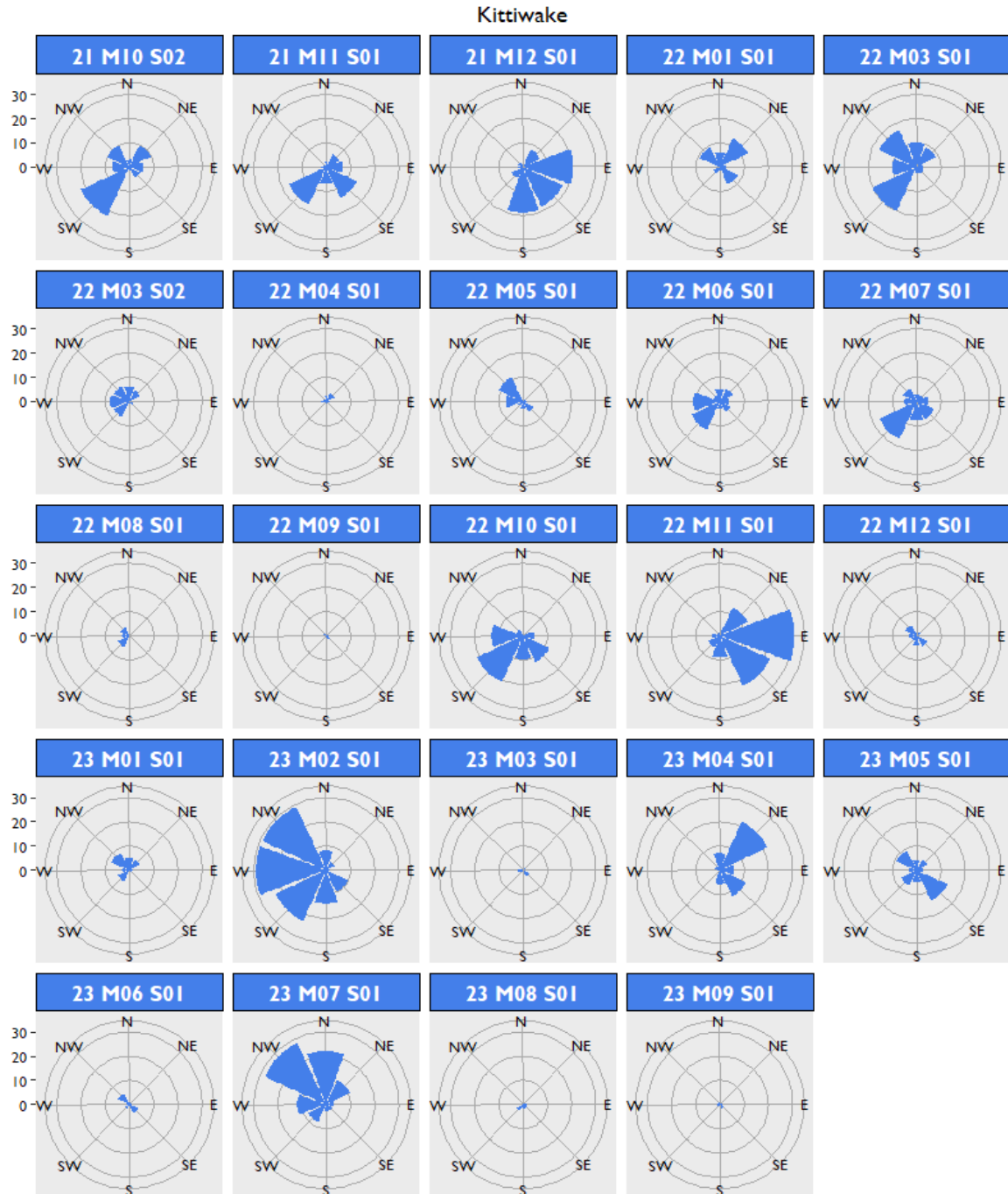


Figure 22 Summarised direction of movement of flying kittiwakes in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.4 Common gull

- 84 Common gull was recorded in relatively low numbers throughout the survey period, with a large peak in November 2021 of 68 birds (Figure 23).
- 85 Density estimates for the species when observed ranged between 0.02 birds/km² (95% CI 0.00 – 0.04) in September 2023 and 0.73 birds/km² (95% CI 0.04 – 2.01) in November 2021 (Figure 24 and Table 14), equating to 17 birds (95% CI 0 – 41) and 686 birds (95% CI 41 – 1,895) respectively.
- 86 Density of common gulls was generally higher in the north, north-east and north-west of the survey area, particularly in the total site buffer area, such as in December 2021, May 2022, January 2023 and April 2023 (Figure 25 to Figure 28). In November 2021, the highest densities of common gulls were distributed towards the south-east of the total site buffer.
- 87 Of the birds that could be aged, 92% (319) were recorded as adults, with six juvenile birds recorded across the survey period (Table 15).
- 88 Over the survey period, 52% of birds were recorded flying, with only September 2023 recording sitting-only birds (Table 16).
- 89 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 29). Common gulls were recorded flying in various directions, with the majority flying east in December 2021 and in easterly directions in April 2023.

Figure 23 Number of common gulls recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

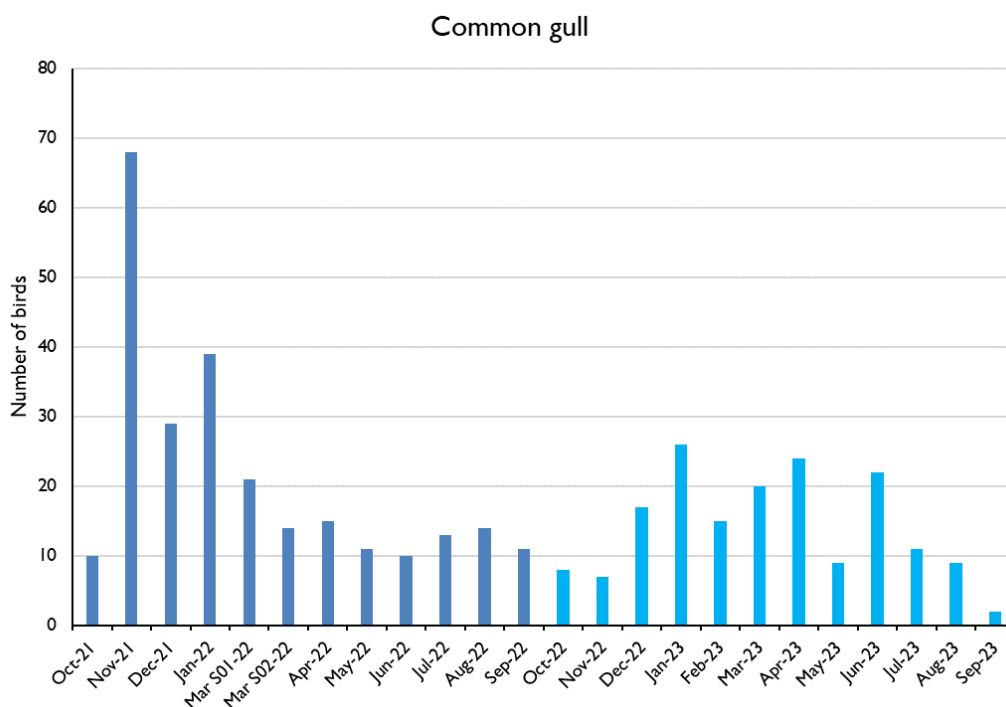


Figure 24 Common gull density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

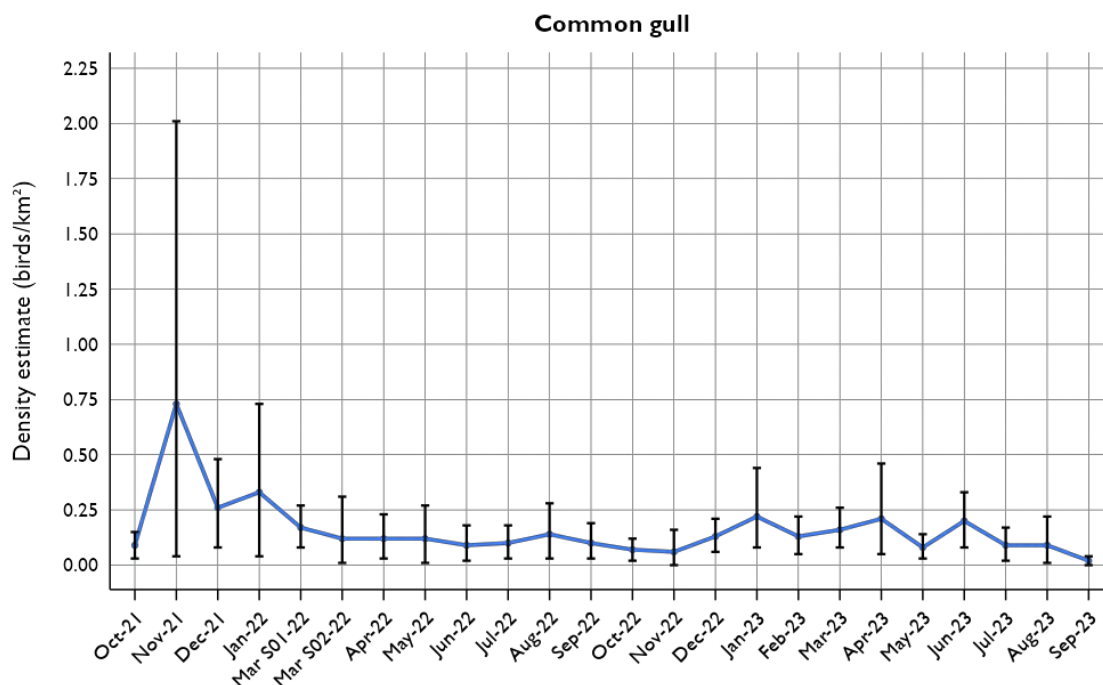


Table 14 Density and population estimates of common gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.09	83	29	145	29	34.08
27 November 2021	0.73	686	41	1895	546	79.47
10 December 2021	0.26	245	75	452	95	38.78
21 January 2022	0.33	314	39	693	177	56.37
01 March 2022	0.17	164	80	254	41	24.66
19 March 2022	0.12	117	8	288	78	66.67
01 April 2022	0.12	114	33	221	44	37.97
27 May 2022	0.12	111	13	258	67	60.36
18 June 2022	0.09	82	23	167	38	46.34
11 July 2022	0.10	90	27	168	29	31.37
06 August 2022	0.14	129	25	269	63	48.84
01 September 2022	0.10	96	25	178	32	32.69
17 October 2022	0.07	63	17	117	25	38.62
29 November 2022	0.06	58	0	152	41	70.69
22 December 2022	0.13	124	57	199	34	27.05
19 January 2023	0.22	211	79	412	78	36.80
09 February 2023	0.13	122	43	207	42	34.43
04 March 2023	0.16	154	72	247	38	24.26
18 April 2023	0.21	198	51	430	90	45.43
02 May 2023	0.08	72	24	136	27	36.54
03 June 2023	0.20	187	78	315	52	27.79
19 July 2023	0.09	83	17	165	36	42.60
17 August 2023	0.09	81	8	204	51	62.96
16 September 2023	0.02	17	0	41	12	70.59

Table 15 Summary of common gull ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	7	2	1	0	70	10
27 November 2021	39	3	0	26	93	68
10 December 2021	27	0	2	0	93	29
21 January 2022	39	0	0	0	100	39
01 March 2022	18	1	0	2	95	21
19 March 2022	13	1	0	0	93	14
01 April 2022	5	1	0	9	83	15
27 May 2022	0	0	0	11	0	11
18 June 2022	10	0	0	0	100	10
11 July 2022	8	1	0	4	89	13
06 August 2022	14	0	0	0	100	14
01 September 2022	7	2	1	1	70	11
17 October 2022	8	0	0	0	100	8
29 November 2022	6	0	1	0	86	7
22 December 2022	11	3	0	3	79	17
19 January 2023	16	1	0	9	94	26
09 February 2023	15	0	0	0	100	15
04 March 2023	20	0	0	0	100	20
18 April 2023	16	3	0	5	84	24
02 May 2023	6	1	0	2	86	9
03 June 2023	16	1	0	5	94	22
19 July 2023	8	2	0	1	80	11
17 August 2023	8	0	1	0	89	9
16 September 2023	2	0	0	0	100	2
Total	319	22	6	78	92	425

Table 16 Summary of common gull behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	8	2	0	0	80	10
27 November 2021	0	13	55	0	0	19	68
10 December 2021	0	25	3	0	1	86	29
21 January 2022	0	4	30	0	5	10	39
01 March 2022	0	13	8	0	0	62	21
19 March 2022	0	4	0	0	10	29	14
01 April 2022	0	6	9	0	0	40	15
27 May 2022	0	10	1	0	0	91	11
18 June 2022	0	8	2	0	0	80	10
11 July 2022	0	9	4	0	0	69	13
06 August 2022	0	9	5	0	0	64	14
01 September 2022	0	8	3	0	0	73	11
17 October 2022	0	8	0	0	0	100	8
29 November 2022	0	6	0	0	1	86	7
22 December 2022	0	11	6	0	0	65	17
19 January 2023	0	13	13	0	0	50	26
09 February 2023	0	11	3	1	0	73	15
04 March 2023	0	11	8	1	0	55	20
18 April 2023	0	13	11	0	0	54	24
02 May 2023	0	7	2	0	0	78	9
03 June 2023	0	12	10	0	0	55	22
19 July 2023	0	9	1	1	0	82	11
17 August 2023	0	5	3	0	1	56	9
16 September 2023	0	0	2	0	0	0	2
Total	0	223	181	3	18	52	425

Figure 25 Density of common gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

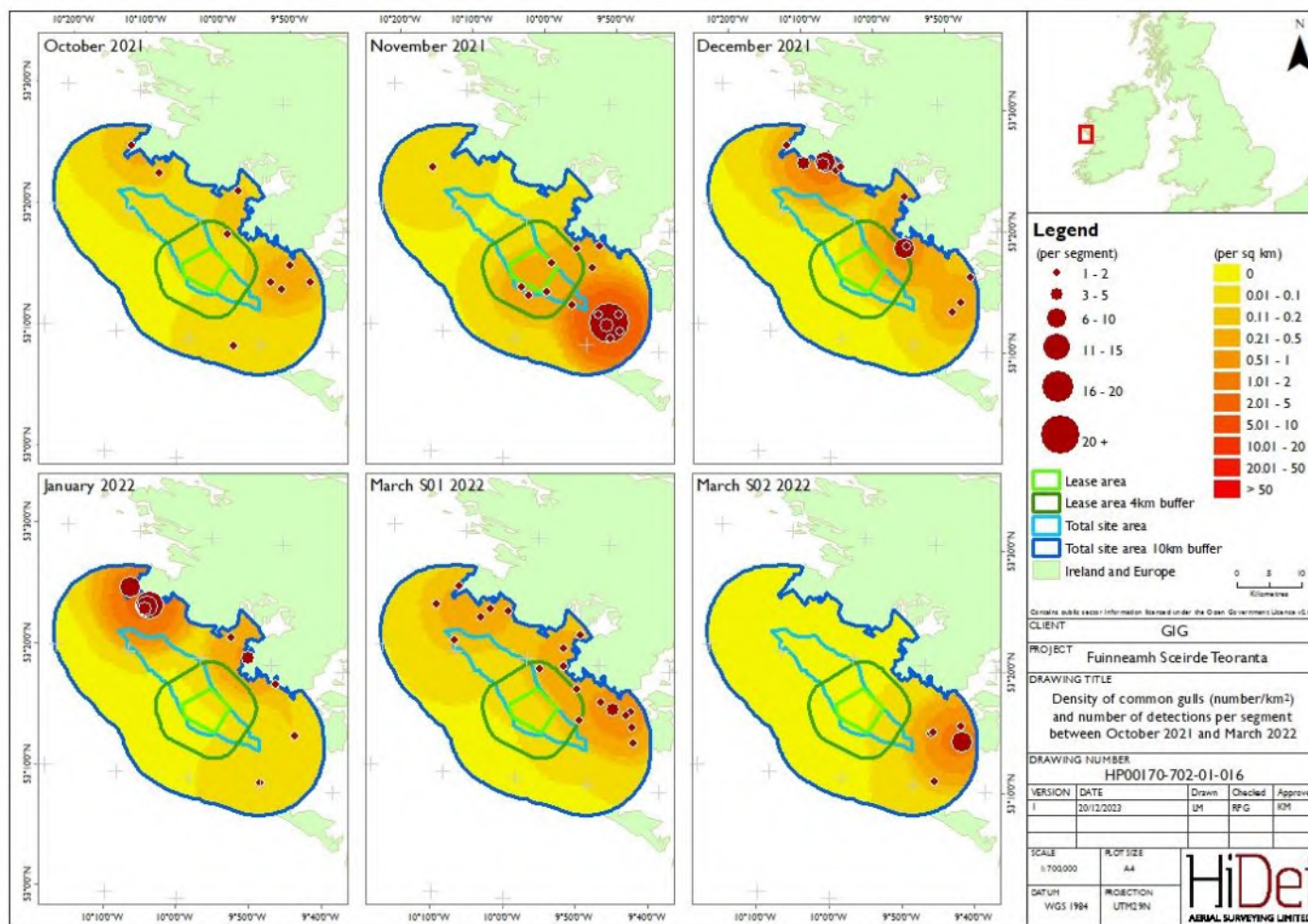


Figure 26 Detections, density of common gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

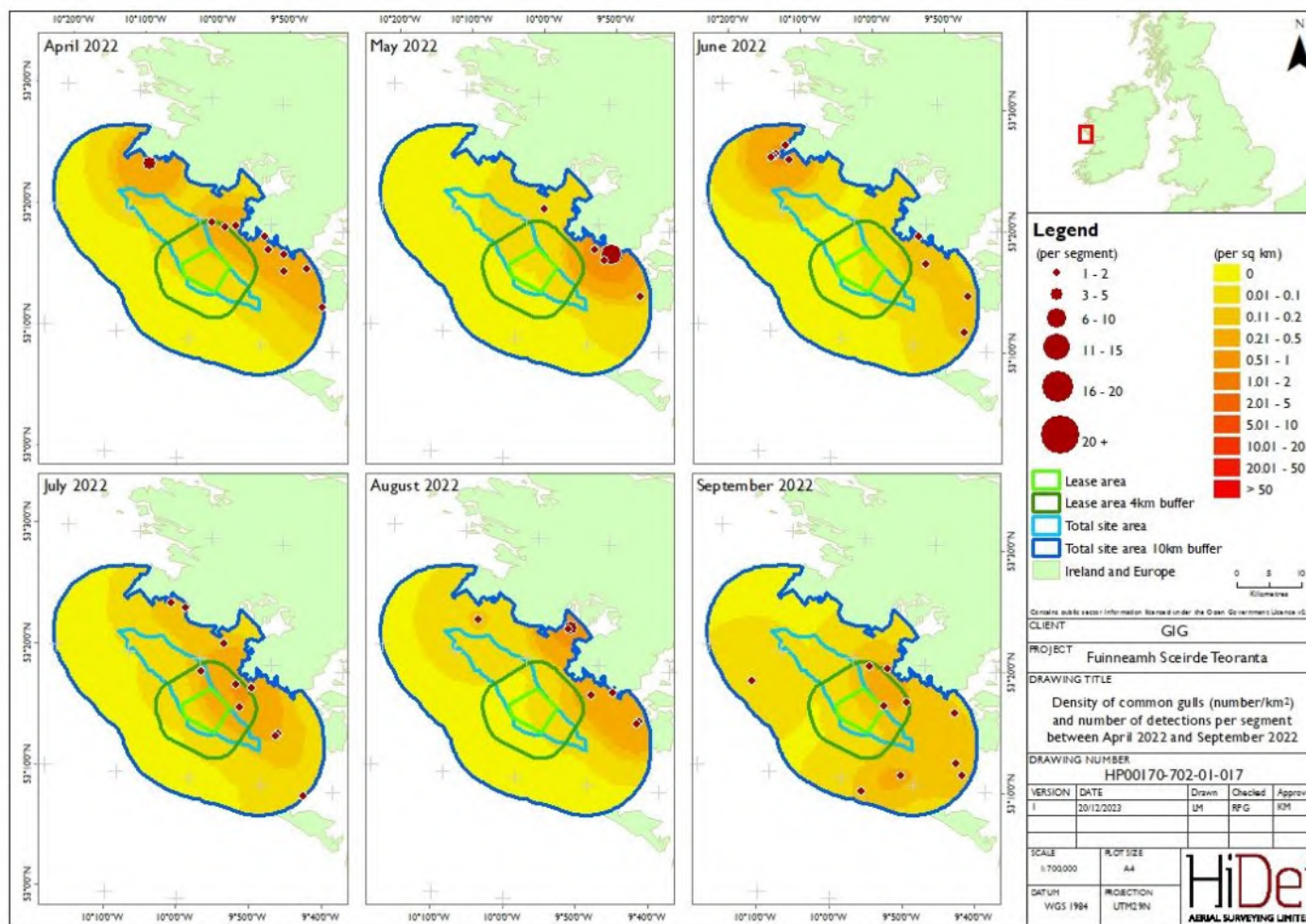


Figure 27 Density of common gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

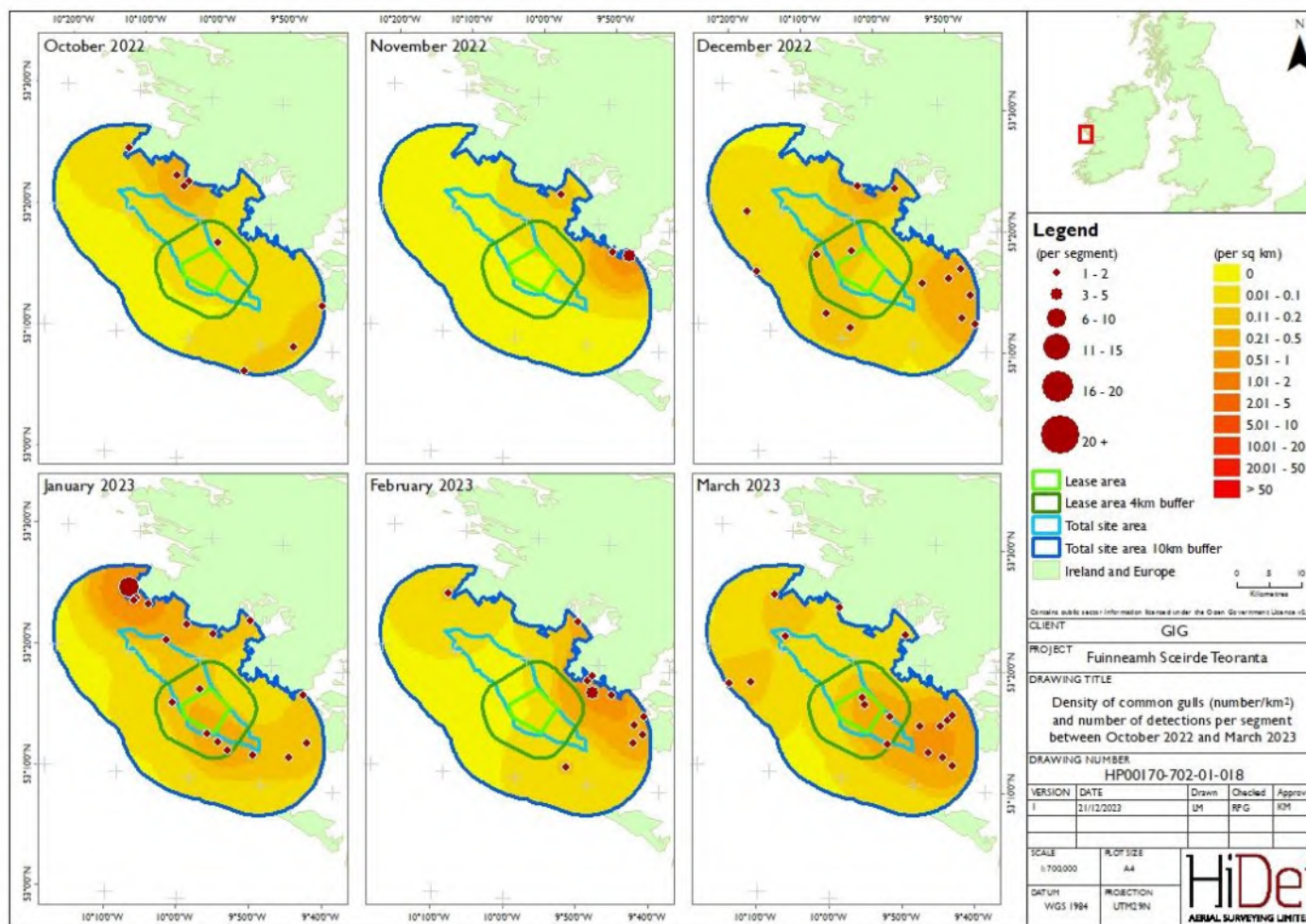


Figure 28 Detections, density of common gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

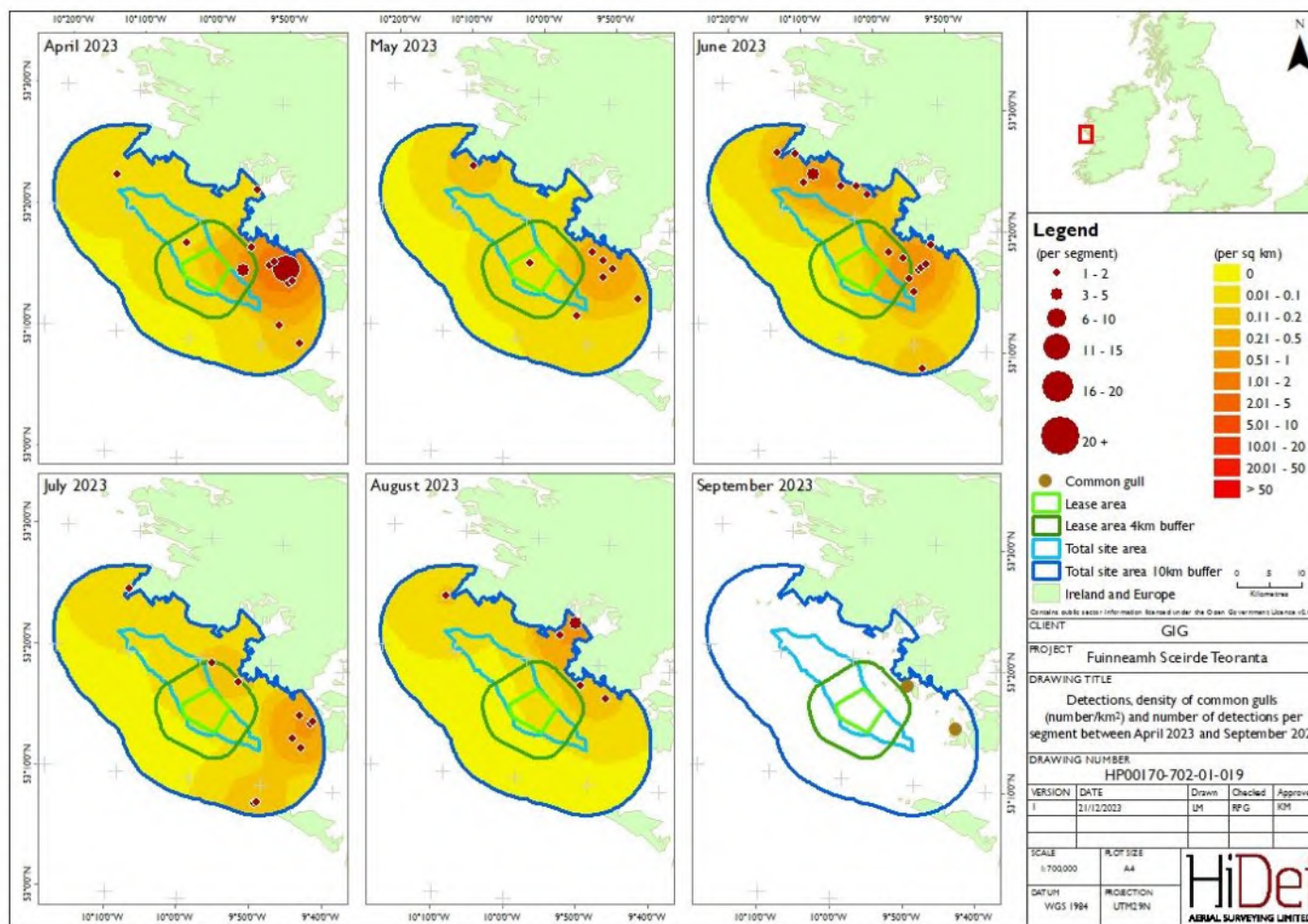
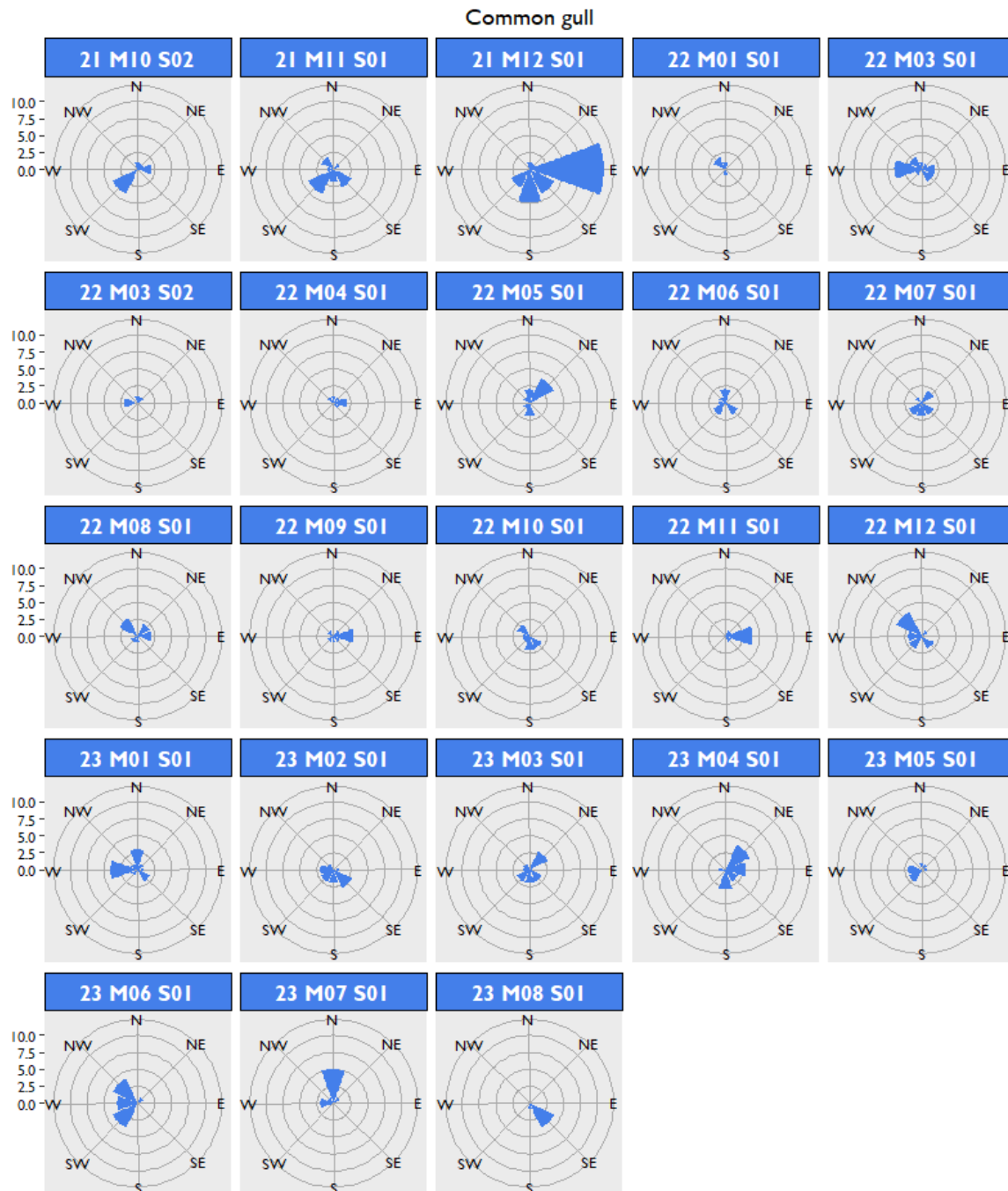


Figure 29 Summarised direction of movement of flying common gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.5 Great black-backed gull

- 90 Great black-backed gull (*Larus marinus*) was recorded in low numbers throughout the survey period, peaking in July 2022 with 39 birds recorded (Figure 30). In March S01 2022, May and June 2023, 30, 35 and 30 observations of great black backed gulls were recorded respectively. The lowest number were recorded in August 2023 with three birds.
- 91 Density estimates for the species when recorded ranged between 0.02 birds/km² (95% CI 0.00 – 0.06) in August 2023 and 0.25 birds/km² (95% CI 0.04 – 0.59) in July 2022 (Figure 31 and Table 17), equating to 21 birds (95% CI 0 – 52) and 239 birds (95% CI 41– 560) respectively.
- 92 Great black-backed gull was found throughout the survey area, with higher densities generally observed within the total site buffer area, particularly in the north-east and east (Figure 32 to Figure 35). In July 2022 when records peaked, the highest density of birds were estimated in the north-east of the lease area buffer and south of the total area buffer (Figure 33) and in August 2022 the birds were distributed towards the northern edge of the lease area buffer. In May 2023 and June 2023, where a secondary peak was recorded, the highest densities of great-black backed gulls were estimated to the north-west of the lease area buffer and in the north-west of the total site buffer respectively (Figure 35).
- 93 Of the birds that could be aged, 84% were recorded as adults, with a total of 39 immature birds and five juveniles recorded over the survey period (Table 18).
- 94 During the survey period, 40% of birds were recorded flying, with a large proportion of birds recorded as sitting on the water during the summer months in July 2022 and May 2023 (Table 19).
- 95 Great black-backed gulls were recorded flying in every survey month and flight direction data are displayed in Figure 36. In June 2023, when flying bird numbers peaked, individuals were mainly heading north-east. In both March 2022 surveys, great black-backed gulls were recorded flying in westerly directions (i.e., south-west, west, and north-west).

Figure 30 Number of great black-backed gulls recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

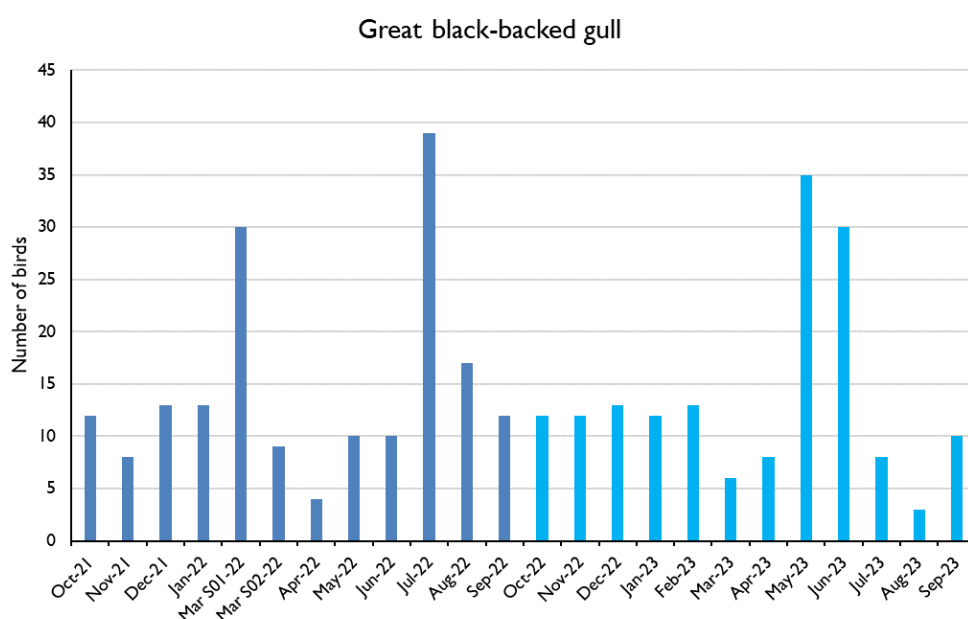


Figure 31 Great black-backed gull density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

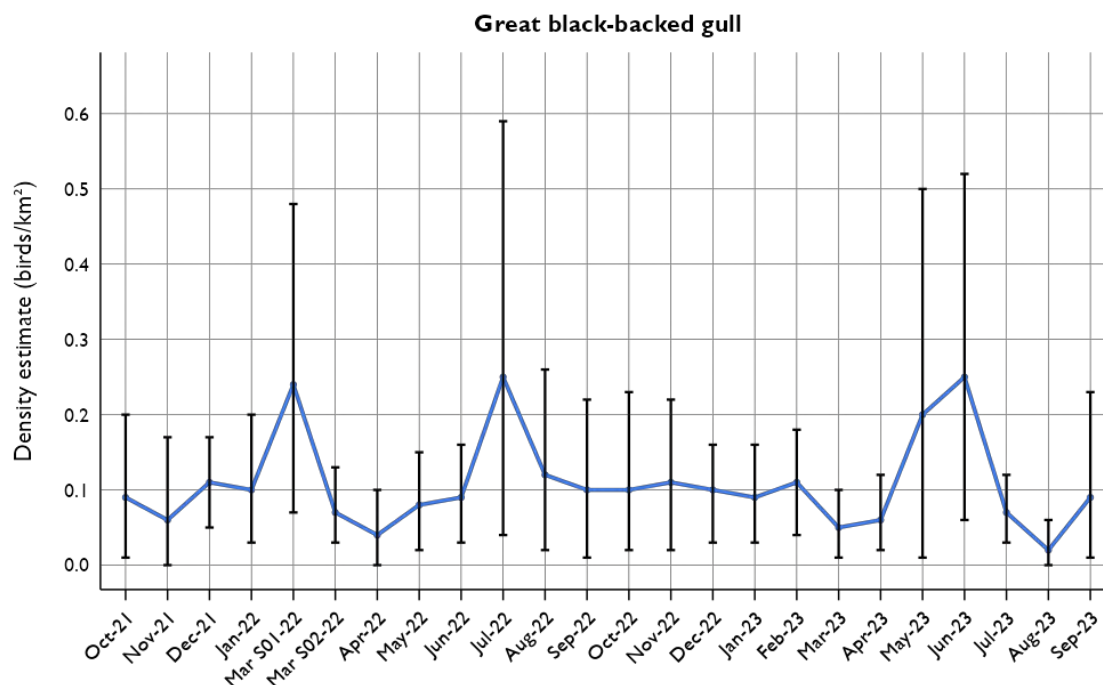


Table 17 **Density and population estimates of great black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.09	88	8	188	41	45.48
27 November 2021	0.06	60	0	158	41	67.41
10 December 2021	0.11	102	49	161	27	25.79
21 January 2022	0.10	95	30	186	36	37.79
01 March 2022	0.24	228	63	454	90	39.23
19 March 2022	0.07	69	24	124	24	33.83
01 April 2022	0.04	37	0	92	25	65.76
27 May 2022	0.08	74	16	146	31	41.34
18 June 2022	0.09	85	31	152	30	34.44
11 July 2022	0.25	239	41	560	104	43.49
06 August 2022	0.12	112	16	250	50	43.83
01 September 2022	0.10	90	8	207	49	53.75
17 October 2022	0.10	98	17	221	51	51.39
29 November 2022	0.11	102	20	210	48	46.25
22 December 2022	0.10	90	33	151	25	27.24
19 January 2023	0.09	82	28	147	26	31.66
09 February 2023	0.11	102	41	174	32	30.64
04 March 2023	0.05	44	8	93	20	44.13
18 April 2023	0.06	58	16	116	21	36.00
02 May 2023	0.20	185	9	471	107	57.80
03 June 2023	0.25	234	55	495	113	47.96
19 July 2023	0.07	67	25	114	24	35.82
17 August 2023	0.02	21	0	52	13	60.23
16 September 2023	0.09	85	8	215	58	68.24

Table 18 Summary of great black-backed gull ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	3	6	2	1	27	12
27 November 2021	5	1	0	2	83	8
10 December 2021	13	0	0	0	100	13
21 January 2022	12	1	0	0	92	13
01 March 2022	15	8	0	7	65	30
19 March 2022	9	0	0	0	100	9
01 April 2022	1	0	0	3	100	4
27 May 2022	0	0	0	10	0	10
18 June 2022	10	0	0	0	100	10
11 July 2022	38	1	0	0	97	39
06 August 2022	8	7	0	2	53	17
01 September 2022	6	2	1	3	67	12
17 October 2022	11	0	0	1	100	12
29 November 2022	11	1	0	0	92	12
22 December 2022	10	1	1	1	83	13
19 January 2023	8	0	0	4	100	12
09 February 2023	10	3	0	0	77	13
04 March 2023	5	1	0	0	83	6
18 April 2023	7	1	0	0	88	8
02 May 2023	4	0	0	31	100	35
03 June 2023	30	0	0	0	100	30
19 July 2023	7	1	0	0	88	8
17 August 2023	2	1	0	0	67	3
16 September 2023	5	4	1	0	50	10
Total	230	39	5	65	84	339

Table 19 Summary of great black-backed gull behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	7	5	0	0	58	12
27 November 2021	0	2	6	0	0	25	8
10 December 2021	0	9	4	0	0	69	13
21 January 2022	0	8	2	0	3	62	13
01 March 2022	0	10	19	0	1	33	30
19 March 2022	0	6	3	0	0	67	9
01 April 2022	0	1	3	0	0	25	4
27 May 2022	0	5	5	0	0	50	10
18 June 2022	0	5	4	0	1	50	10
11 July 2022	0	4	35	0	0	10	39
06 August 2022	0	8	9	0	0	47	17
01 September 2022	0	1	10	1	0	8	12
17 October 2022	0	5	7	0	0	42	12
29 November 2022	0	6	6	0	0	50	12
22 December 2022	0	5	8	0	0	38	13
19 January 2023	0	3	7	0	2	25	12
09 February 2023	0	8	5	0	0	62	13
04 March 2023	0	1	5	0	0	17	6
18 April 2023	0	4	4	0	0	50	8
02 May 2023	0	6	25	0	4	17	35
03 June 2023	0	20	9	1	0	67	30
19 July 2023	0	5	3	0	0	62	8
17 August 2023	0	2	1	0	0	67	3
16 September 2023	0	5	4	1	0	50	10
Total	0	136	189	3	11	40	339

Figure 32 Density of great black-backed gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

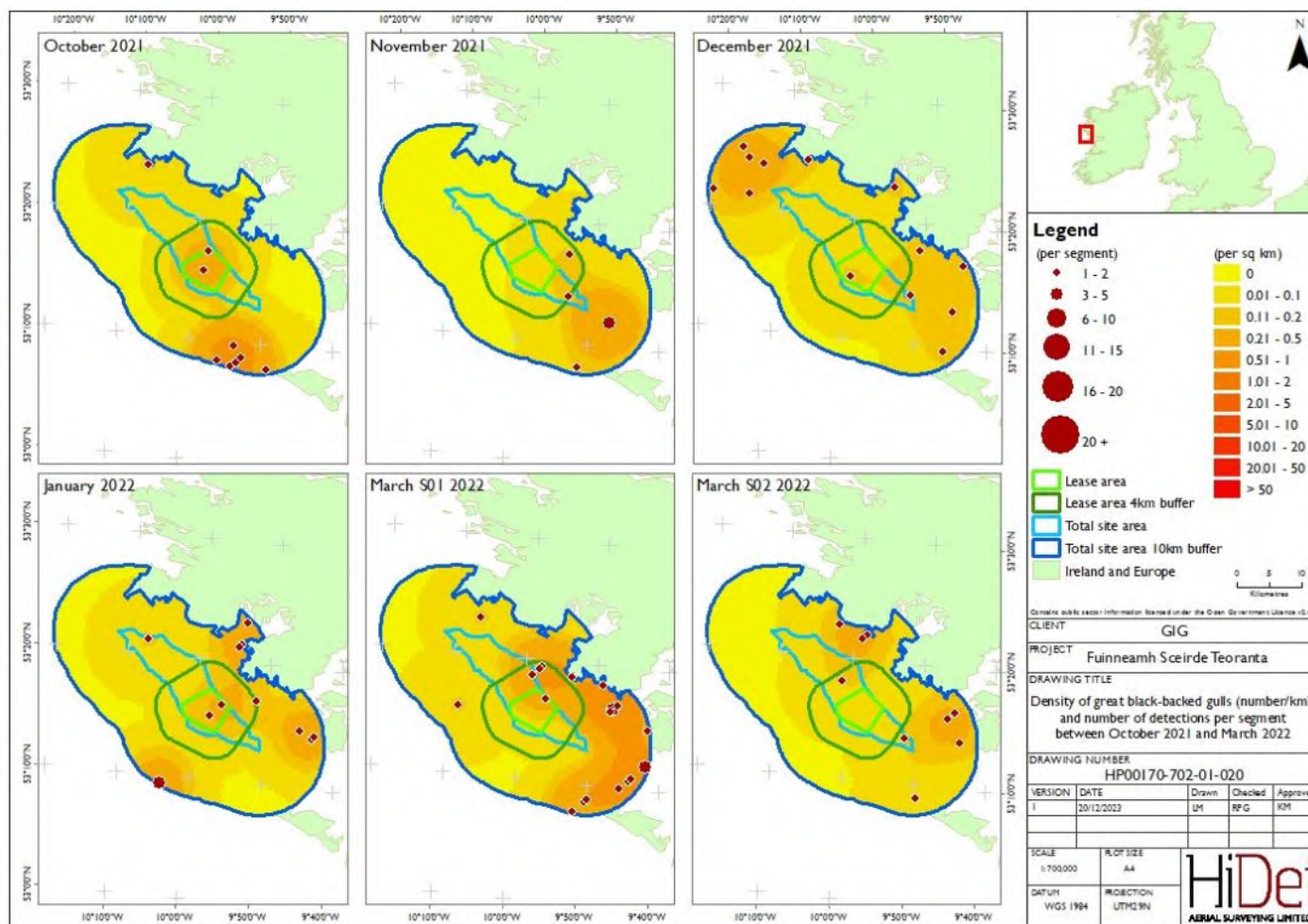


Figure 33 Detections, density (number/km²) and number of detections per segment of great black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

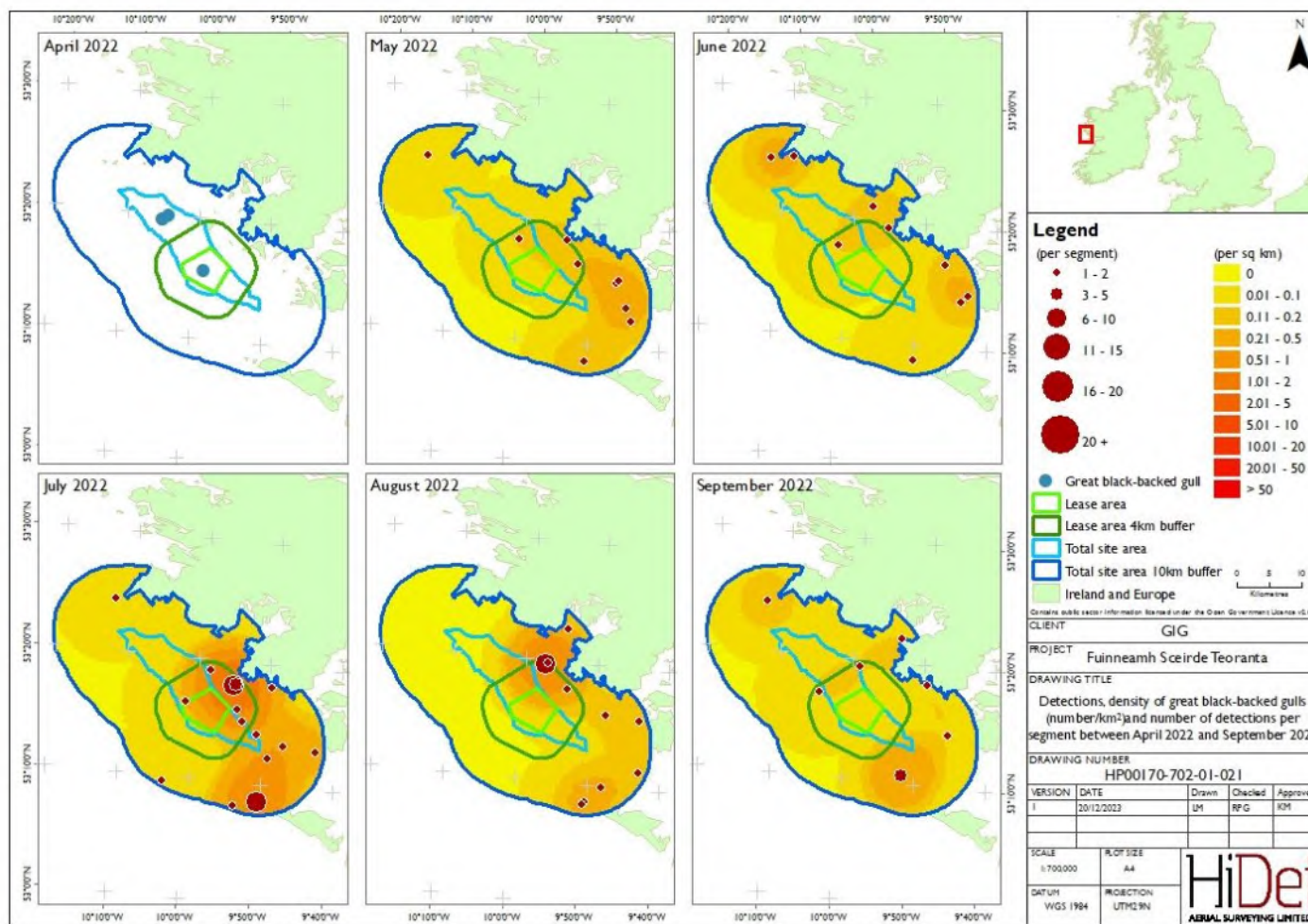


Figure 34 Density of great black-backed gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

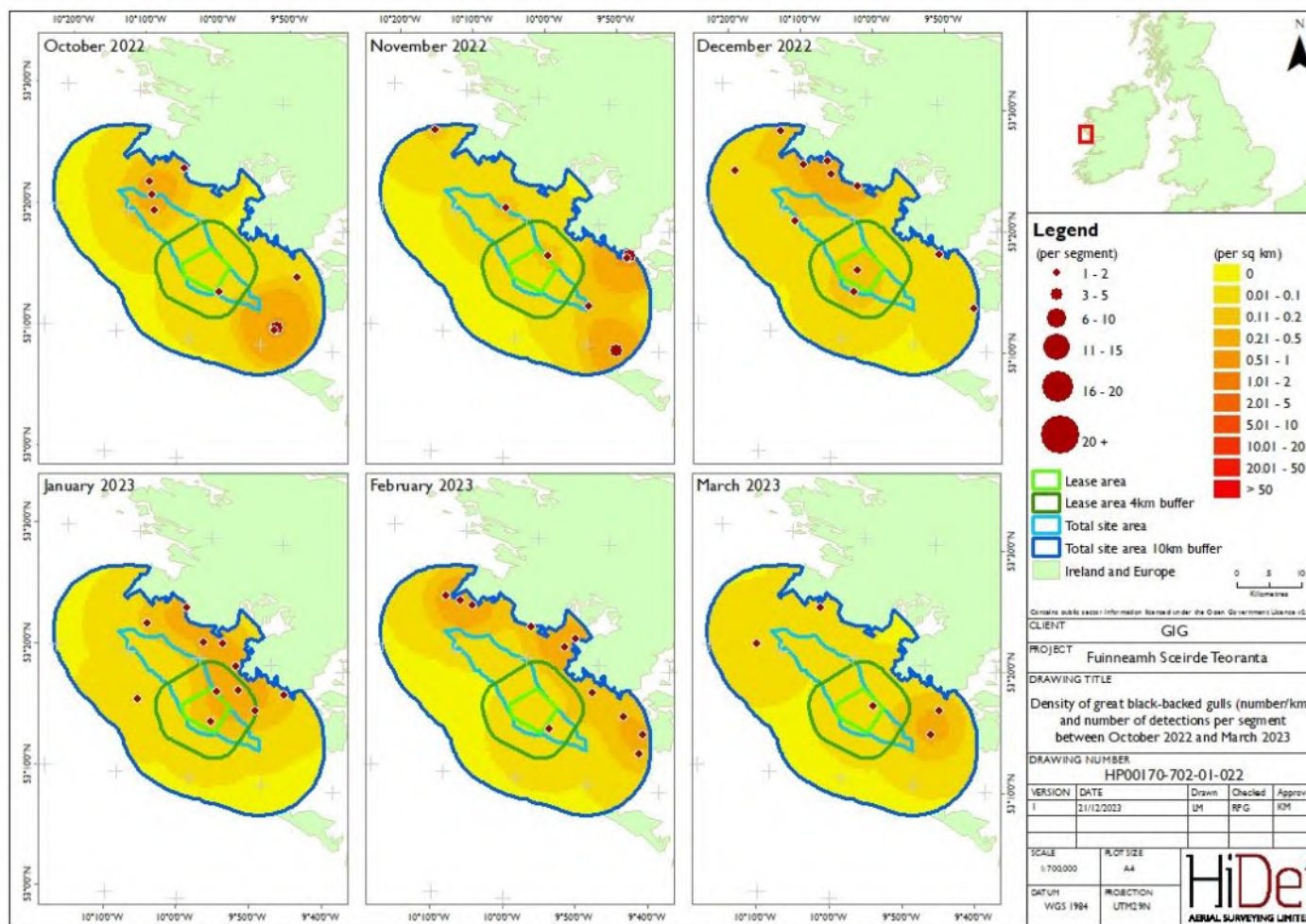


Figure 35 Detections, density (number/km²) and number of detections per segment of great black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

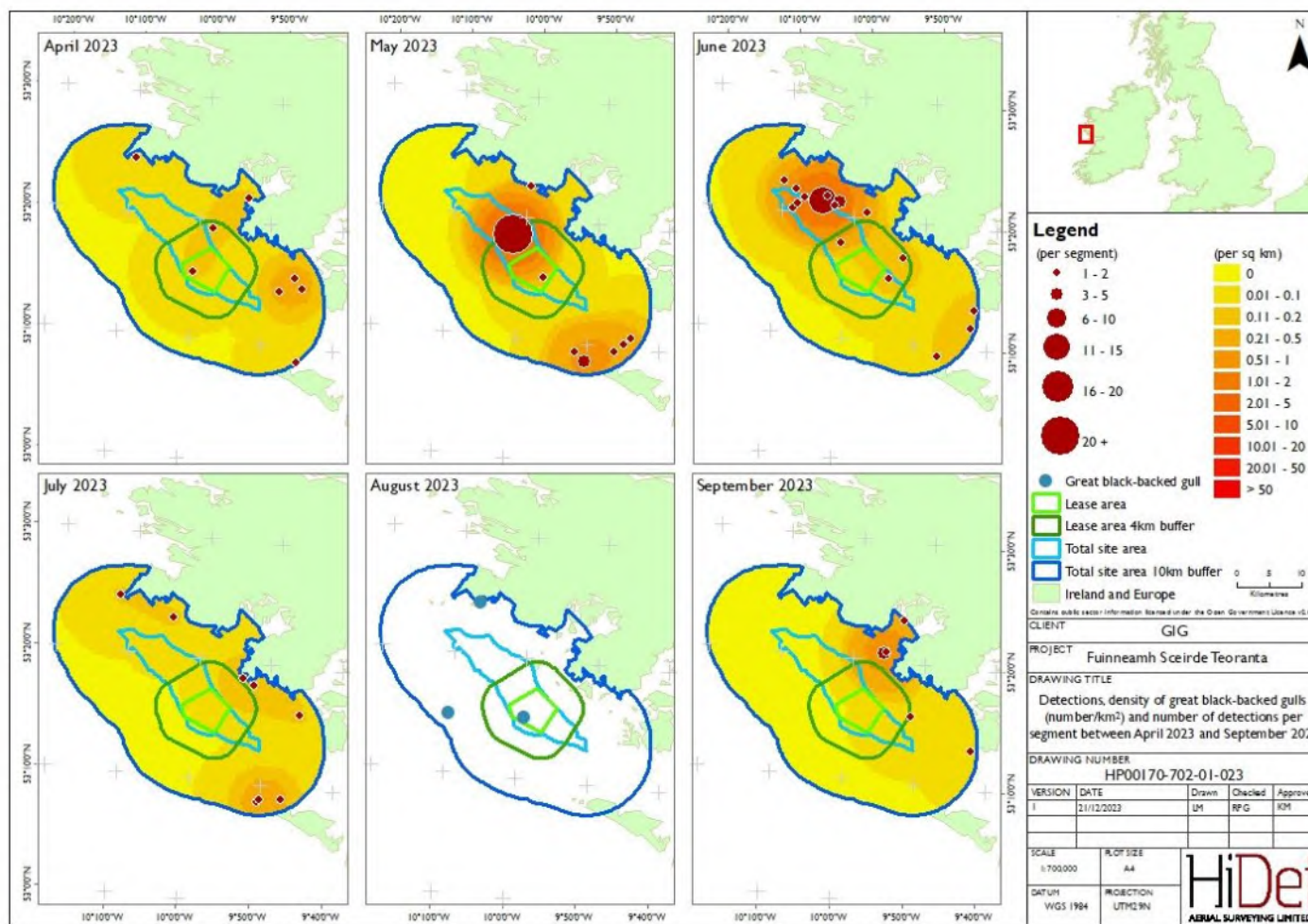
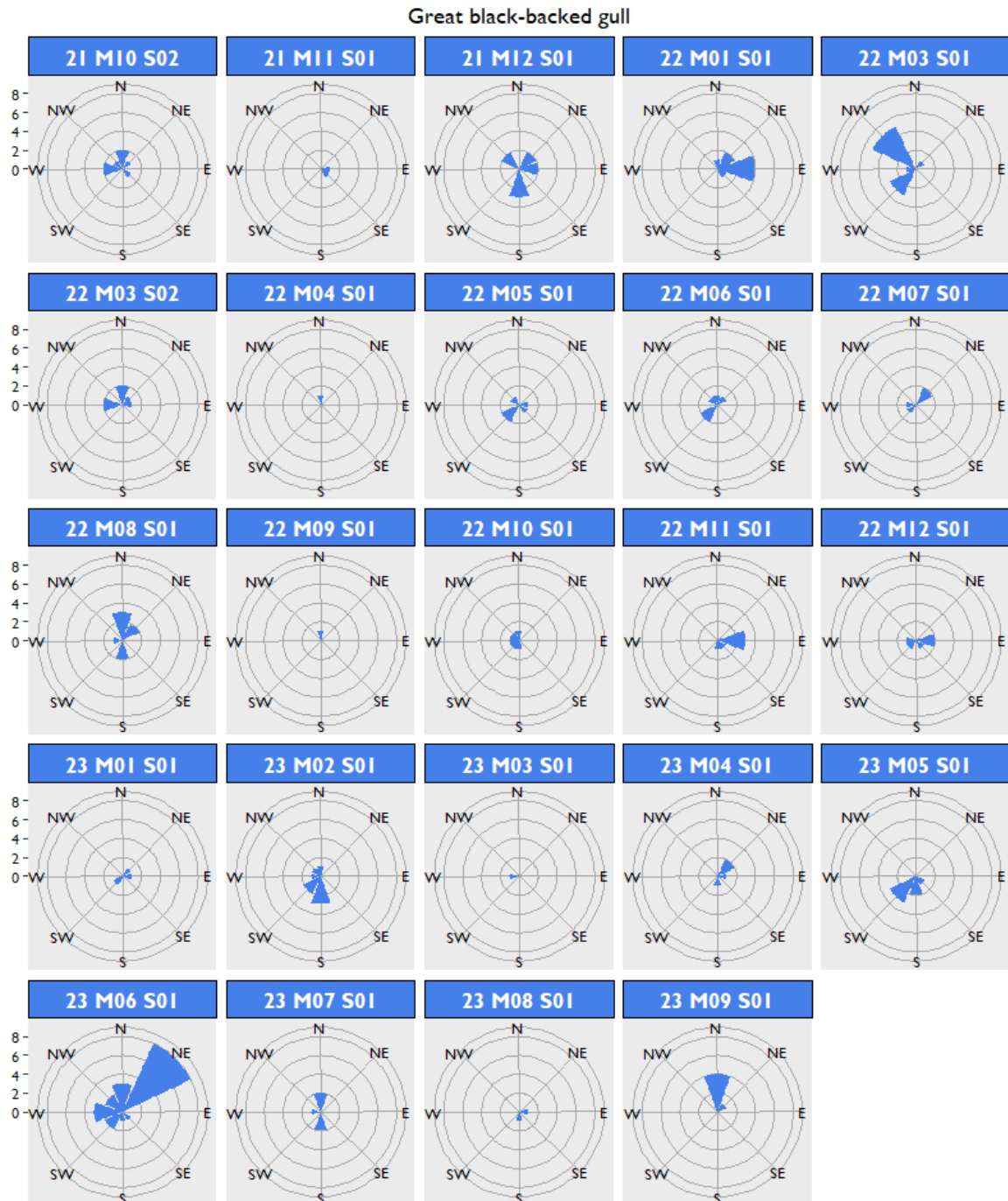


Figure 36 Summarised direction of movement of flying great black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.6 Herring gull

- 96 Herring gull was recorded in relatively low numbers throughout the survey period, with a large peak in November 2021 of 142 birds (Figure 37), with the next peak in July 2022. The lowest number of herring gull was recorded in March Survey 02 and April 2022.
- 97 Density estimates for the species when observed ranged between 0.05 birds/km² (95% CI 0.01 – 0.12) in March 2022 and 1.34 birds/km² (95% CI 0.08 – 3.57) in November 2021 (Figure 38 and Table 20), equating to 50 birds (95% CI 8 – 111) and 1,269 birds (95% CI 74 – 3,373) respectively.
- 98 Density of herring gulls was generally higher in the eastern side of the survey area, particularly in the total buffer area, such as in March Survey 01 and Survey 02 2022, June 2022, October 2022 and July 2023 (Figure 39 to Figure 42). In November 2021, when numbers peaked, higher densities of herring gull were estimated in the south-east of the survey area (Figure 39).
- 99 Of the birds that could be aged, 79% were recorded as adults, with the highest number of juvenile birds recorded in August 2022. Immature birds were recorded in all months except April and May 2022 with a total of 123 birds recorded across the 24-month survey period (Table 21).
- 100 Over the survey period, 38% of birds were recorded flying, with a large proportion of birds recorded sitting on the water in November 2021 (Table 22).
- 101 Herring gull was recorded flying in all months and flight direction data are displayed in Figure 43. In November 2021, birds were recorded flying in southerly directions, whereas in March Survey 01 2022, more birds were flying north. During the summer months of July and August 2022, herring gulls were recorded flying south to south-west and west to north respectively. Between April to June 2023, flying directions recorded were more variable.

Figure 37 Number of herring gulls recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

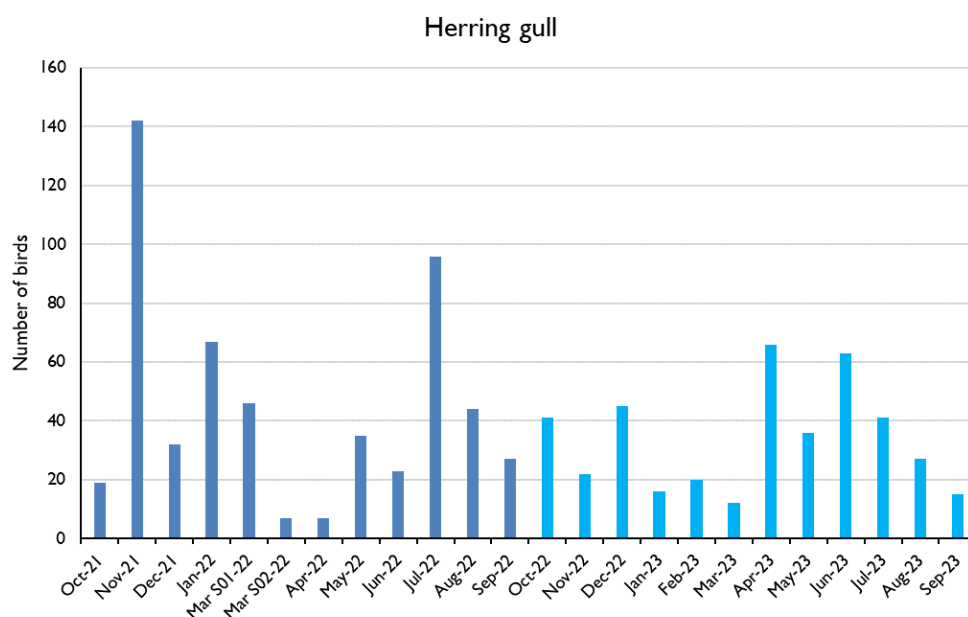


Figure 38 Herring gull density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

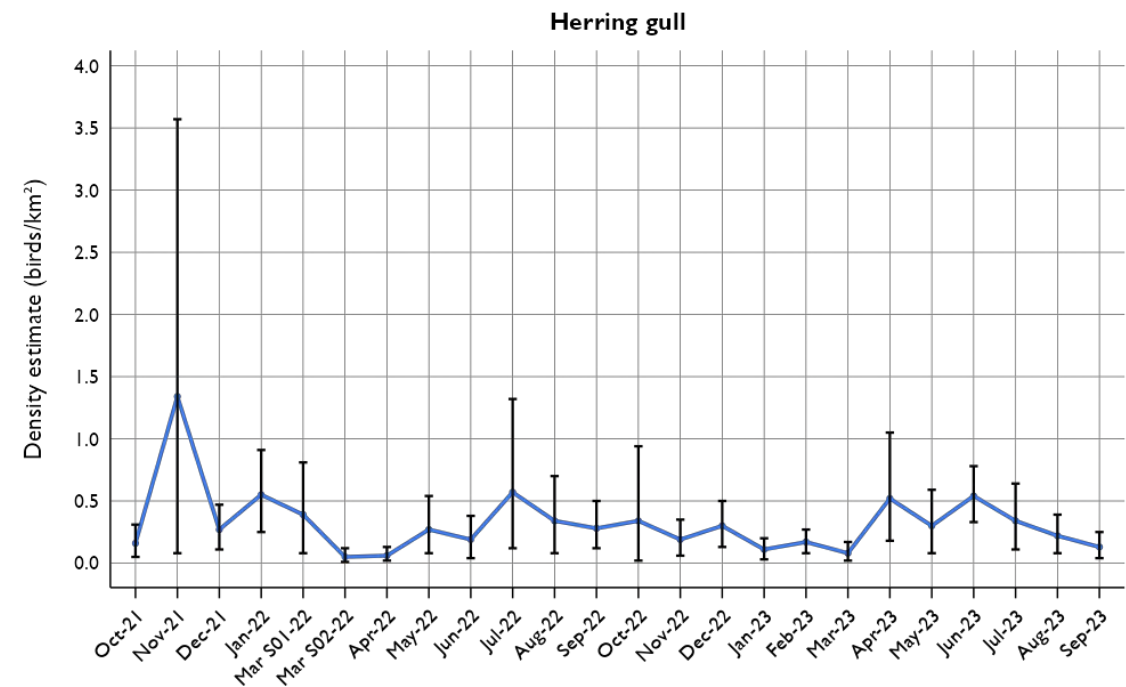


Table 20 **Density and population estimates of herring gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.16	151	48	295	64	41.81
27 November 2021	1.34	1269	74	3373	971	76.44
10 December 2021	0.27	251	106	441	78	30.89
21 January 2022	0.55	516	237	861	154	29.70
01 March 2022	0.39	366	80	767	175	47.55
19 March 2022	0.05	50	8	111	23	44.94
01 April 2022	0.06	58	16	119	28	48.28
27 May 2022	0.27	258	80	513	103	39.81
18 June 2022	0.19	181	41	361	81	44.25
11 July 2022	0.57	536	109	1246	257	47.85
06 August 2022	0.34	321	75	664	119	36.79
01 September 2022	0.28	267	112	470	89	33.13
17 October 2022	0.34	325	23	883	232	71.15
29 November 2022	0.19	180	53	327	62	34.26
22 December 2022	0.30	282	127	468	76	26.64
19 January 2023	0.11	101	29	190	31	30.23
09 February 2023	0.17	156	71	253	43	27.20
04 March 2023	0.08	73	16	157	29	39.73
18 April 2023	0.52	487	170	989	203	41.57
02 May 2023	0.30	282	73	559	125	44.02
03 June 2023	0.54	506	313	740	101	19.84
19 July 2023	0.34	323	106	600	116	35.71
17 August 2023	0.22	207	78	365	66	31.70
16 September 2023	0.13	121	41	233	46	37.34

Table 21 Summary of herring gull ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	12	7	0	0	63	19
27 November 2021	29	8	0	105	78	142
10 December 2021	22	8	1	1	71	32
21 January 2022	60	7	0	0	90	67
01 March 2022	26	17	0	3	60	46
19 March 2022	5	2	0	0	71	7
01 April 2022	7	0	0	0	100	7
27 May 2022	0	0	0	35	0	35
18 June 2022	18	5	0	0	78	23
11 July 2022	86	6	0	4	93	96
06 August 2022	25	7	8	4	62	44
01 September 2022	14	2	0	11	88	27
17 October 2022	26	5	1	9	81	41
29 November 2022	17	3	2	0	77	22
22 December 2022	25	7	4	9	69	45
19 January 2023	7	4	0	5	64	16
09 February 2023	13	3	1	3	76	20
04 March 2023	11	1	0	0	92	12
18 April 2023	44	11	0	11	80	66
02 May 2023	13	8	0	15	62	36
03 June 2023	47	6	0	10	89	63
19 July 2023	39	1	1	0	95	41
17 August 2023	14	2	5	6	67	27
16 September 2023	8	3	3	1	57	15
Total	568	123	26	232	79	949

Table 22 Summary of herring gull behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	10	6	0	3	53	19
27 November 2021	0	23	119	0	0	16	142
10 December 2021	0	22	6	0	4	69	32
21 January 2022	0	13	31	0	23	19	67
01 March 2022	0	26	20	0	0	57	46
19 March 2022	0	3	2	0	2	43	7
01 April 2022	0	7	0	0	0	100	7
27 May 2022	0	21	14	0	0	60	35
18 June 2022	0	10	13	0	0	43	23
11 July 2022	0	10	81	0	5	10	96
06 August 2022	0	31	12	0	1	70	44
01 September 2022	0	6	20	1	0	22	27
17 October 2022	0	12	29	0	0	29	41
29 November 2022	0	12	10	0	0	55	22
22 December 2022	0	23	22	0	0	51	45
19 January 2023	0	6	10	0	0	38	16
09 February 2023	0	7	11	0	2	35	20
04 March 2023	0	12	0	0	0	100	12
18 April 2023	0	24	41	0	1	36	66
02 May 2023	0	13	13	0	10	36	36
03 June 2023	0	39	23	0	1	62	63
19 July 2023	0	16	11	0	14	39	41
17 August 2023	0	6	9	0	12	22	27
16 September 2023	0	7	7	0	1	47	15
Total	0	359	510	1	79	38	949

Figure 39 Density of herring gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

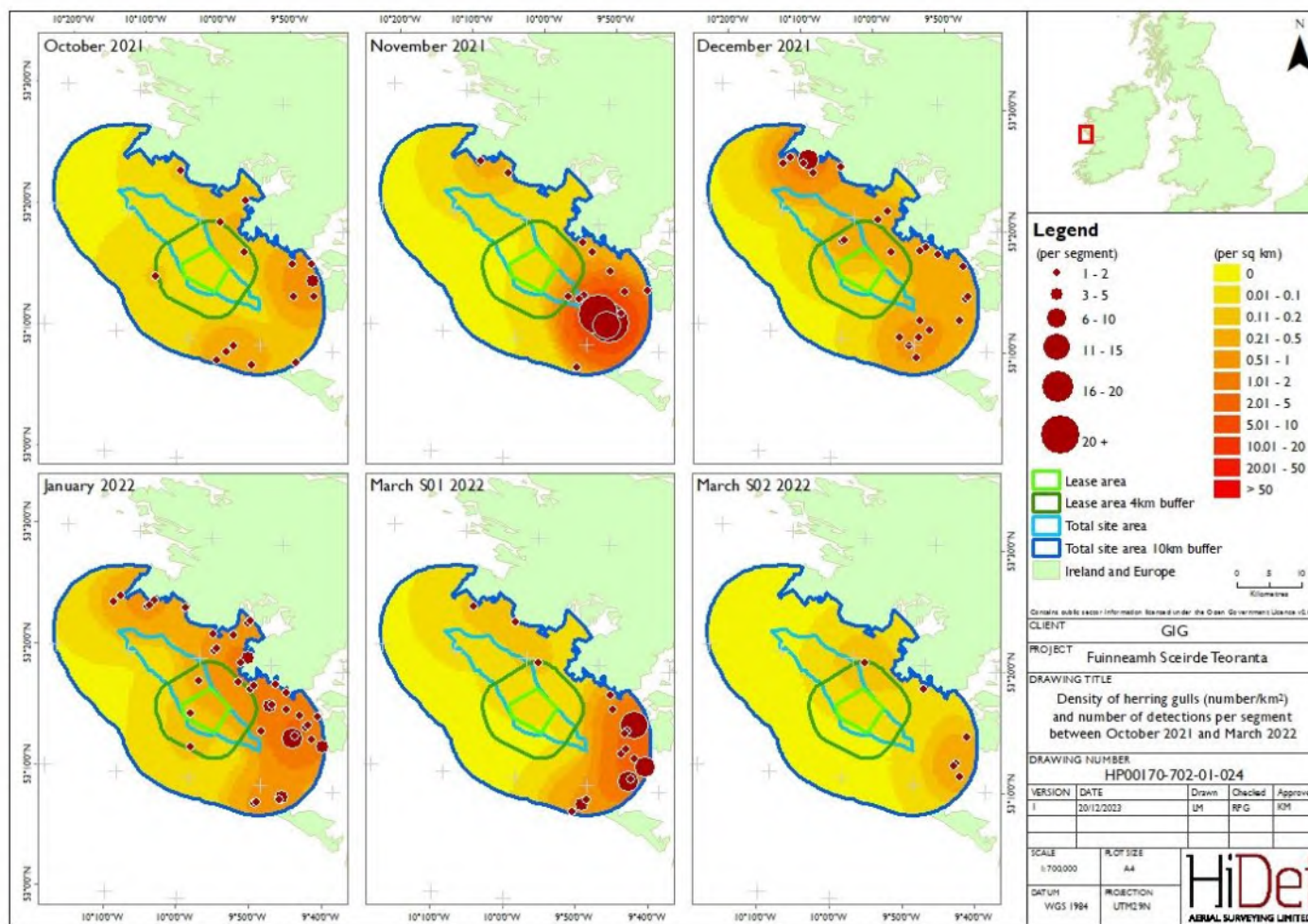


Figure 40 Detections, density of herring gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

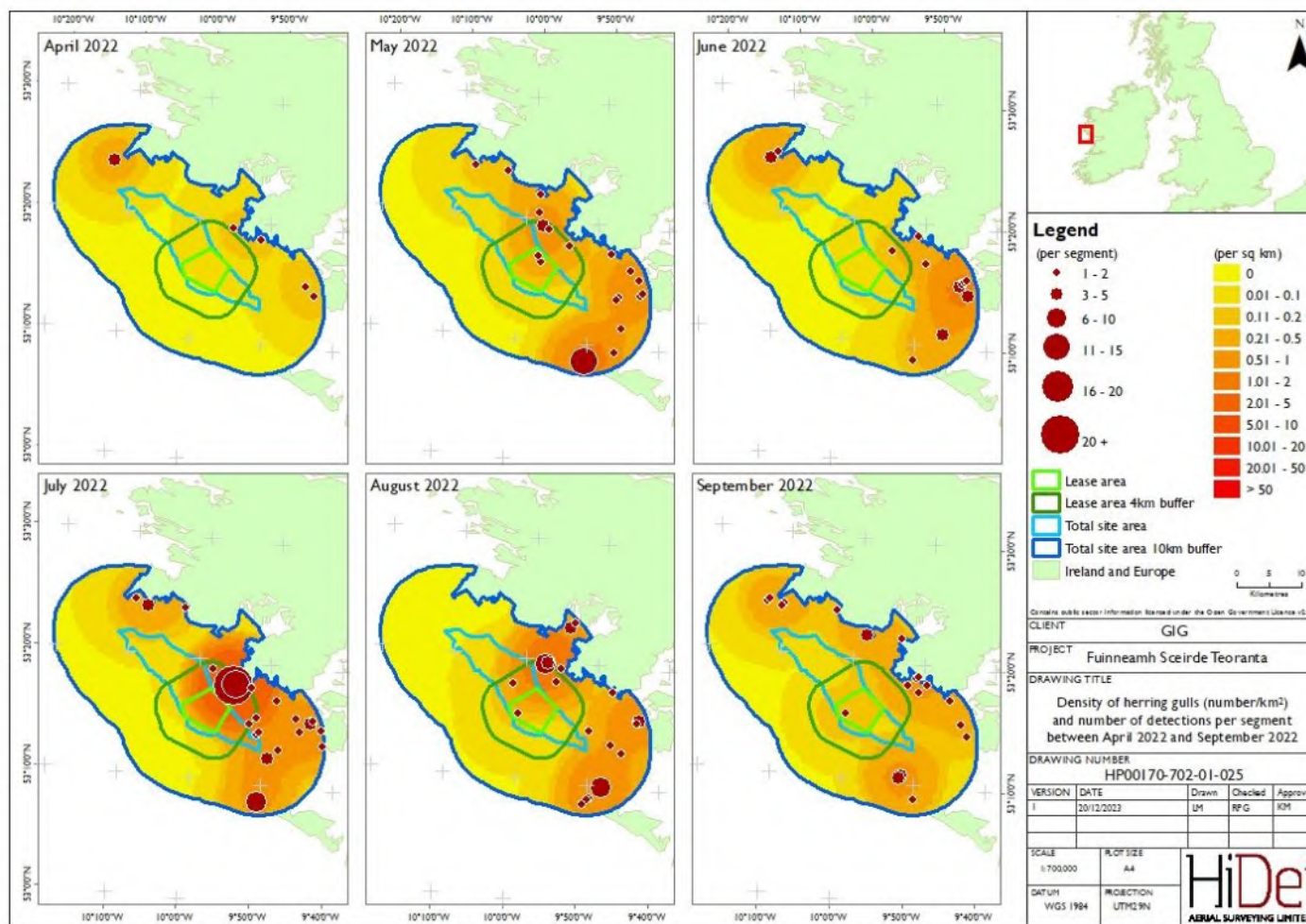


Figure 41 Density of herring gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

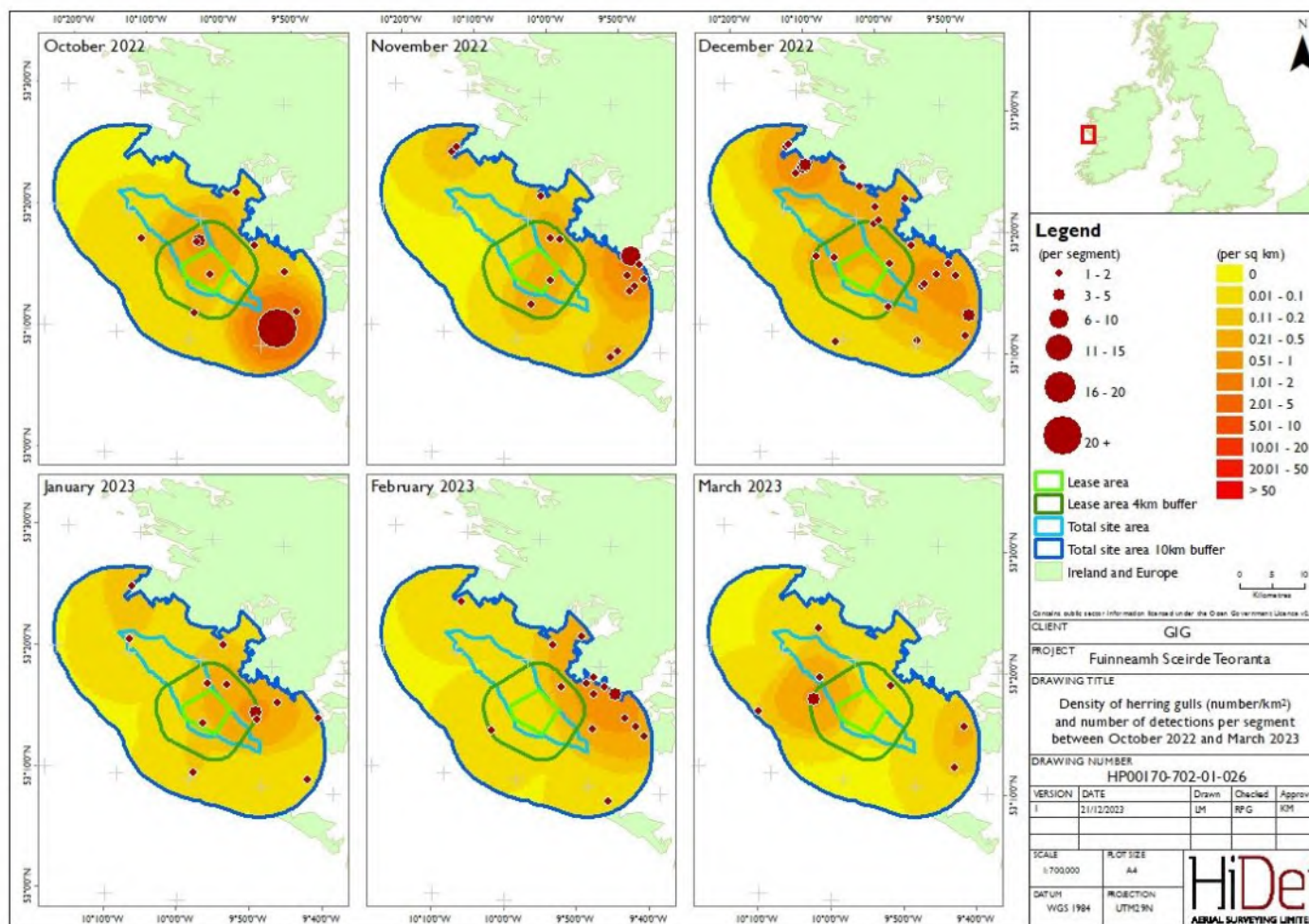


Figure 42 Detections, density of herring gulls (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

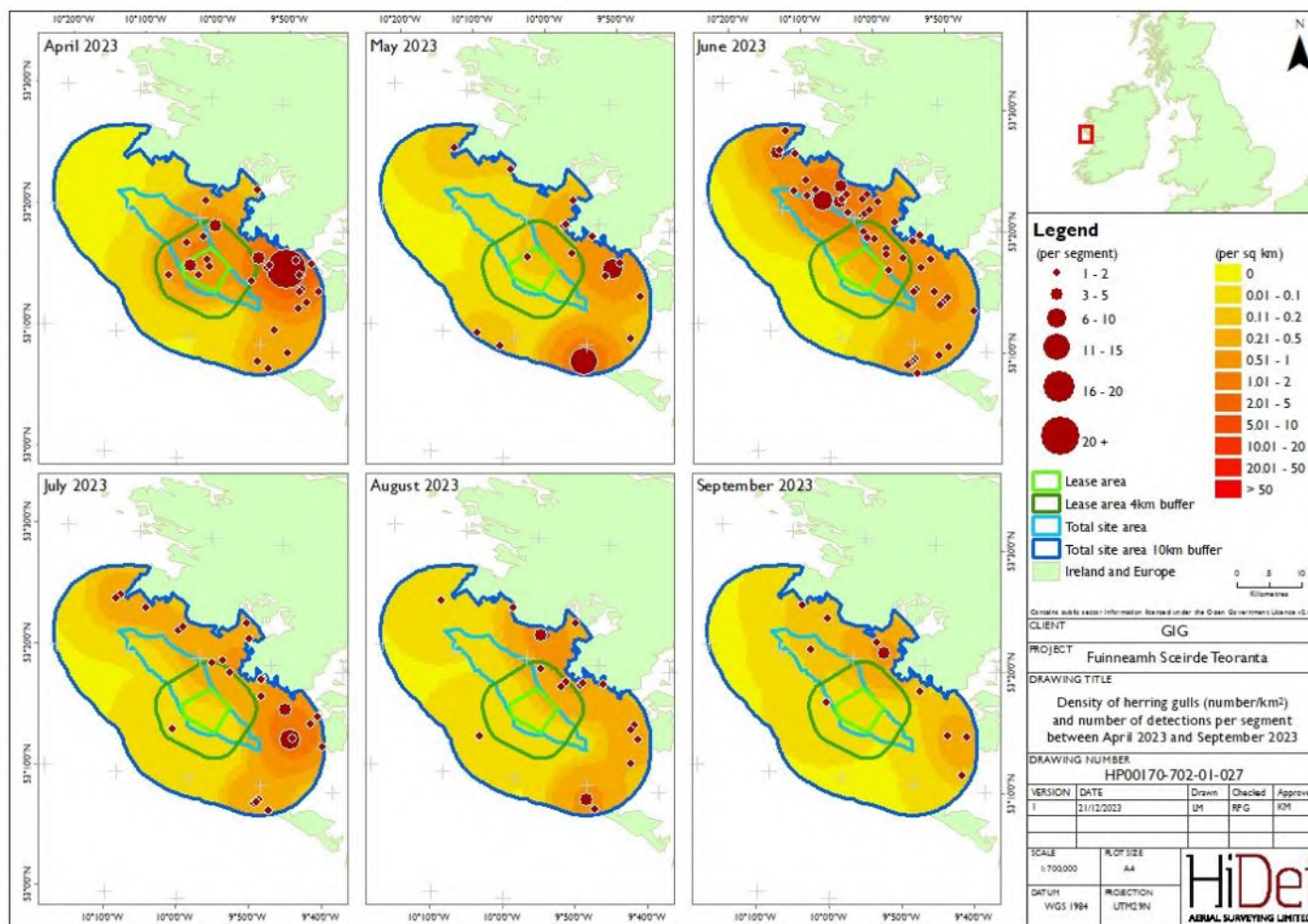
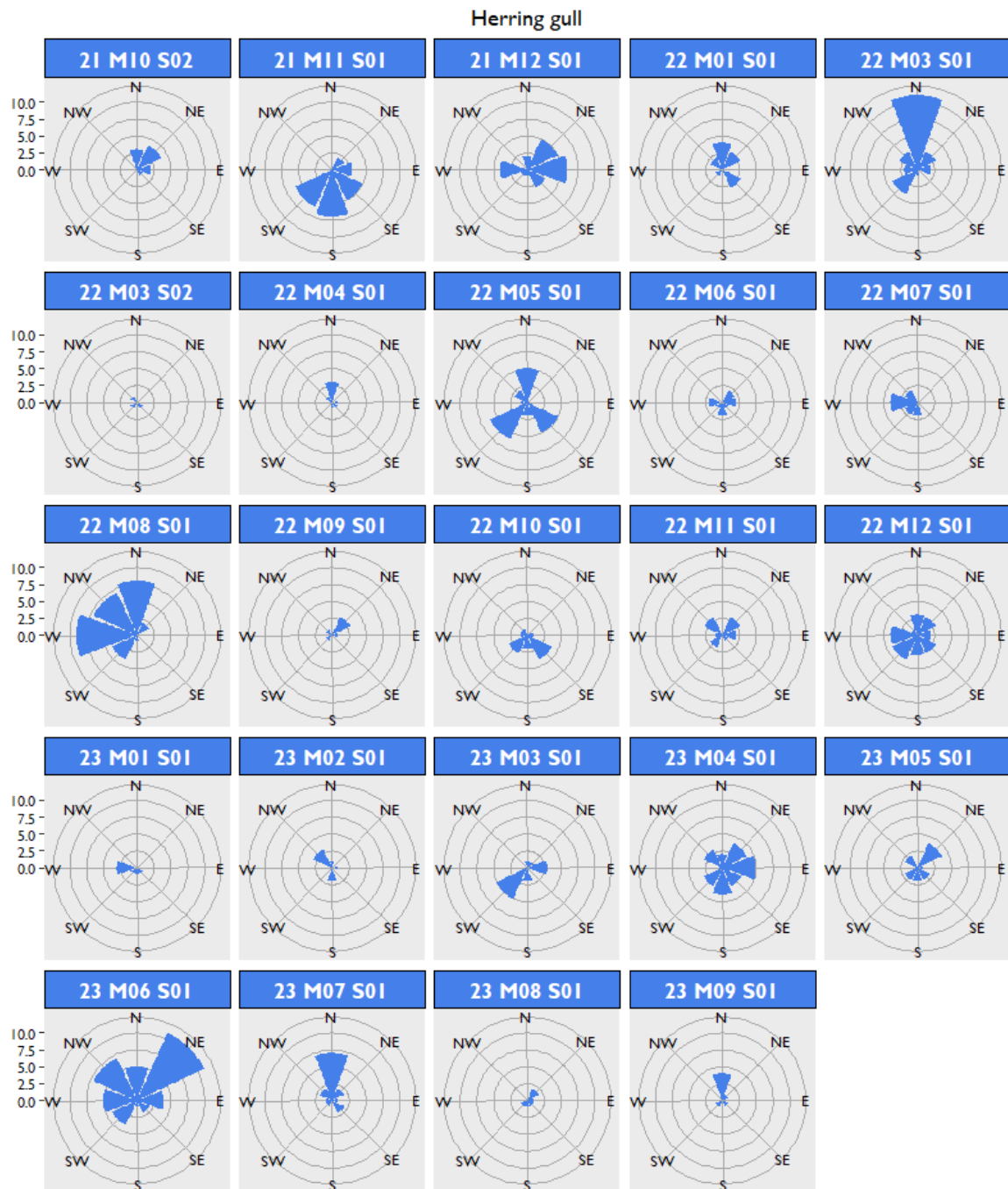


Figure 43 Summarised direction of movement of flying herring gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.7 Lesser black-backed gull

- 102 Lesser black-backed gull (*Larus fuscus*) was recorded in relatively low numbers throughout the survey period, with a peak in June 2023 of 50 birds (Figure 44). The species was not recorded in the winter months between December 2021 and March Survey 01 2022, and October 2022 to March 2023.
- 103 Density estimates for the species when observed ranged between 0.01 birds/km² (95% CI 0.00 – 0.03) in April 2022 and 0.38 birds/km² (95% CI 0.16 – 0.66) in June 2023 (Figure 45 and Table 23), equating to 8 birds (95% CI 0 – 25) and 356 birds (95% CI 148 – 627) respectively.
- 104 Density of lesser black-backed gull was generally higher in the south of the total site buffer in the March Survey 2022 (Figure 46). Between May and July 2022, higher densities were estimated in the north and east of the lease area buffer (Figure 47). In May and June 2023, higher densities were estimated towards the south and north of the total site buffer respectively (Figure 48). There were no observations recorded between October 2022 and March 2023, therefore no map has been presented.
- 105 Of the birds that could be aged, 97% were recorded as adults. No juvenile birds were recorded across the survey period and only 5 records in total of immature birds with one in March 2022, three in June 2023 and one in September 2023 (Table 24).
- 106 Over the survey period, 54% of birds were recorded flying, primarily during the summer months between April and September 2022 and 2023 (Table 25).
- 107 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 49). In June 2023, when numbers peaked, birds were mainly heading in north-easterly directions.

Figure 44 Number of lesser black-backed gulls recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

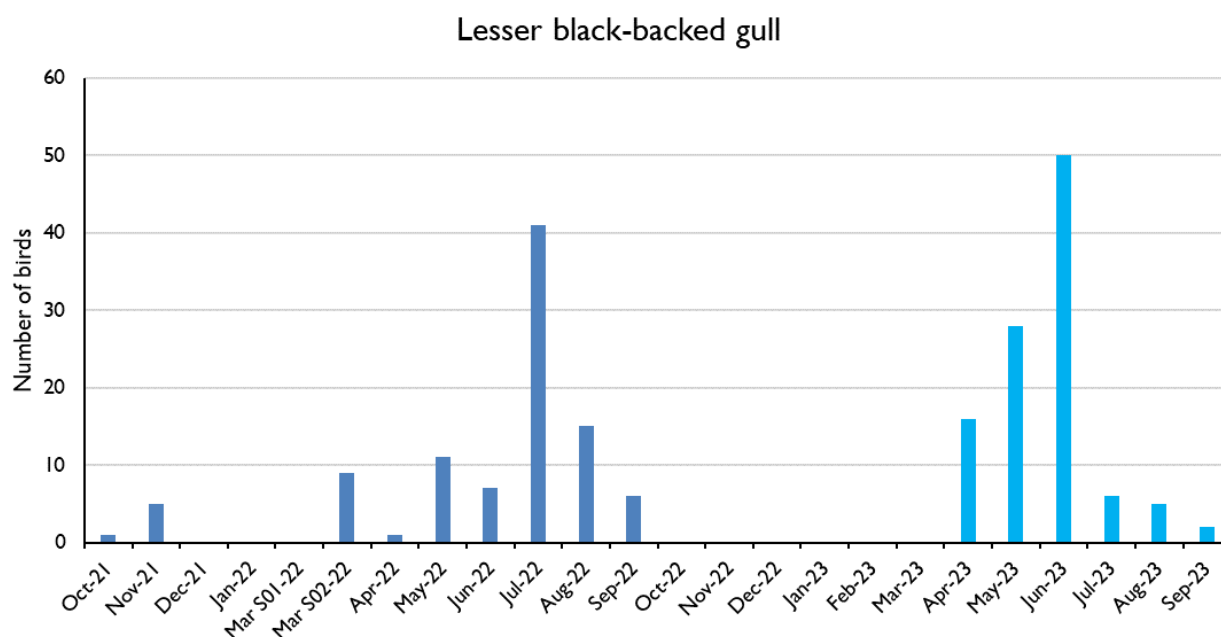


Figure 45 Lesser black-backed gull density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

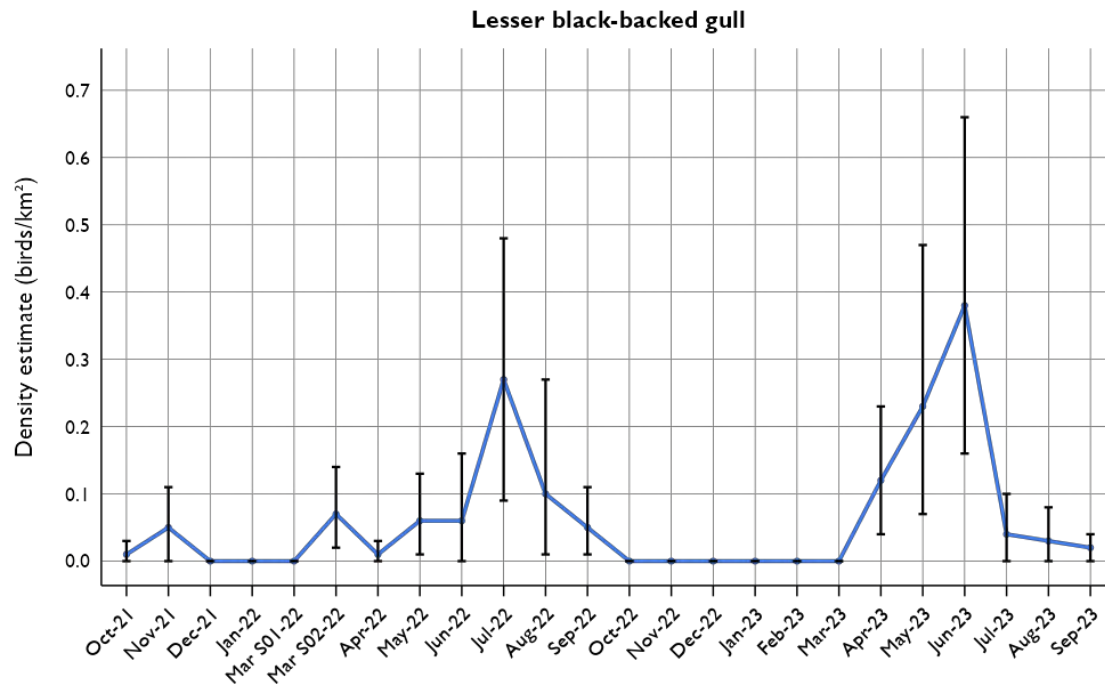


Table 23 **Density and population estimates of lesser black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.01	9	0	25	8	88.89
27 November 2021	0.05	44	0	105	28	63.64
10 December 2021	0.00	0	0	0	0	0.00
21 January 2022	0.00	0	0	0	0	0.00
01 March 2022	0.00	0	0	0	0	0.00
19 March 2022	0.07	68	16	132	28	40.14
01 April 2022	0.01	8	0	25	8	100.00
27 May 2022	0.06	60	8	127	23	37.01
18 June 2022	0.06	56	0	147	37	64.68
11 July 2022	0.27	254	84	455	73	28.53
06 August 2022	0.1	96	8	256	54	55.44
01 September 2022	0.05	49	8	104	23	46.04
17 October 2022	0.00	0	0	0	0	0.00
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.00	0	0	0	0	0.00
19 January 2023	0.00	0	0	0	0	0.00
09 February 2023	0.00	0	0	0	0	0.00
04 March 2023	0.00	0	0	0	0	0.00
18 April 2023	0.12	114	38	220	41	35.11
02 May 2023	0.23	216	64	441	92	42.29
03 June 2023	0.38	356	148	627	104	29.17
19 July 2023	0.04	42	0	97	21	49.08
17 August 2023	0.03	33	0	75	14	42.21
16 September 2023	0.02	17	0	42	12	70.59

Table 24 Summary of lesser black-backed gull ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	1	0	0	0	100	1
27 November 2021	5	0	0	0	100	5
10 December 2021	0	0	0	0	-	0
21 January 2022	0	0	0	0	-	0
01 March 2022	0	0	0	0	-	0
19 March 2022	8	1	0	0	89	9
01 April 2022	1	0	0	0	100	1
27 May 2022	0	0	0	11	0	11
18 June 2022	5	0	0	2	100	7
11 July 2022	36	0	0	5	100	41
06 August 2022	15	0	0	0	100	15
01 September 2022	6	0	0	0	100	6
17 October 2022	0	0	0	0	-	0
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	0	0	0	-	0
09 February 2023	0	0	0	0	-	0
04 March 2023	0	0	0	0	-	0
18 April 2023	12	0	0	4	100	16
02 May 2023	24	0	0	4	100	28
03 June 2023	47	3	0	0	94	50
19 July 2023	6	0	0	0	100	6
17 August 2023	5	0	0	0	100	5
16 September 2023	1	1	0	0	50	2
Total	172	5	0	26	97	203

Table 25 Summary of lesser black-backed gull behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	0	1	0	0	0	1
27 November 2021	0	3	2	0	0	60	5
10 December 2021	0	0	0	0	0	-	0
21 January 2022	0	0	0	0	0	-	0
01 March 2022	0	0	0	0	0	-	0
19 March 2022	0	7	2	0	0	78	9
01 April 2022	0	1	0	0	0	100	1
27 May 2022	0	9	2	0	0	82	11
18 June 2022	0	1	6	0	0	14	7
11 July 2022	0	9	32	0	0	22	41
06 August 2022	0	13	2	0	0	87	15
01 September 2022	0	2	4	0	0	33	6
17 October 2022	0	0	0	0	0	-	0
29 November 2022	0	0	0	0	0	-	0
22 December 2022	0	0	0	0	0	-	0
19 January 2023	0	0	0	0	0	-	0
09 February 2023	0	0	0	0	0	-	0
04 March 2023	0	0	0	0	0	-	0
18 April 2023	0	9	7	0	0	56	16
02 May 2023	0	10	17	0	1	36	28
03 June 2023	0	34	16	0	0	68	50
19 July 2023	0	5	1	0	0	83	6
17 August 2023	0	5	0	0	0	100	5
16 September 2023	0	2	0	0	0	100	2
Total	0	110	92	0	1	54	203

Figure 46 Detections, density (number/km²) and number of detections per segment of lesser black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

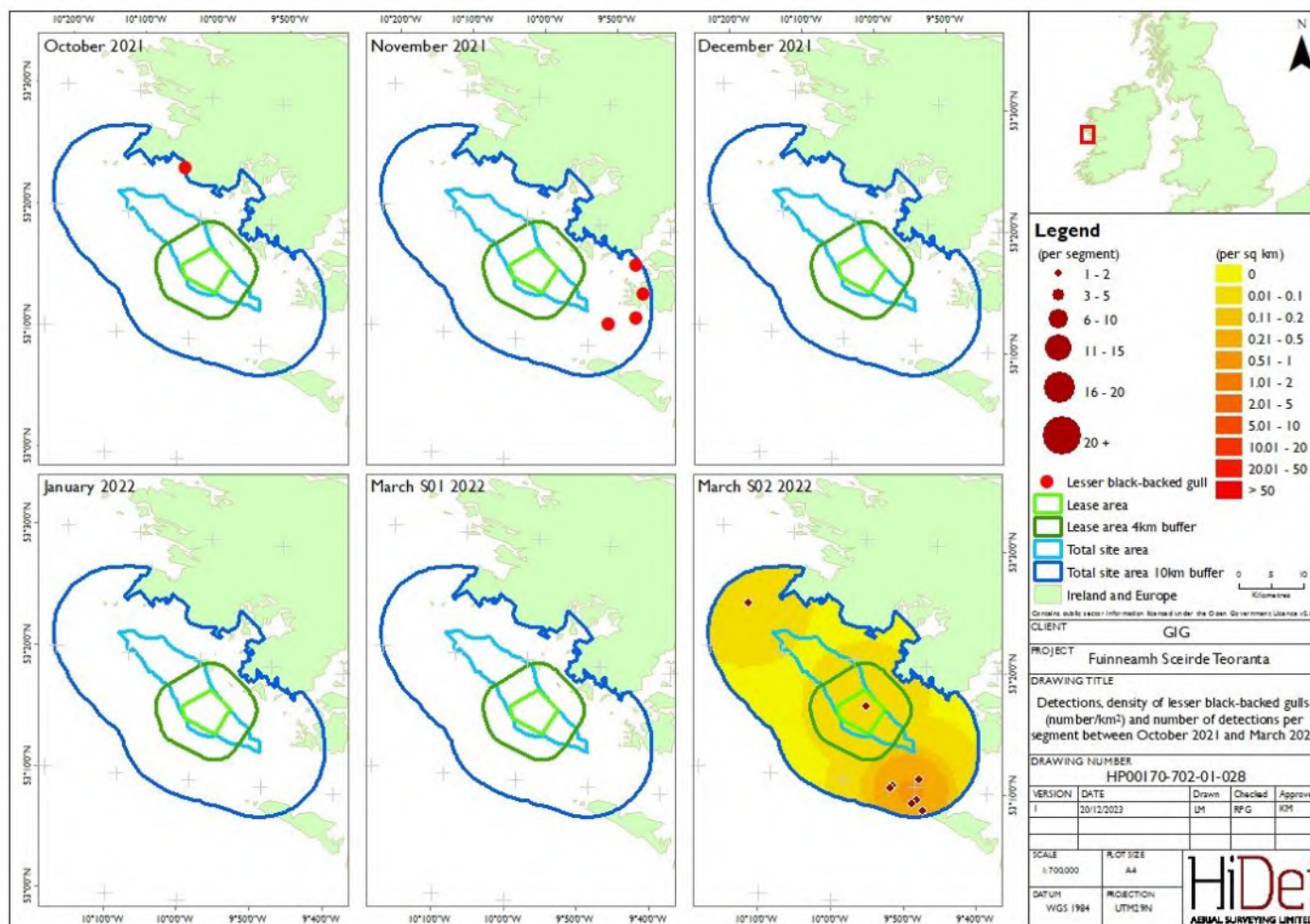


Figure 47 Detections, density (number/km²) and number of detections per segment of lesser black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

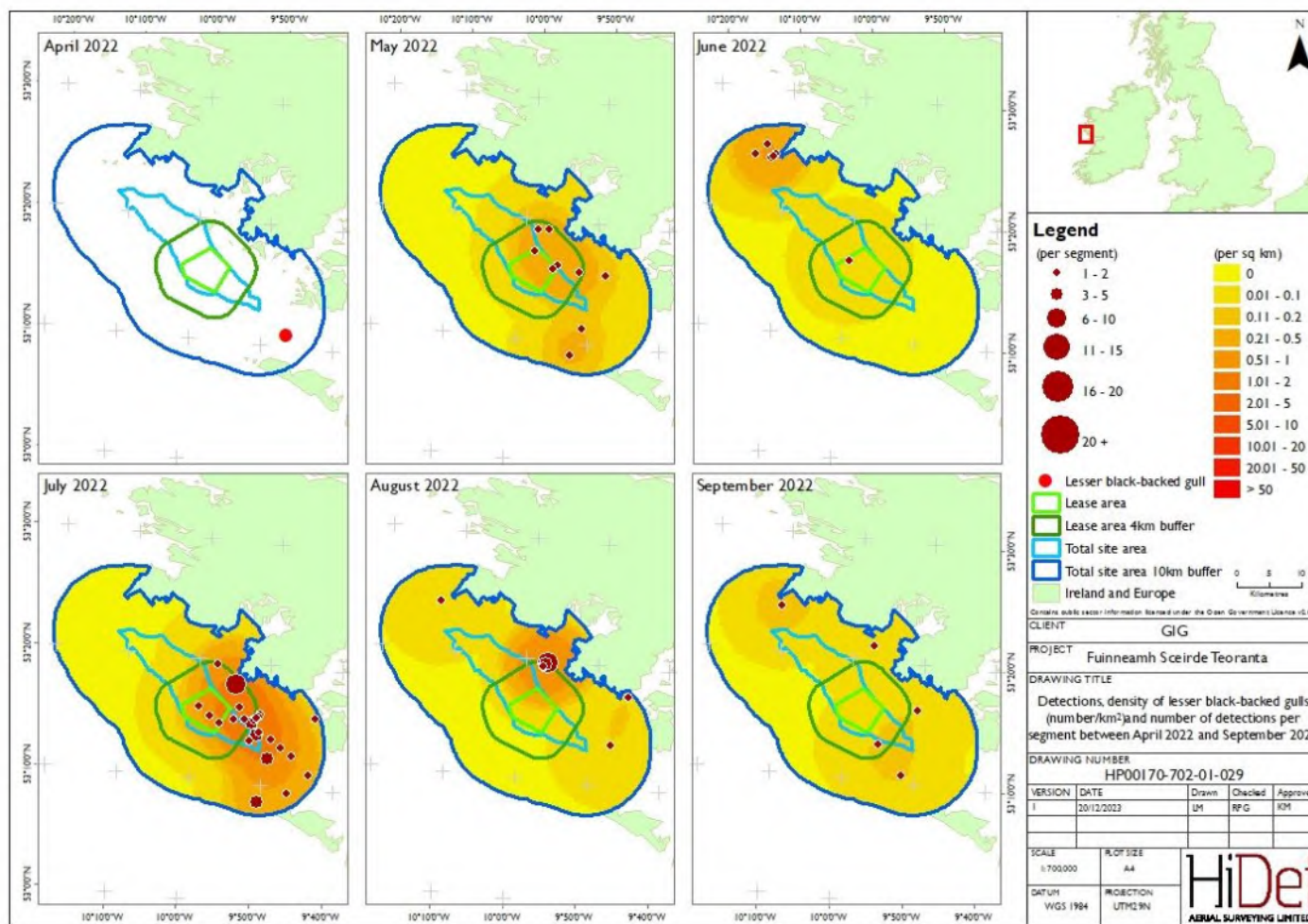


Figure 48 Detections, density (number/km²) and number of detections per segment of lesser black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

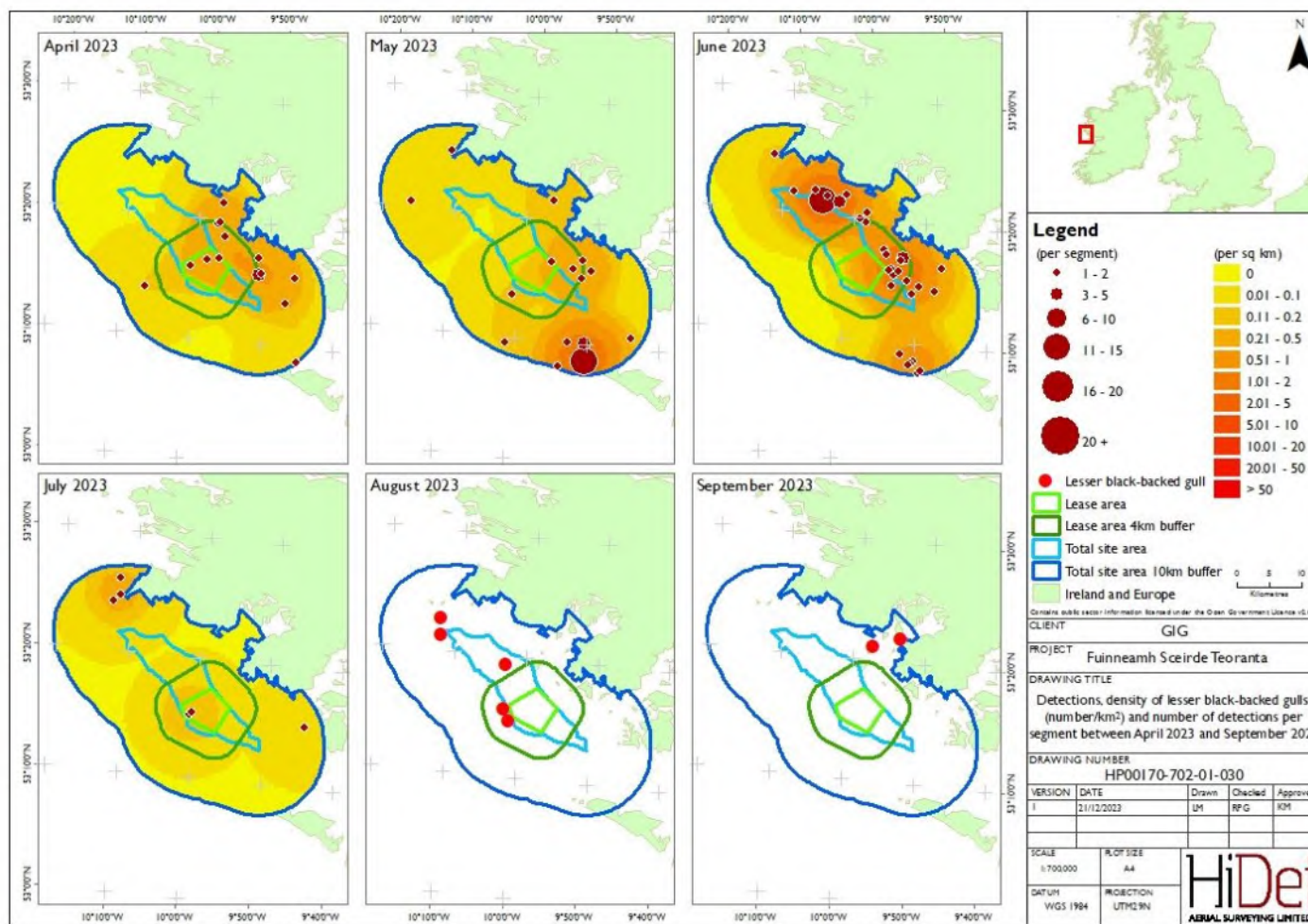
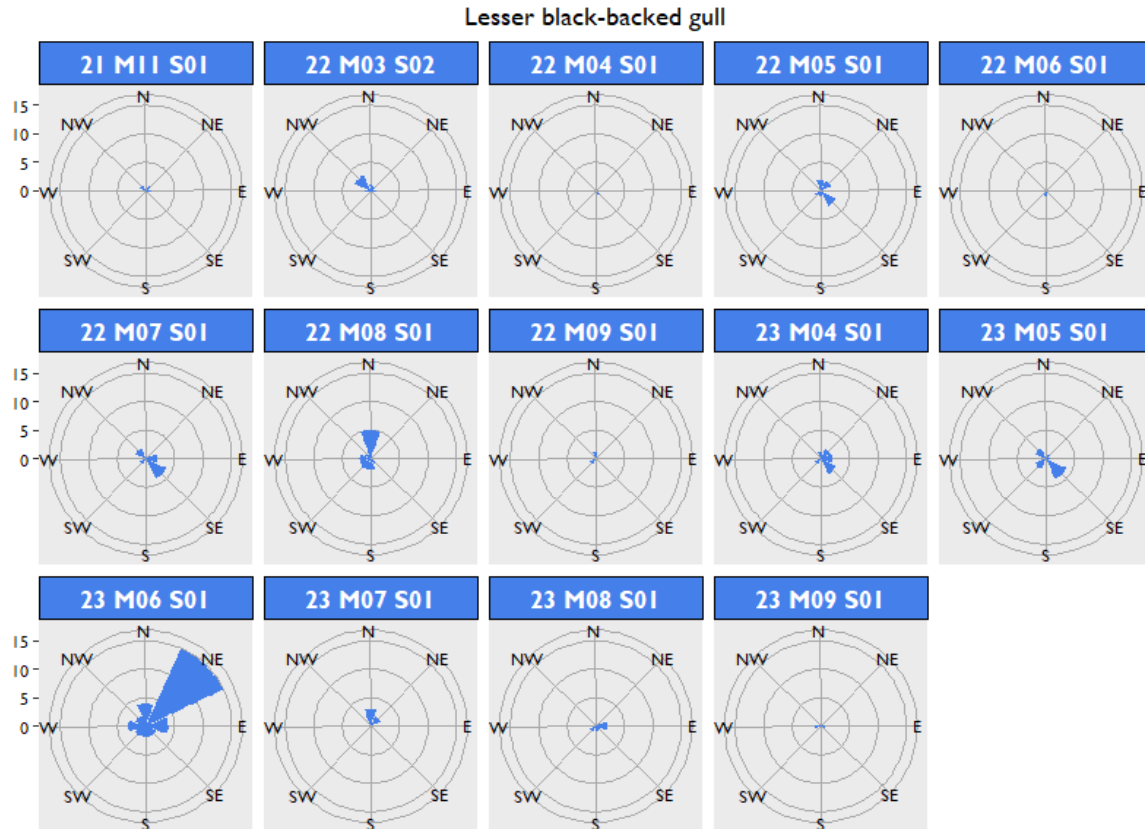


Figure 49 Summarised direction of movement of flying lesser black-backed gulls in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.8 Common tern

- 108 Common tern was recorded in relatively low numbers from May to September 2022. This was similar for the year from April to June 2023 before increasing and peaking in July 2023. No common terns were recorded in the winter months between October 2021 and April 2022 and October 2022 and March 2023 (Figure 50).
- 109 Density estimates for the species when recorded ranged between 0.05 birds/km² (95% CI 0.00 – 0.10) in June 2023 and 0.56 birds/km² (95% CI 0.21 – 0.97) in July 2023 (Figure 51 and Table 26), equating to 44 birds (95% CI 2 – 93) and 529 birds (95% CI 201– 914) respectively.
- 110 Common tern was found throughout the survey area in the months they were recorded, with higher densities recorded in the south of the total buffer area in September 2022 (Figure 52) and north-east of the total site buffer area in August 2023 (Figure 53). In July 2022 and 2023, common terns were widespread across the survey area, with higher estimates in the lease area buffer for the latter month.
- 111 Over the survey period, 89% of birds were recorded flying, with 100% of birds recorded flying in seven out of the ten months they were observed (Table 27).
- 112 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 54). In July 2022, birds were mainly heading south-west, while in July 2023, when numbers peaked, the species were flying in westerly to northerly directions and in August 2023, most birds were recorded flying south-east.

Figure 50 Number of common terns recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

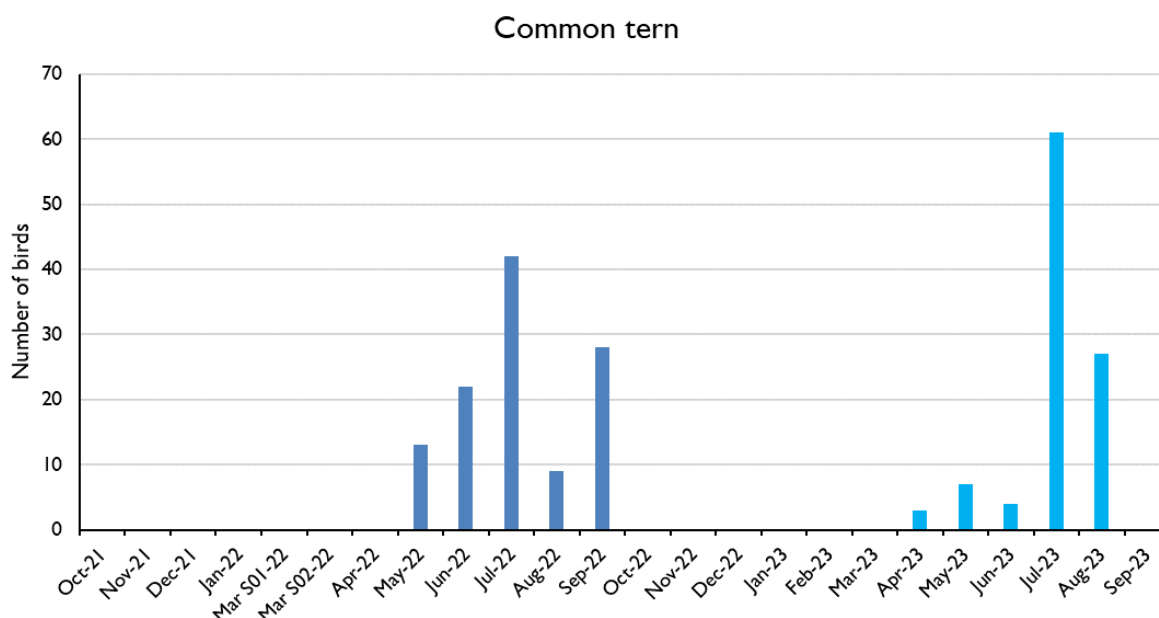


Figure 51 Common tern density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

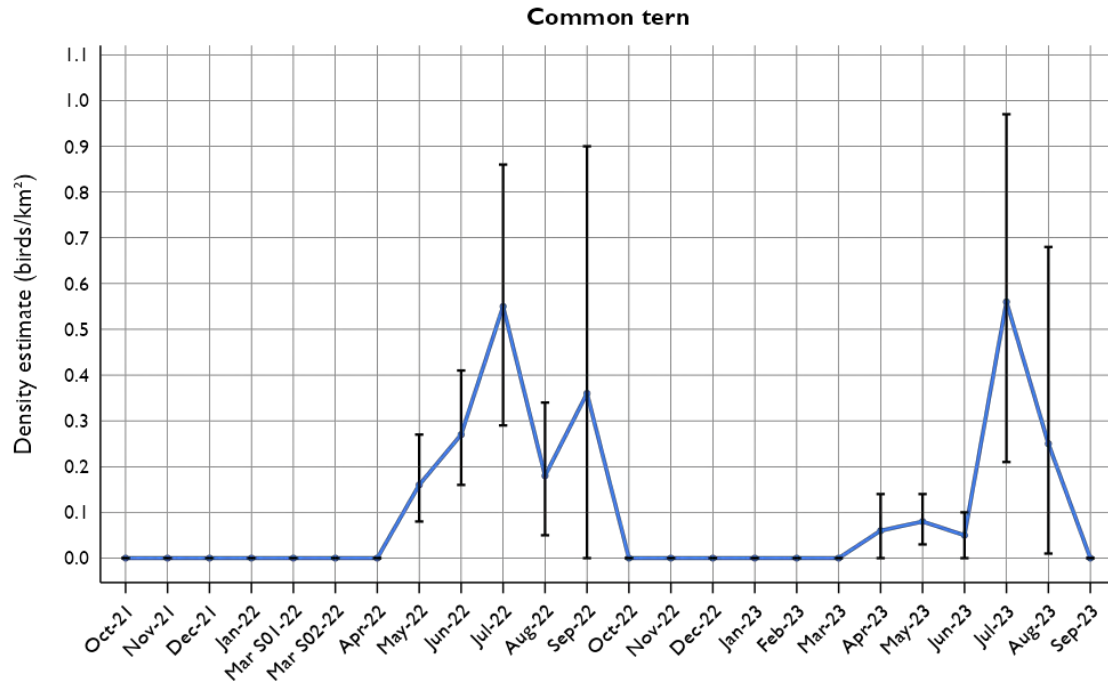


Table 26 **Density and population estimates of common terns in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.00	0	0	0	0	0.00
27 November 2021	0.00	0	0	0	0	0.00
10 December 2021	0.00	0	0	0	0	0.00
21 January 2022	0.00	0	0	0	0	0.00
01 March 2022	0.00	0	0	0	0	0.00
19 March 2022	0.00	0	0	0	0	0.00
01 April 2022	0.00	0	0	0	0	0.00
27 May 2022	0.16	154	75	251	42	26.91
18 June 2022	0.27	259	148	386	57	21.79
11 July 2022	0.55	515	274	816	123	23.73
06 August 2022	0.18	168	49	325	63	37.29
01 September 2022	0.36	339	0	851	230	67.85
17 October 2022	0.00	0	0	0	0	0.00
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.00	0	0	0	0	0.00
19 January 2023	0.00	0	0	0	0	0.00
09 February 2023	0.00	0	0	0	0	0.00
04 March 2023	0.00	0	0	0	0	0.00
18 April 2023	0.06	58	0	130	34	58.62
02 May 2023	0.08	75	24	132	29	38.67
03 June 2023	0.05	44	2	93	19	41.78
19 July 2023	0.56	529	201	914	148	27.88
17 August 2023	0.25	236	8	644	204	86.44
16 September 2023	0.00	0	0	0	0	0.00

Table 27 Summary of common tern behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	0	0	0	-	0
27 November 2021	0	0	0	0	-	0
10 December 2021	0	0	0	0	-	0
21 January 2022	0	0	0	0	-	0
01 March 2022	0	0	0	0	-	0
19 March 2022	0	0	0	0	-	0
01 April 2022	0	0	0	0	-	0
27 May 2022	0	13	0	0	100	13
18 June 2022	0	22	0	0	100	22
11 July 2022	0	42	0	0	100	42
06 August 2022	0	8	1	0	89	9
01 September 2022	0	7	21	0	25	28
17 October 2022	0	0	0	0	-	0
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	0	0	0	-	0
09 February 2023	0	0	0	0	-	0
04 March 2023	0	0	0	0	-	0
18 April 2023	0	3	0	0	100	3
02 May 2023	0	7	0	0	100	7
03 June 2023	0	4	0	0	100	4
19 July 2023	0	60	1	0	98	61
17 August 2023	0	27	0	0	100	27
16 September 2023	0	0	0	0	-	0
Total	0	193	23	0	89	216

Figure 52 Detections, density (number/km²) and number of detections per segment of common terns in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

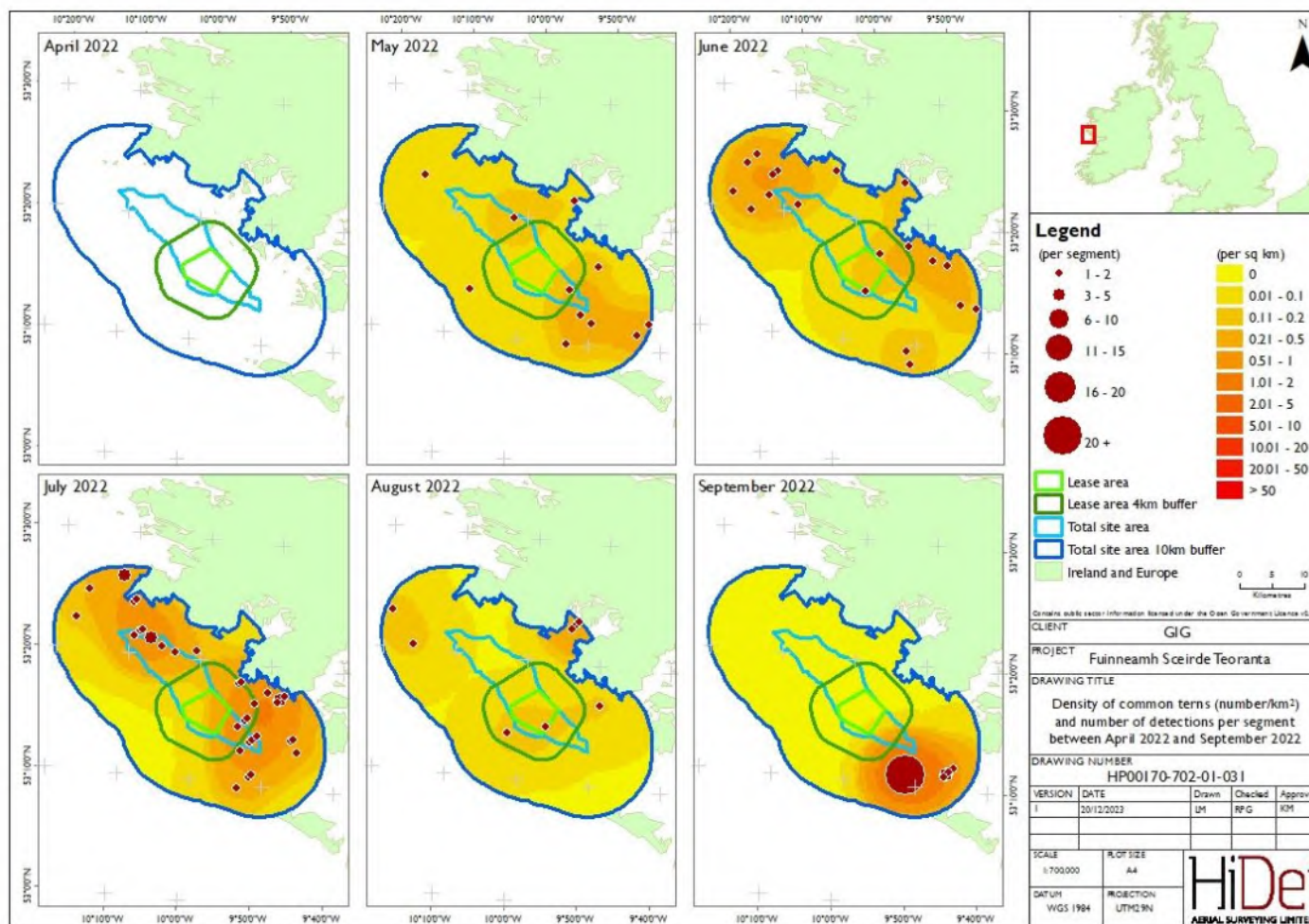


Figure 53 Detections, density (number/km²) and number of detections per segment of common terns in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

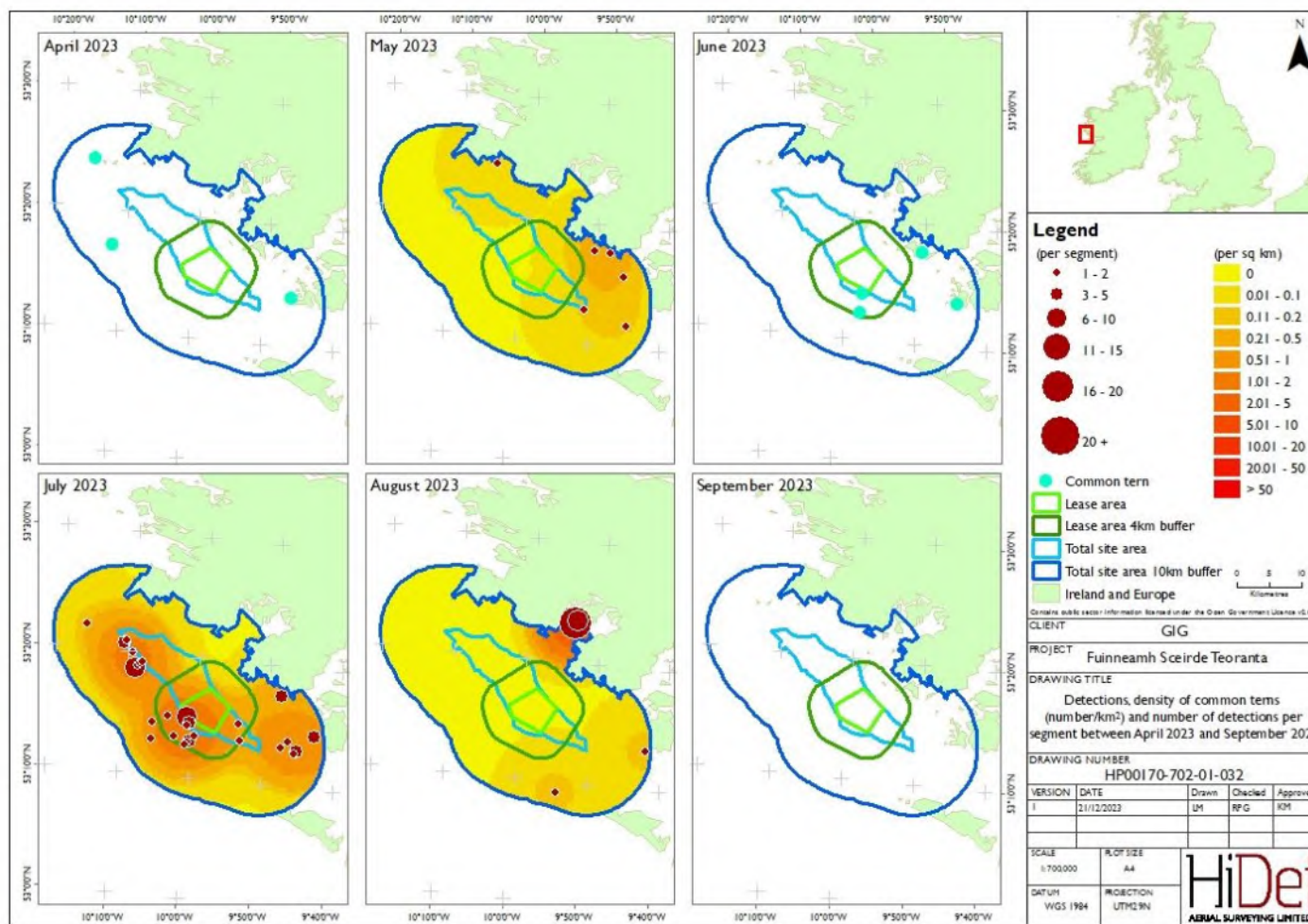
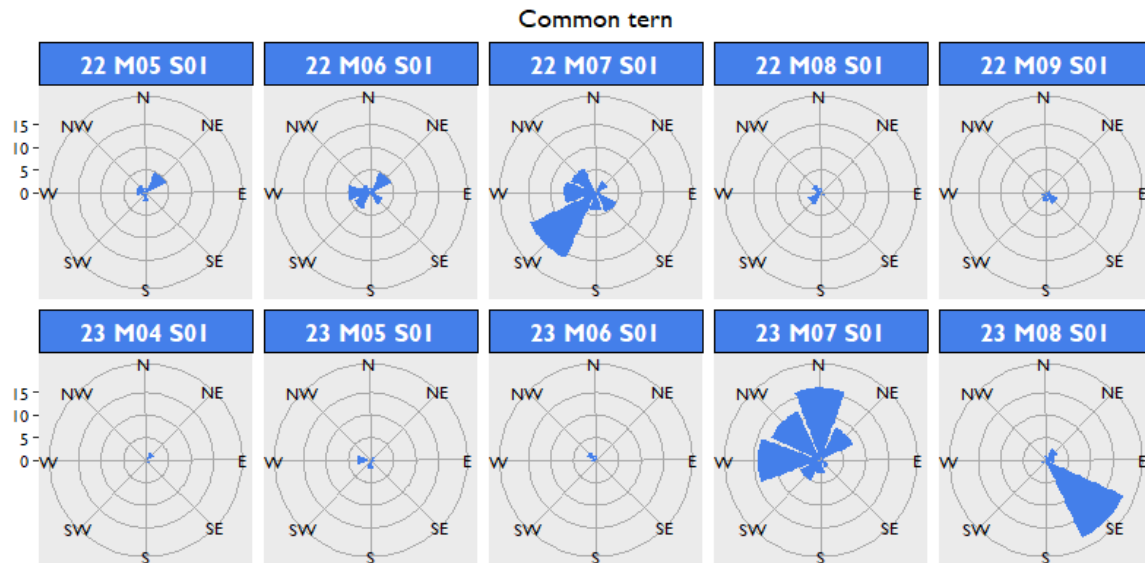


Figure 54 Summarised direction of movement of flying common terns in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.9 Arctic tern

- I 13 Arctic tern was recorded in similar numbers to common tern and in relatively low numbers from May 2022 to August 2022. Peak numbers of the species were recorded in May and July 2023 with 44 and 48 birds respectively (Figure 55). Arctic tern was only recorded in eight of the 24-month survey period and only in summer months, with the exception of one record in October 2022.
- I 14 Density estimates for the species when recorded ranged between 0.01 birds/km² (95% CI 0.00 – 0.03) in October 2022 and 0.60 birds/km² (95% CI 0.24 – 1.05) in May 2023 (Figure 56 and Table 28), equating to 9 birds (95% CI 0 – 25) and 562 birds (95% CI 228 – 993) respectively.
- I 15 Arctic tern was found throughout the survey area, with higher densities recorded in the north-west and north of the survey area, such as in May and August 2022 (Figure 57). In May 2023, higher densities of the species were estimated to the east of the lease area buffer within the total area buffer (Figure 59) whereas in July 2022 and 2023, Arctic terns were widespread across the survey area.
- I 16 Over the survey period, 99% of birds were recorded flying, with 100% of birds recorded flying in all months except for May 2023 (Table 29).
- I 17 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 60). In July 2023, when numbers peaked, flying direction was variable, but with more birds flying in northerly and westerly directions. In May 2023 in the second peak, more birds were flying east.

Figure 55 Number of Arctic terns recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

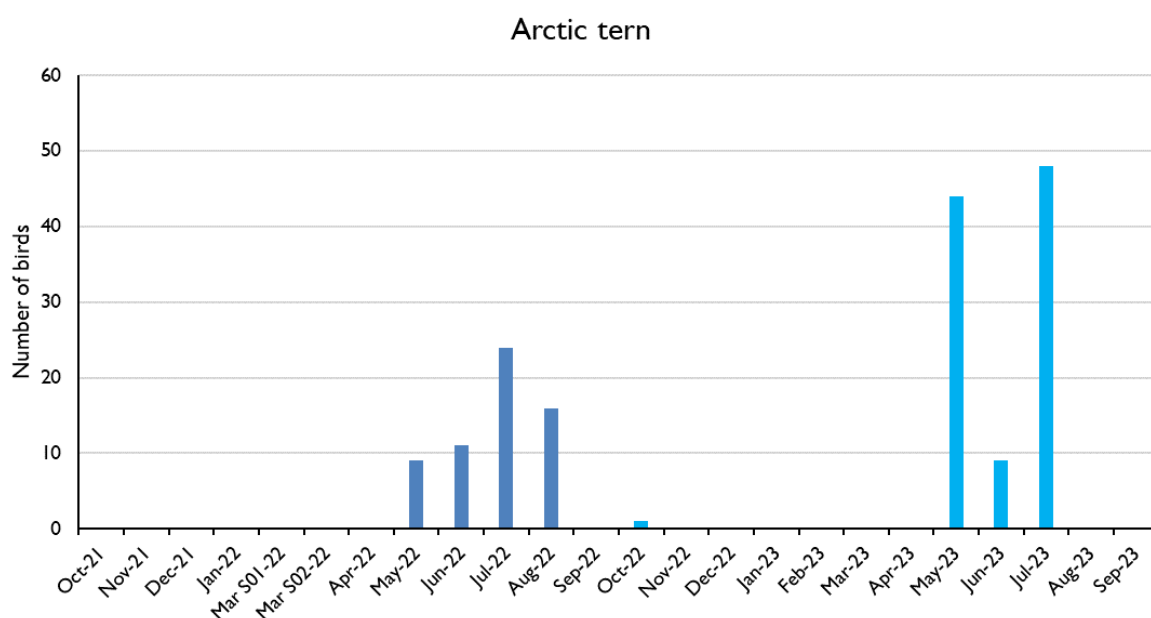


Figure 56 Arctic tern density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

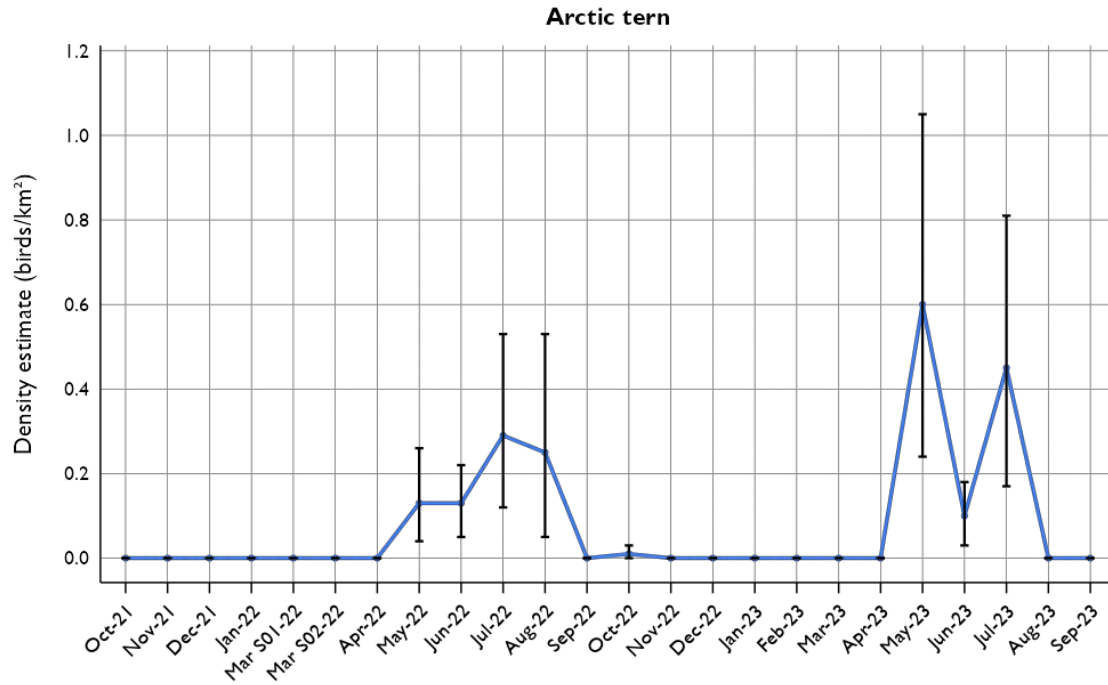


Table 28 **Density and population estimates of Arctic tern in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.00	0	0	0	0	0.00
27 November 2021	0.00	0	0	0	0	0.00
10 December 2021	0.00	0	0	0	0	0.00
21 January 2022	0.00	0	0	0	0	0.00
01 March 2022	0.00	0	0	0	0	0.00
19 March 2022	0.00	0	0	0	0	0.00
01 April 2022	0.00	0	0	0	0	0.00
27 May 2022	0.13	123	36	246	40	32.21
18 June 2022	0.13	123	48	206	33	26.27
11 July 2022	0.29	276	117	497	78	28.08
06 August 2022	0.25	236	51	501	118	50.00
01 September 2022	0.00	0	0	0	0	0.00
17 October 2022	0.01	9	0	25	8	88.89
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.00	0	0	0	0	0.00
19 January 2023	0.00	0	0	0	0	0.00
09 February 2023	0.00	0	0	0	0	0.00
04 March 2023	0.00	0	0	0	0	0.00
18 April 2023	0.00	0	0	0	0	0.00
02 May 2023	0.60	562	228	993	167	29.60
03 June 2023	0.10	93	30	170	27	28.95
19 July 2023	0.45	423	160	764	126	29.71
17 August 2023	0.00	0	0	0	0	0.00
16 September 2023	0.00	0	0	0	0	0.00

Table 29 Summary of Arctic tern behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	0	0	0	-	0
27 November 2021	0	0	0	0	-	0
10 December 2021	0	0	0	0	-	0
21 January 2022	0	0	0	0	-	0
01 March 2022	0	0	0	0	-	0
19 March 2022	0	0	0	0	-	0
01 April 2022	0	0	0	0	-	0
27 May 2022	0	9	0	0	100	9
18 June 2022	0	11	0	0	100	11
11 July 2022	0	24	0	0	100	24
06 August 2022	0	16	0	0	100	16
01 September 2022	0	0	0	0	-	0
17 October 2022	0	1	0	0	100	1
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	0	0	0	-	0
09 February 2023	0	0	0	0	-	0
04 March 2023	0	0	0	0	-	0
18 April 2023	0	0	0	0	-	0
02 May 2023	0	43	1	0	98	44
03 June 2023	0	9	0	0	100	9
19 July 2023	0	48	0	0	100	48
17 August 2023	0	0	0	0	-	0
16 September 2023	0	0	0	0	-	0
Total	0	161	1	0	99	162

Figure 57 Density (number/km²) and number of detections per segment of Arctic terns in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

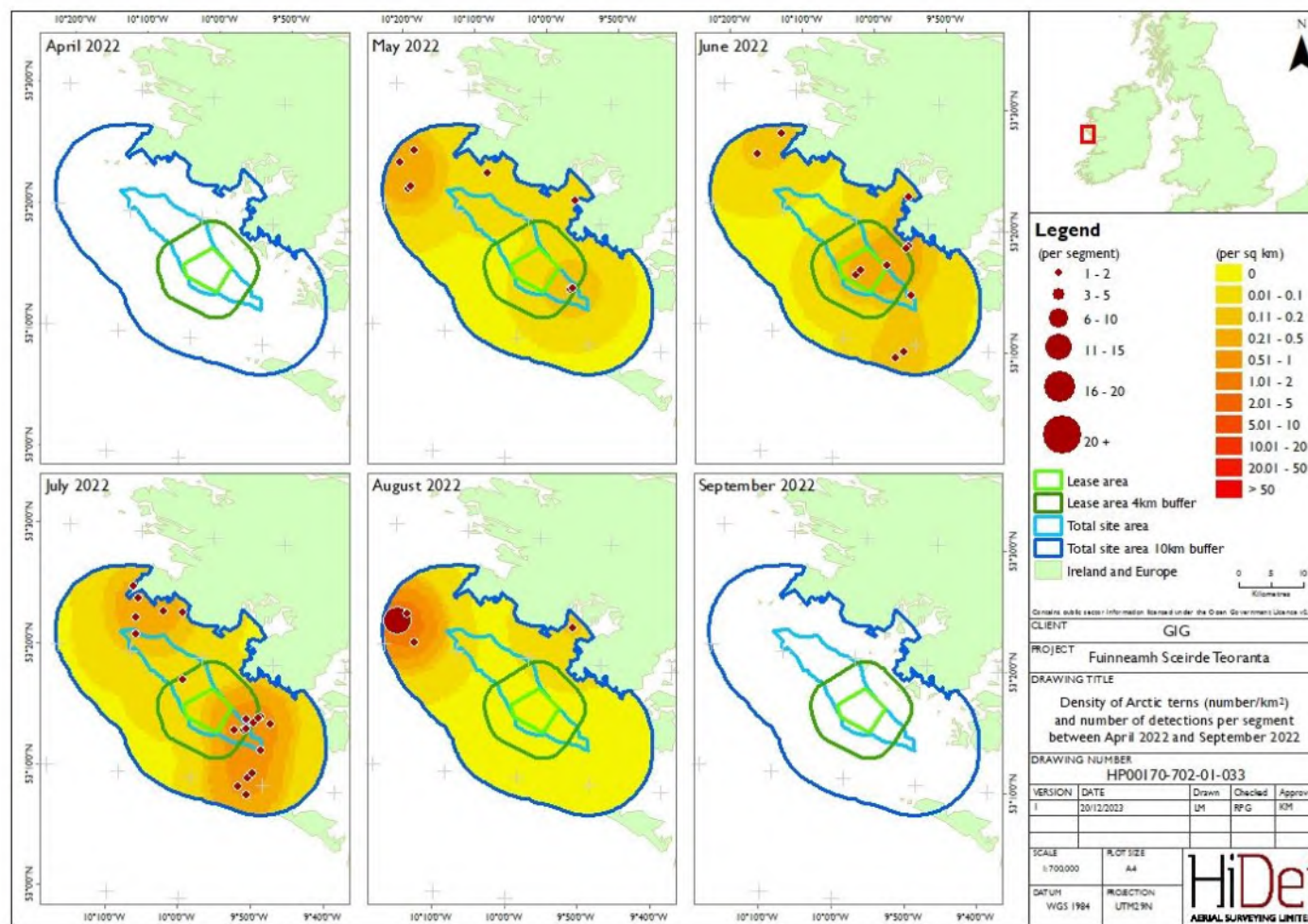


Figure 58 Detections of Arctic terns in the Fuinneamh Sceilte Teoranta survey area between October 2022 and March 2023

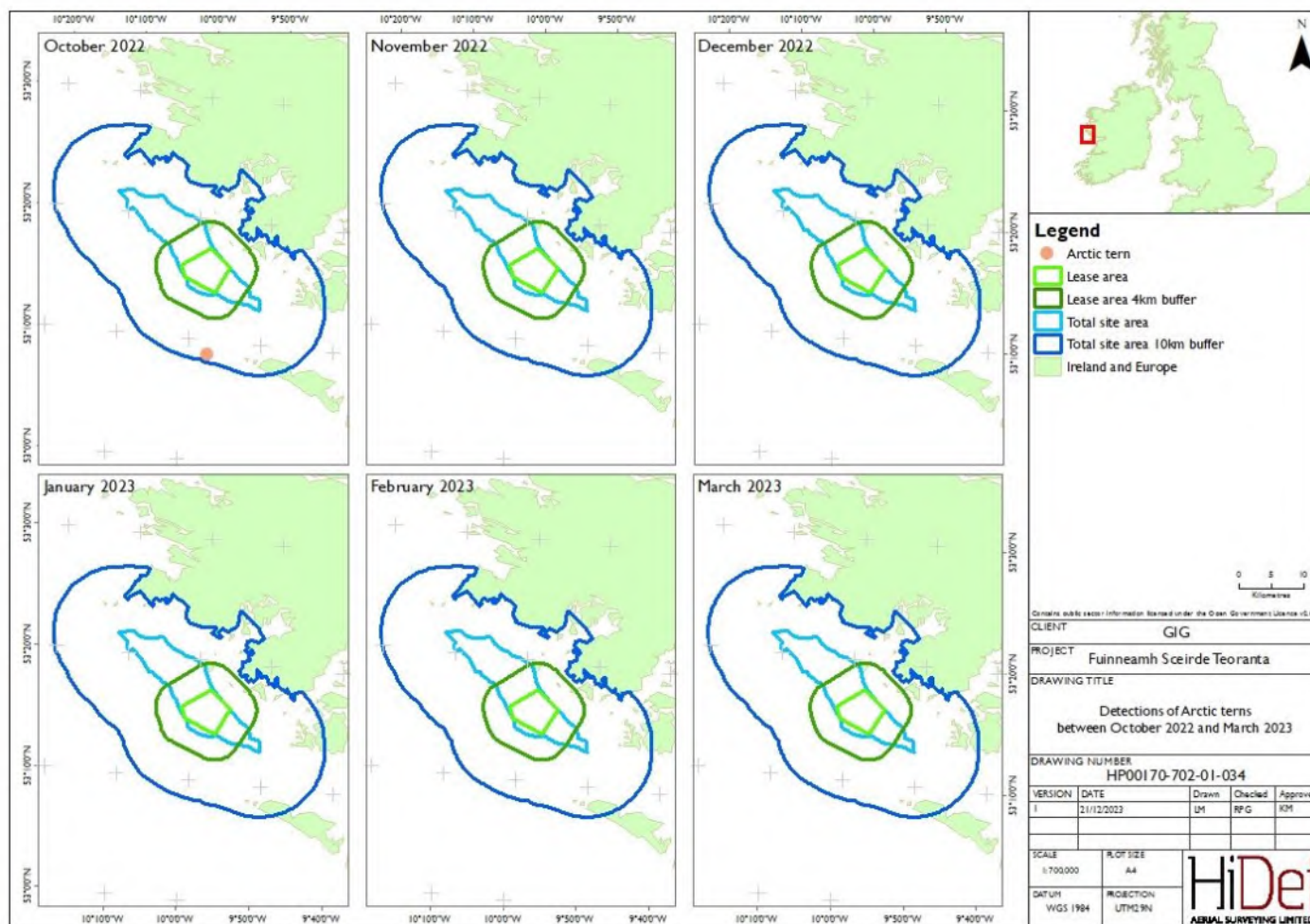


Figure 59 Density of Arctic terns (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

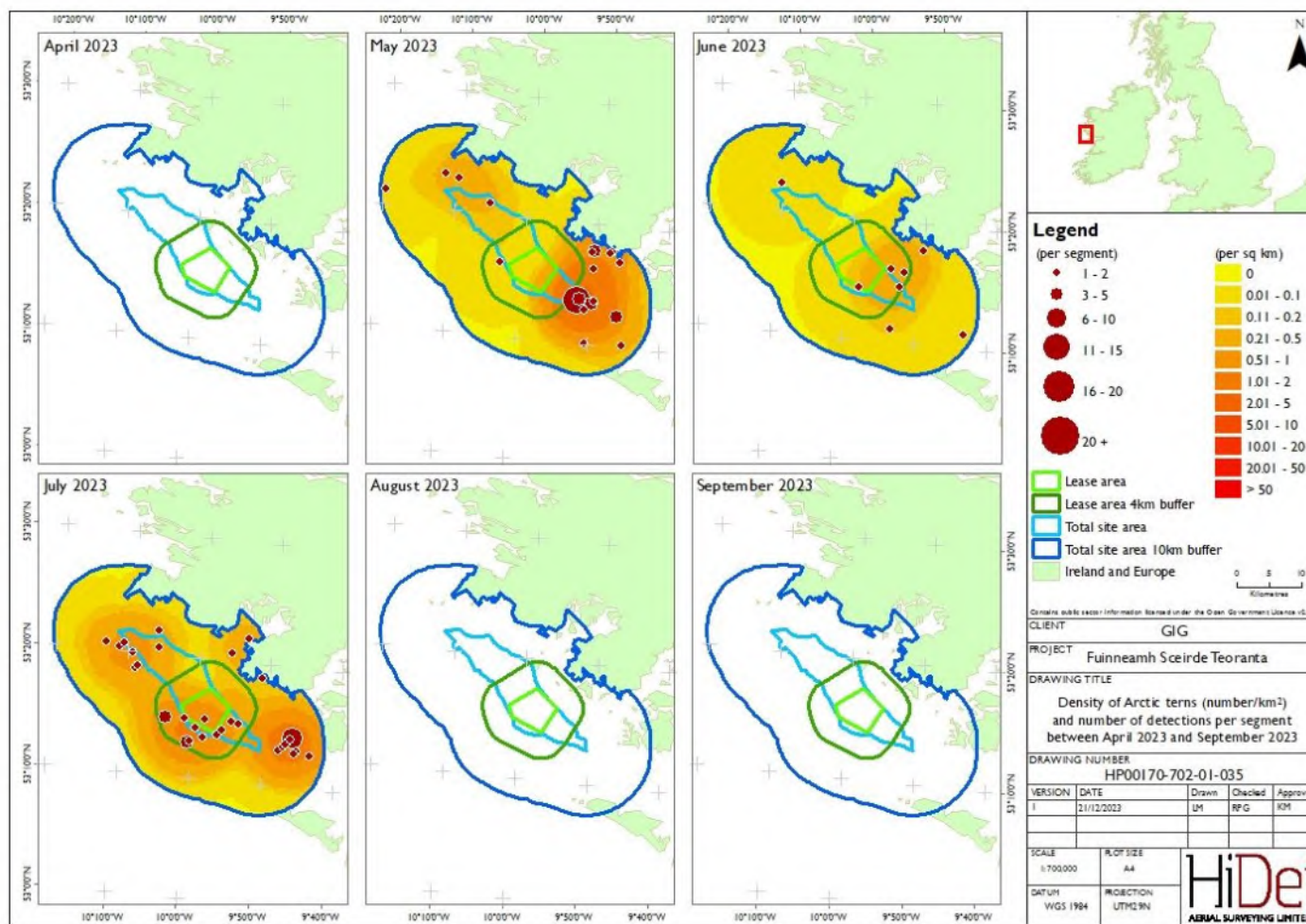
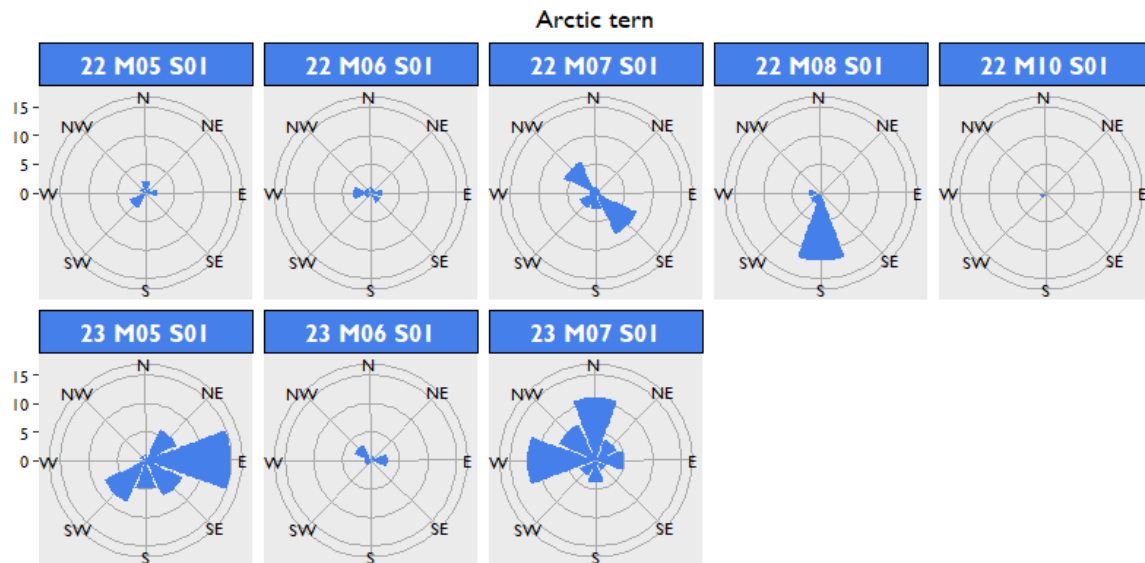


Figure 60 Summarised direction of movement of flying Arctic terns in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.10 Guillemot

- 118 Guillemot was the most abundant species recorded throughout the survey period with the highest numbers recorded at the end of the summer months between July and September 2022 (peaking at 2,716 birds in July 2022) (Figure 61).
- 119 Absolute density estimates for the species ranged between 0.33 birds/km² (95% CI 0.17 – 0.53) in December 2021 and 26.62 birds/km² (95% CI 17.72 – 37.60) in August 2022 (Figure 62 and Table 30), equating to 315 birds (95% CI 161 – 493) and 25,123 birds (95% CI 16,729 – 35,493) respectively.
- 120 Guillemot was found throughout the survey area with widespread estimated densities. Higher densities of the species were estimated towards the west, south-west and south of the total site buffer area, such as in October 2021, August to October 2022, and June 2023 (Figure 63 to Figure 66).
- 121 Age data for guillemot are not presented since adults are only aged in the presence of a juvenile at sea when adult males accompany chicks after leaving the nest site. A total of 211 adult-chick pairs were recorded over the survey period (154 pairs in July 2022; 12 pairs in August 2022 and 45 pairs in July 2023).
- 122 Over the survey period, only 4% of birds were recorded flying, with the largest number and second largest proportion of flying birds recorded in June 2023 (288; 15%). As expected for the species, most birds throughout the survey period were recorded sitting on the water (Table 31).
- 123 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 67). In June 2023, most guillemots were flying, the birds were headed in west, north-west, north and north-east directions, although all directions of flying were recorded for the species in this month.

Figure 61 Number of guillemots recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

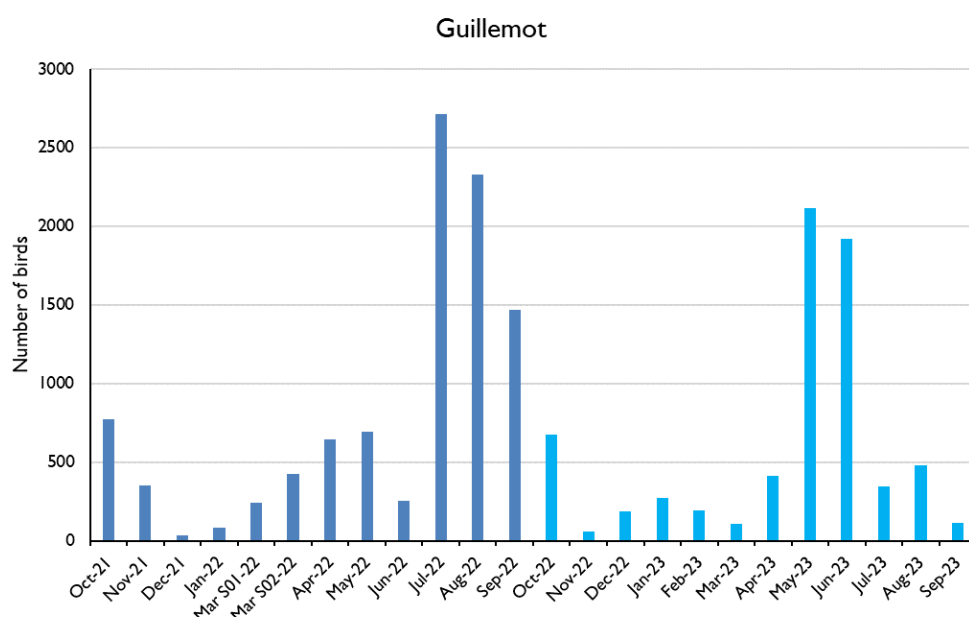


Figure 62 Absolute guillemot density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

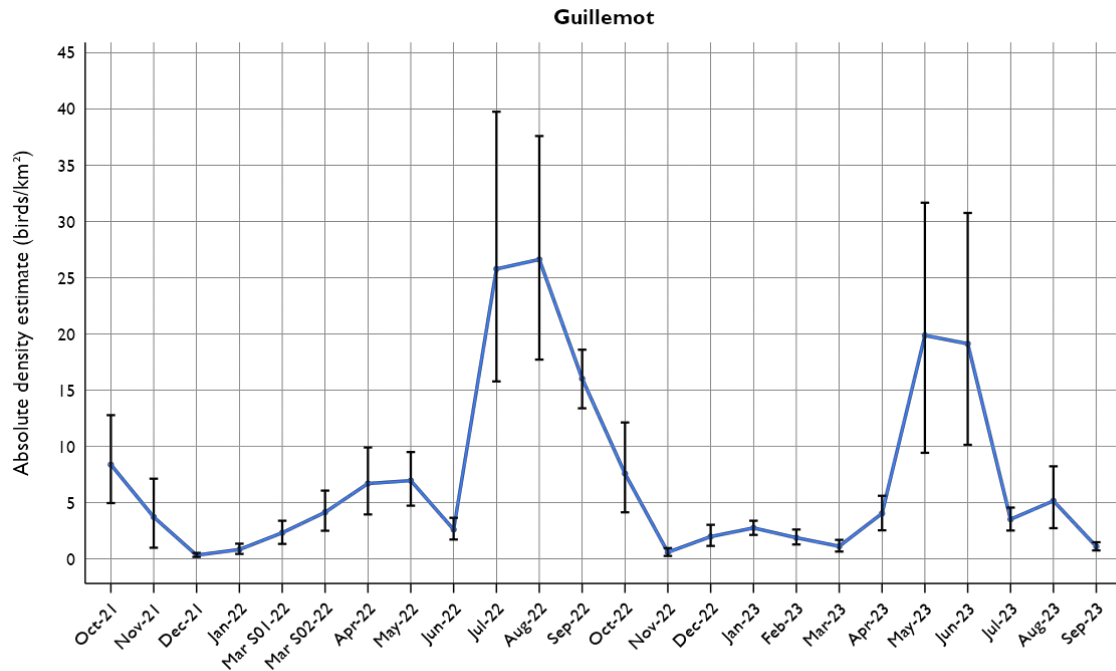


Table 30 Absolute monthly density and population estimates for guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023, accounting for the potential number of birds estimated as being unavailable for detection

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	6.47	6111	3716	9413	1413	23.12	8.38	7916	4685	12071	1939	24.49
27 November 2021	2.85	2688	641	5211	1029	38.25	3.72	3517	931	6727	1434	40.77
10 December 2021	0.26	245	129	366	48	19.40	0.33	315	161	493	62	19.68
21 January 2022	0.65	614	355	903	123	20.00	0.83	786	411	1276	178	22.65
01 March 2022	1.75	1656	1020	2349	282	17.02	2.32	2181	1255	3199	405	18.57
19 March 2022	3.19	3015	1941	4355	568	18.81	4.14	3910	2365	5739	791	20.23
01 April 2022	5.14	4848	3038	7073	927	19.1	6.70	6318	3742	9359	1323	20.94
27 May 2022	5.34	5044	3607	6669	686	13.59	6.96	6572	4454	8968	980	14.91
18 June 2022	2.04	1924	1363	2537	261	13.52	2.61	2472	1624	3445	374	15.13
11 July 2022	19.52	18423	11395	28157	3855	20.92	25.78	24337	14891	37529	5491	22.56
06 August 2022	19.97	18851	11789	27391	3916	20.77	26.62	25123	16729	35493	5405	21.51
01 September 2022	12.30	11609	9801	13353	800	6.89	16.03	15136	12629	17563	1141	7.54
17 October 2022	5.83	5506	3097	8663	1432	26.00	7.58	7164	3901	11457	1994	27.83
29 November 2022	0.45	425	211	688	102	23.80	0.59	554	254	912	146	26.35

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
22 December 2022	1.53	1448	831	2167	298	20.52	1.98	1874	1078	2864	421	22.47
19 January 2023	2.09	1975	1556	2443	177	8.94	2.75	2600	2016	3209	251	9.65
09 February 2023	1.45	1373	909	1883	218	15.81	1.88	1784	1202	2458	299	16.76
04 March 2023	0.88	830	520	1190	156	18.71	1.12	1060	610	1600	218	20.57
18 April 2023	3.08	2903	1887	3972	459	15.79	4.04	3817	2394	5301	655	17.16
02 May 2023	15.28	14419	7236	23631	3309	22.94	19.87	18755	8898	29895	4649	24.79
03 June 2023	14.88	14041	8017	22293	3127	22.27	19.13	18059	9570	29030	4402	24.38
19 July 2023	2.72	2568	1932	3251	286	11.13	3.52	3322	2374	4305	405	12.19
17 August 2023	3.89	3671	1913	5947	1028	27.99	5.16	4870	2575	7780	1417	29.10
16 September 2023	0.84	797	572	1041	95	11.88	1.10	1040	704	1401	129	12.40

Table 31 Summary of guillemot behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Other behaviour recorded	% Flying	Total
28 October 2021	0	29	746	0	0	4	775
27 November 2021	0	7	344	0	0	2	351
10 December 2021	0	3	31	0	0	9	34
21 January 2022	0	8	77	0	0	9	85
01 March 2022	0	12	231	0	0	5	243
19 March 2022	0	19	403	0	0	5	422
01 April 2022	0	30	612	0	0	5	642
27 May 2022	2	42	650	0	0	6	694
18 June 2022	0	22	229	0	0	9	251
11 July 2022	0	77	2638	1	0	3	2716
06 August 2022	0	2	2327	0	0	0	2329
01 September 2022	0	7	1460	0	0	0	1467
17 October 2022	0	41	634	0	0	6	675
29 November 2022	0	1	59	0	0	2	60
22 December 2022	0	1	183	0	0	0	184
19 January 2023	0	1	273	0	0	0	274
09 February 2023	0	2	192	0	0	1	194
04 March 2023	0	17	92	0	0	16	109
18 April 2023	0	17	394	0	1	4	412
02 May 2023	1	85	2032	0	0	4	2118
03 June 2023	1	288	1629	0	0	15	1918
19 July 2023	0	29	314	0	0	8	343
17 August 2023	3	1	475	0	0	0	479
16 September 2023	0	9	104	0	0	8	113
Total	7	750	16129	1	1	4	16888

Figure 63 Density (number/km²) and number of detections per segment of guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

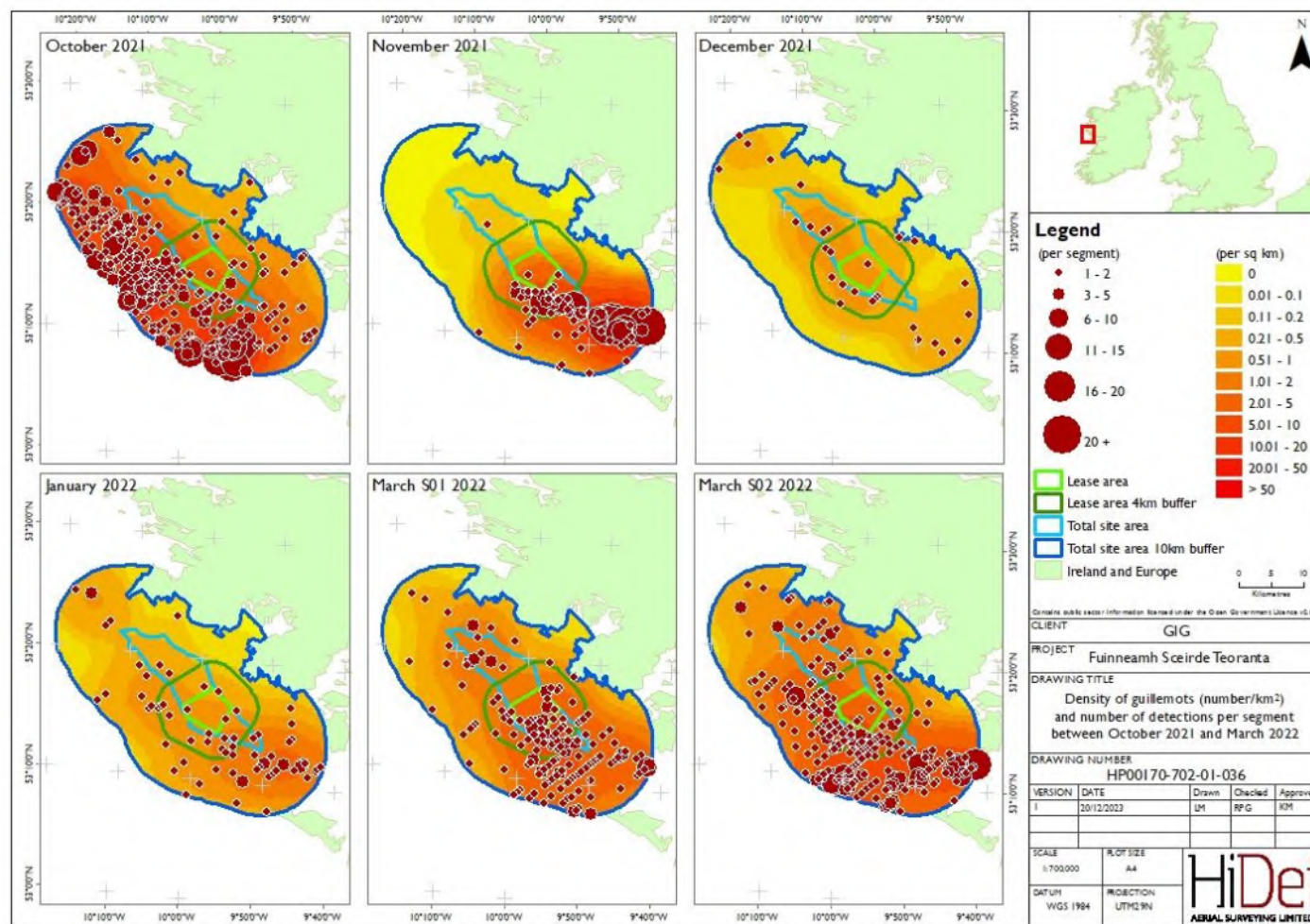


Figure 64 Density (number/km²) and number of detections per segment of guillemots in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

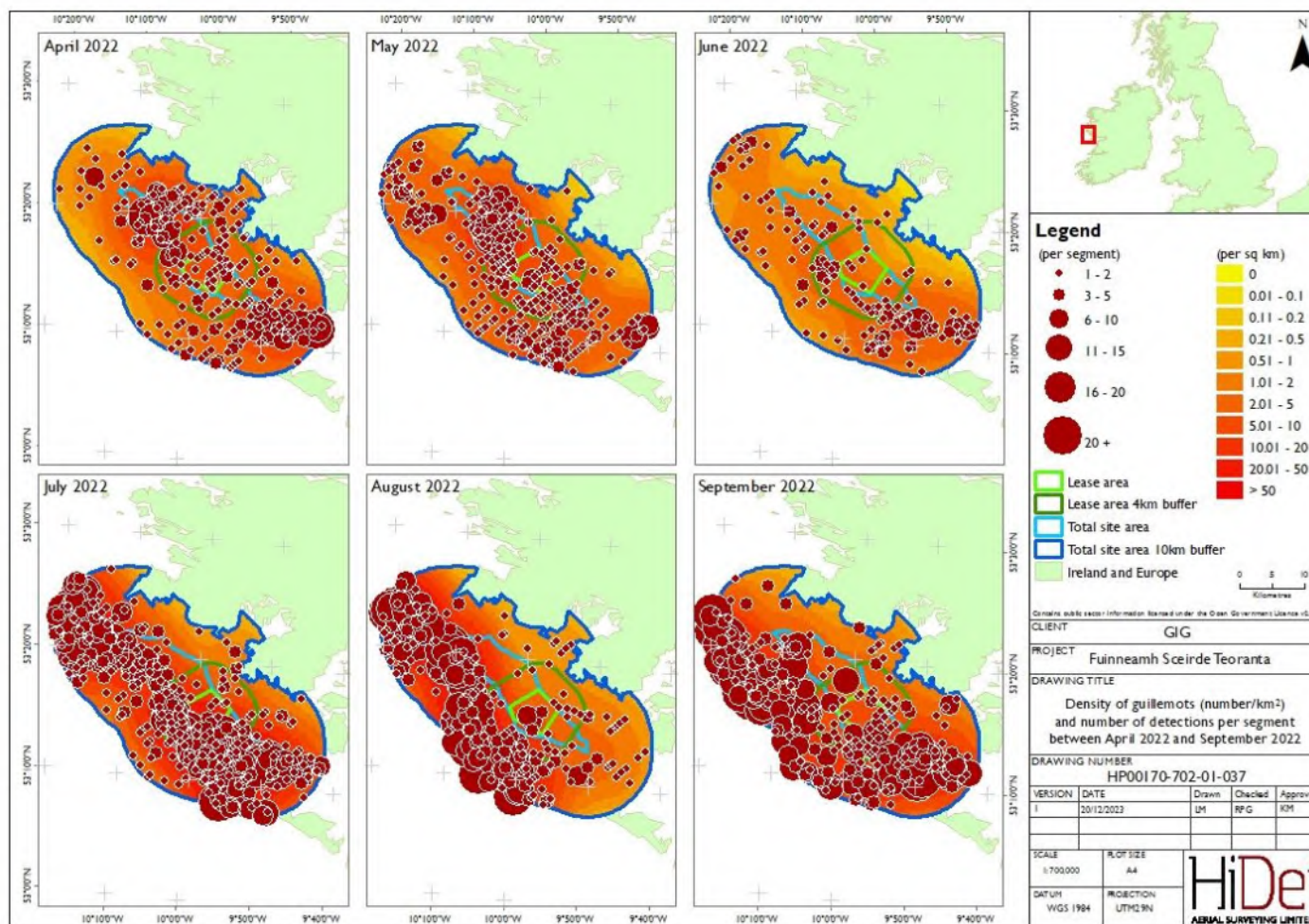


Figure 65 Density (number/km²) and number of detections per segment of guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

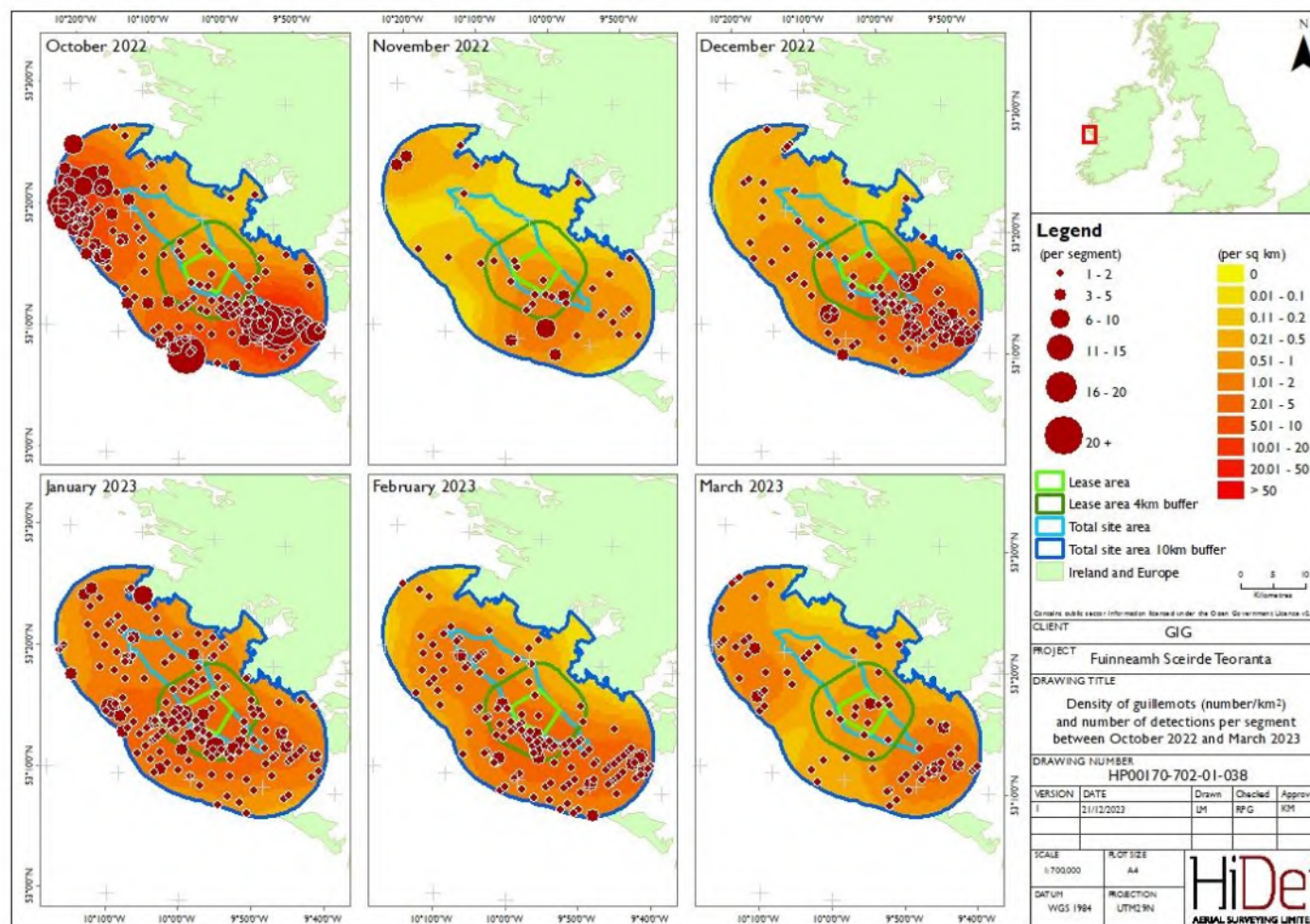


Figure 66 Density (number/km²) and number of detections per segment of guillemots in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

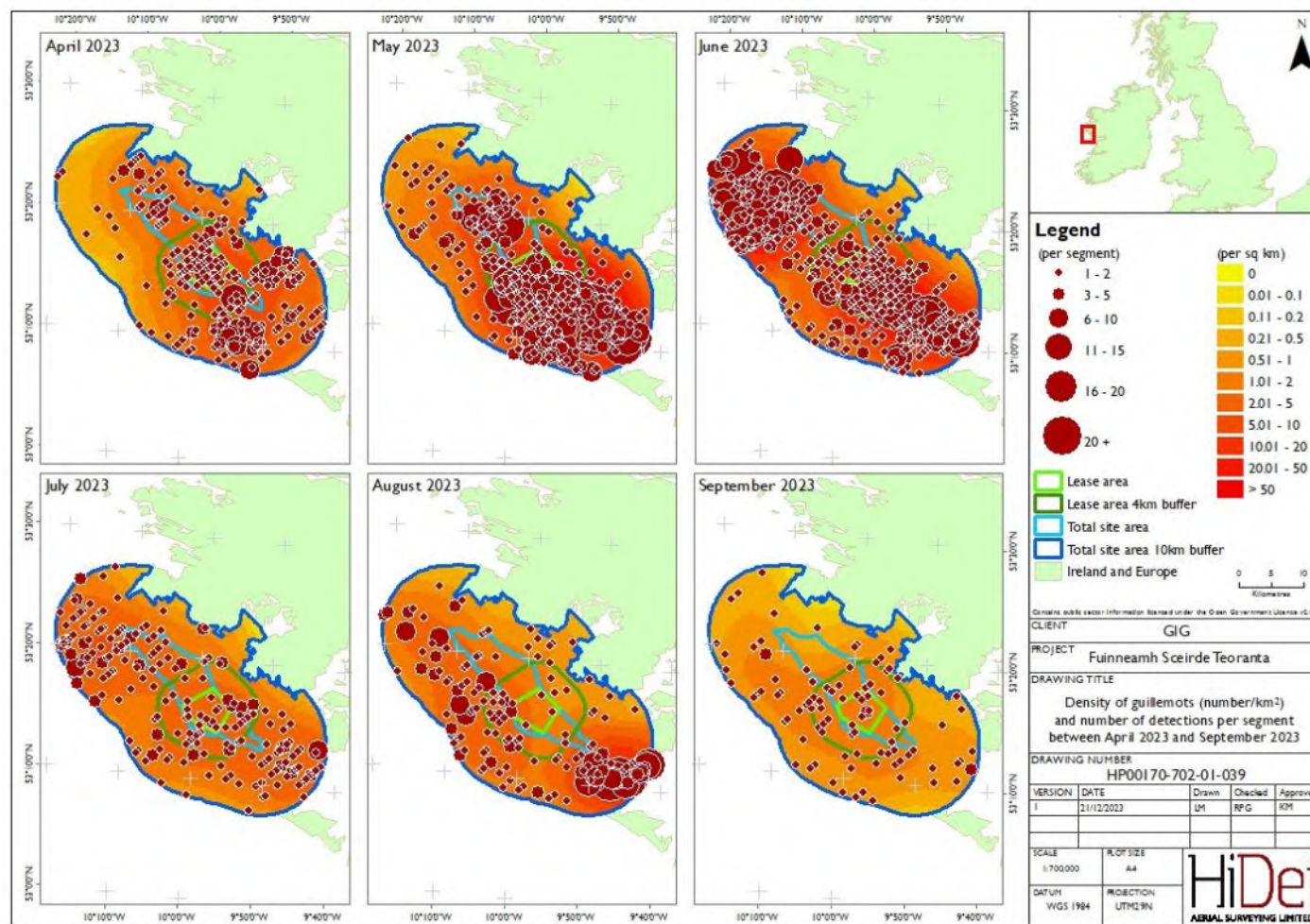
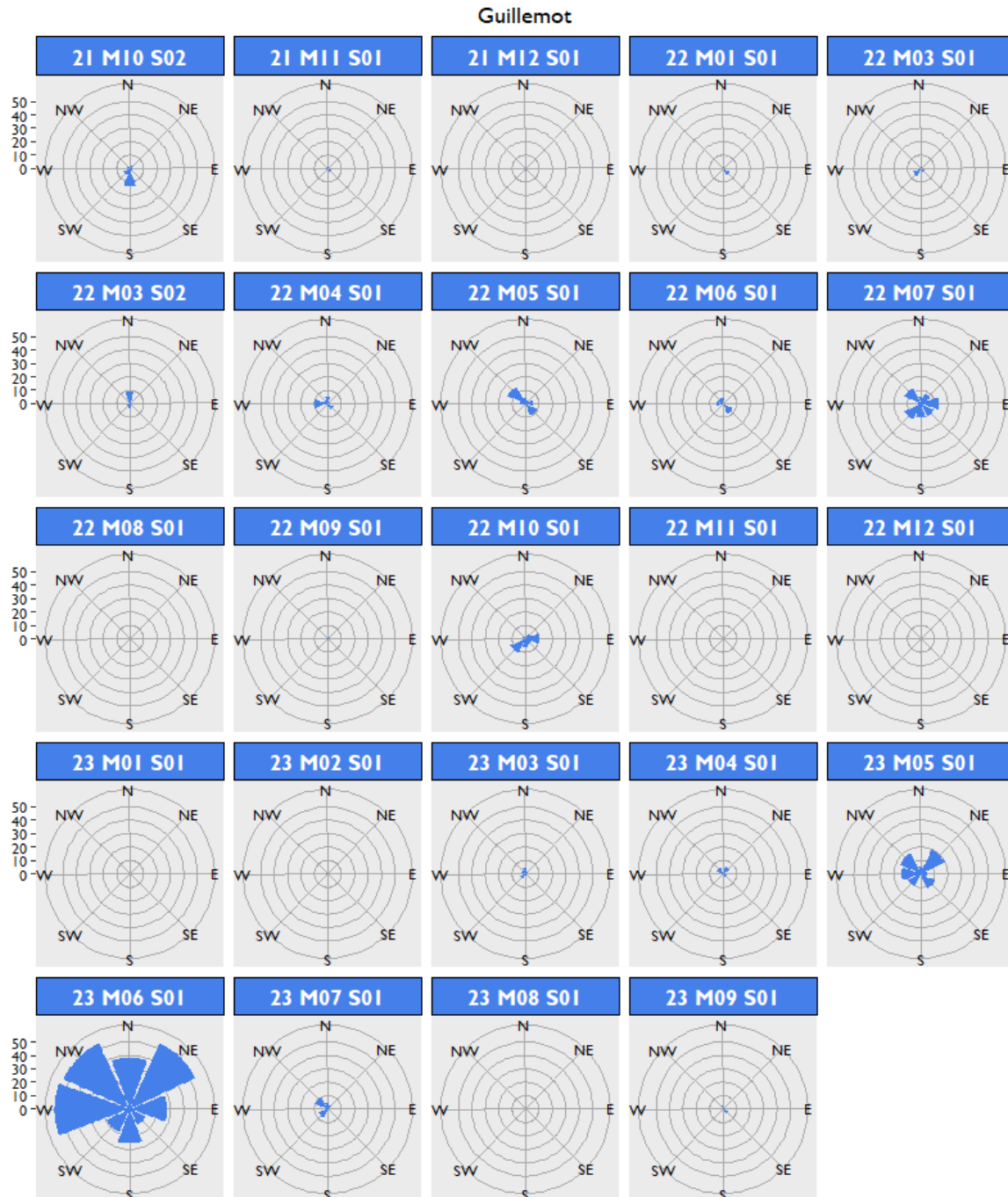


Figure 67 Summarised direction of movement of flying guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.11 Razorbill

- 124 Razorbill was recorded throughout the survey period with the highest numbers recorded in July 2022 (246 birds). This contrasts with other months where counts were typically under 100 (Figure 68).
- 125 Absolute density estimates for the species ranged between 0.01 birds/km² (95% CI 0.00 – 0.04) in June 2022 and 2.50 birds/km² (95% CI 1.38 – 3.84) in July 2022 (Figure 69 and Table 32), equating to 11 birds (95% CI 1 – 31) and 2,360 birds (95% CI 1,306 – 3,626) respectively.
- 126 Razorbill occurred throughout the survey area. When numbers peaked in July 2022 the birds were recorded in higher densities to the north-west, central and south-east of the survey area. Whilst in November 2021, December 2022 and May 2023 birds were found in higher densities to the south of the lease area, total site area and the buffers (Figure 70 and Figure 73).
- 127 As with guillemot, age data for razorbill are not presented since adults are only aged in the presence of a juvenile at sea when adult males accompany chicks after leaving the nest site. A total of eight adult-chick pairs were recorded over the survey period, with seven pairs in July 2022 and one pair in August 2022.
- 128 Over the survey period, only 7% of birds were recorded flying (Table 33). As expected for the species, most birds were recorded sitting on the water with diving birds recorded in November 2022 and February 2023.
- 129 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 74). In July 2022, when numbers peaked, flying direction was variable with more flying towards the west and north-west. In May and June 2023, most birds were flying in a north-westerly direction.

Figure 68 Number of razorbills recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

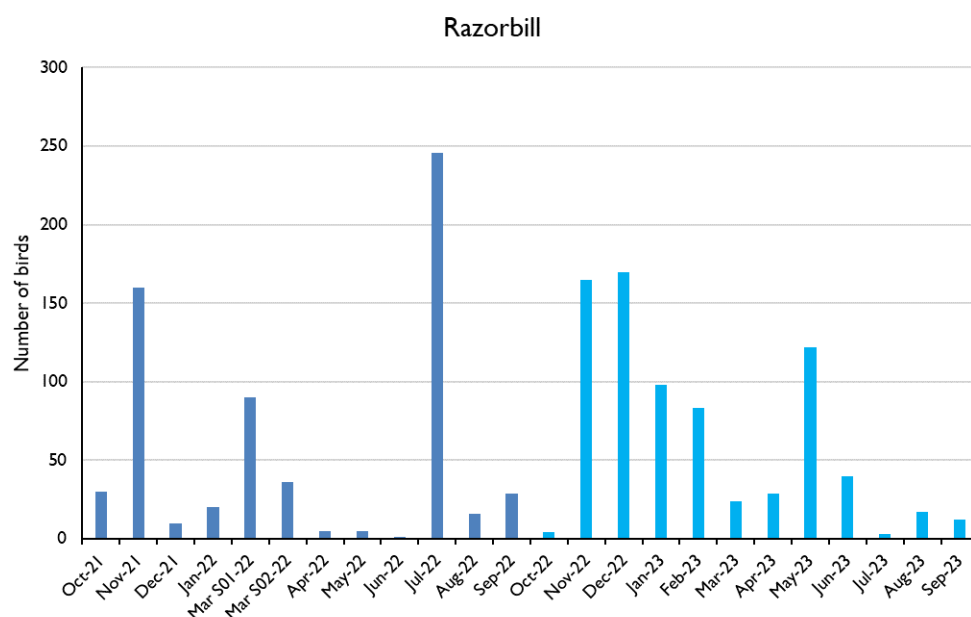


Figure 69

Razorbill absolute density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

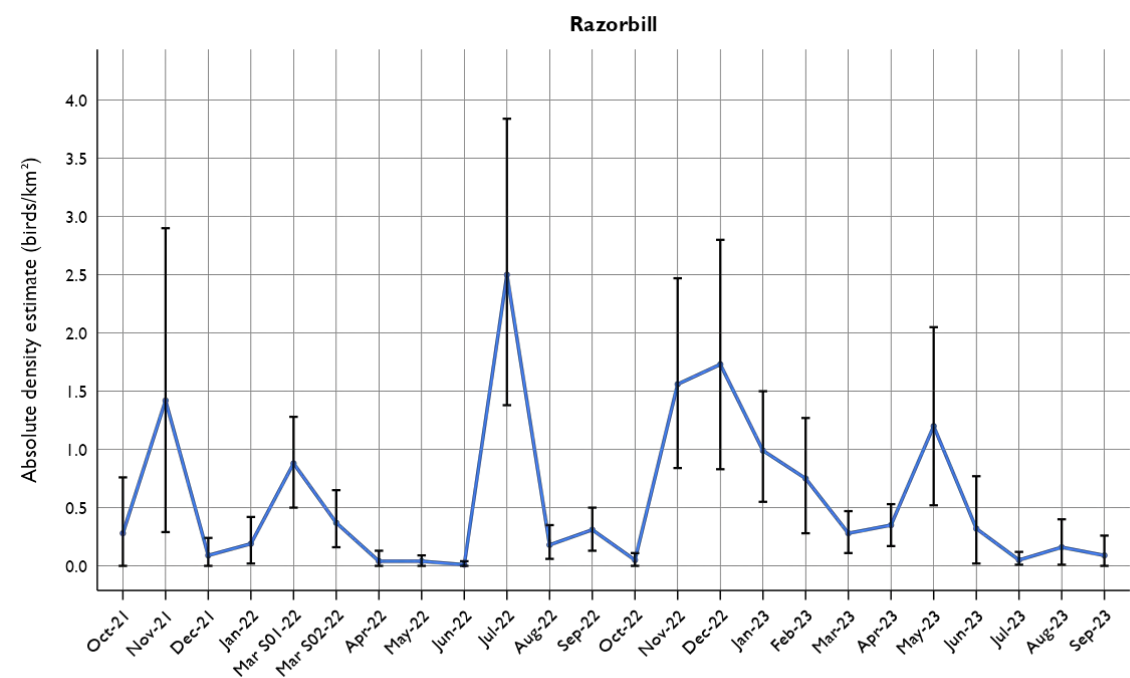


Table 32 Absolute monthly density and population estimates for razorbills in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023, accounting for the potential number of birds estimated as being unavailable for detection

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.25	234	26	548	131	55.79	0.28	258	1	712	181	70.16
27 November 2021	1.19	1126	320	2170	396	35.15	1.42	1347	276	2744	564	41.87
10 December 2021	0.07	69	0	180	39	55.92	0.09	83	0	227	55	66.27
21 January 2022	0.16	149	42	296	58	38.73	0.19	173	24	392	79	45.66
01 March 2022	0.72	681	388	994	139	20.35	0.88	831	477	1215	194	23.35
19 March 2022	0.31	291	130	465	74	25.35	0.37	354	144	613	103	29.10
01 April 2022	0.04	40	0	120	39	97.50	0.04	41	0	121	39	95.12
27 May 2022	0.03	31	2	65	14	43.28	0.04	38	2	79	20	52.63
18 June 2022	0.01	9	1	25	8	88.89	0.01	11	1	31	12	109.09
11 July 2022	2.06	1941	1126	2857	376	19.36	2.50	2360	1306	3626	528	22.37
06 August 2022	0.15	144	43	285	61	42.04	0.18	171	54	331	83	48.54
01 September 2022	0.26	241	129	363	59	24.12	0.31	290	128	482	86	29.66
17 October 2022	0.04	34	1	85	24	70.59	0.05	42	1	109	34	80.95
29 November 2022	1.29	1221	673	1907	253	20.71	1.56	1474	798	2329	361	24.49

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
22 December 2022	1.41	1330	618	2092	325	24.36	1.73	1633	782	2648	470	28.78
19 January 2023	0.82	773	437	1162	152	19.58	0.99	937	521	1414	215	22.95
09 February 2023	0.64	604	270	1019	162	26.67	0.75	715	264	1203	224	31.33
04 March 2023	0.22	209	96	344	65	31.10	0.28	260	101	442	93	35.77
18 April 2023	0.28	268	136	420	66	24.54	0.35	331	166	500	92	27.79
02 May 2023	0.99	932	405	1568	250	26.75	1.20	1141	488	1935	338	29.62
03 June 2023	0.28	268	70	517	98	36.56	0.32	306	24	719	138	45.10
19 July 2023	0.04	42	7	99	23	53.72	0.05	50	7	121	33	66.00
17 August 2023	0.14	131	9	311	75	56.82	0.16	155	11	378	107	69.03
16 September 2023	0.09	84	0	249	68	80.85	0.09	84	0	249	68	80.95

Table 33 Summary of razorbill behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	11	19	0	37	30
27 November 2021	0	5	155	0	3	160
10 December 2021	0	0	10	0	0	10
21 January 2022	0	5	15	0	25	20
01 March 2022	0	0	90	0	0	90
19 March 2022	0	4	32	0	11	36
01 April 2022	0	5	0	0	100	5
27 May 2022	0	0	5	0	0	5
18 June 2022	0	0	1	0	0	1
11 July 2022	0	19	227	0	8	246
06 August 2022	0	0	16	0	0	16
01 September 2022	0	2	27	0	7	29
17 October 2022	0	0	4	0	0	4
29 November 2022	1	1	163	0	1	165
22 December 2022	0	1	169	0	1	170
19 January 2023	0	0	98	0	0	98
09 February 2023	1	3	79	0	4	83
04 March 2023	0	1	23	0	4	24
18 April 2023	0	0	29	0	0	29
02 May 2023	0	12	110	0	10	122
03 June 2023	0	13	27	0	32	40
19 July 2023	0	0	3	0	0	3
17 August 2023	0	0	17	0	0	17
16 September 2023	0	12	0	0	100	12
Total	2	94	1319	0	7	1415

Figure 70 Density (number/km²) and number of detections per segment of razorbills in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

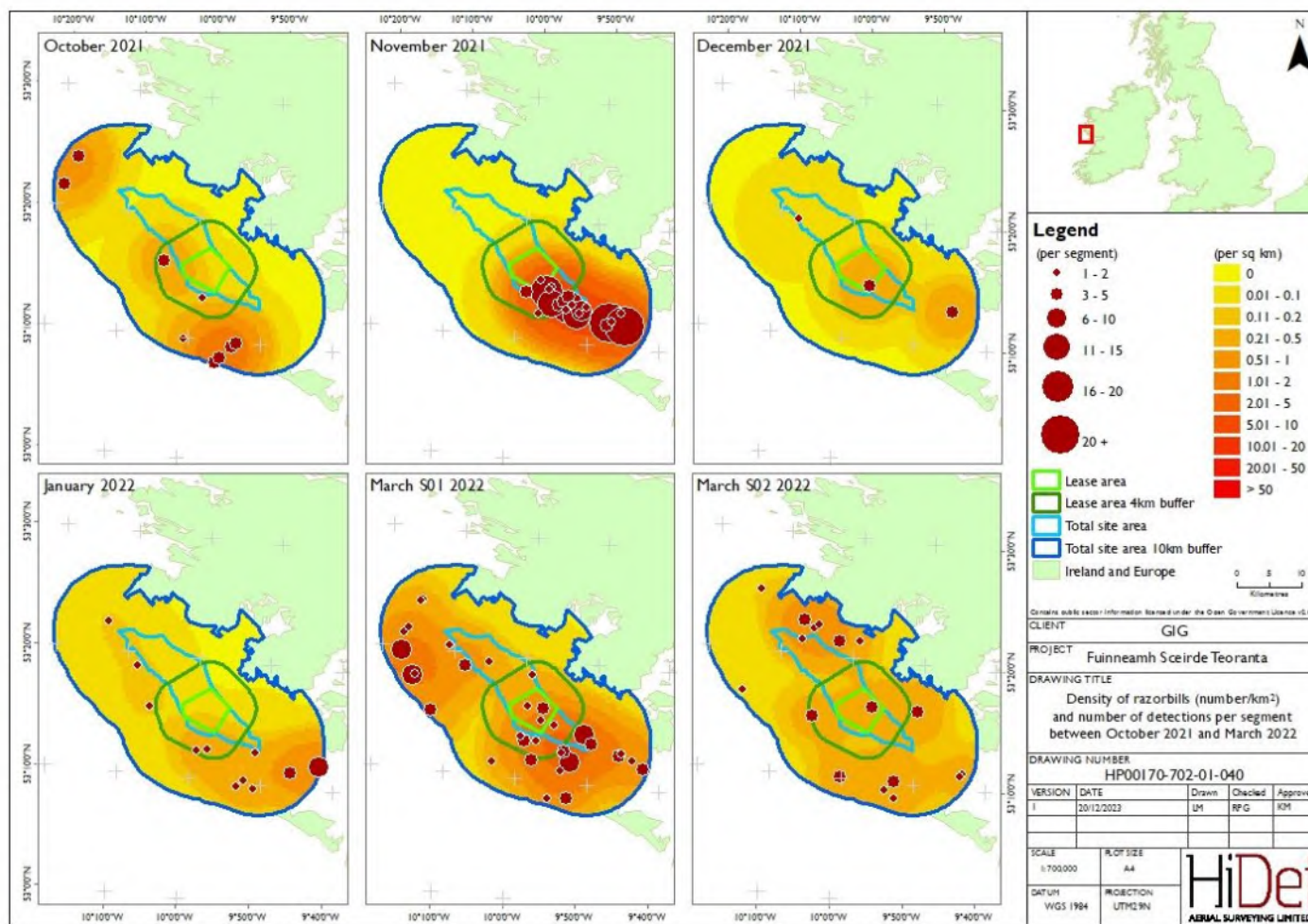


Figure 71 Detections, density (number/km²) and number of detections per segment of razorbills in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

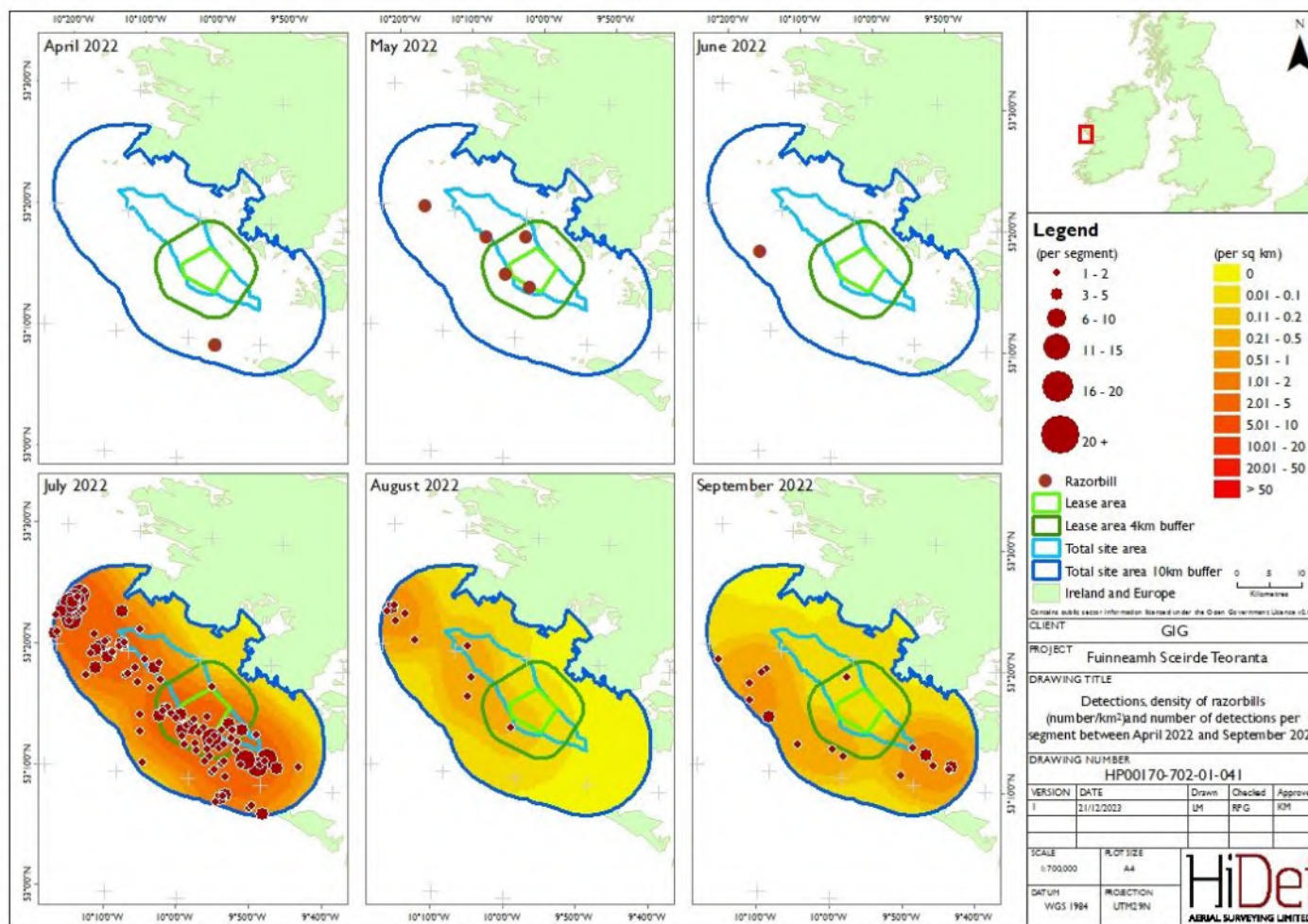


Figure 72 Detections, density (number/km²) and number of detections per segment of razorbills in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

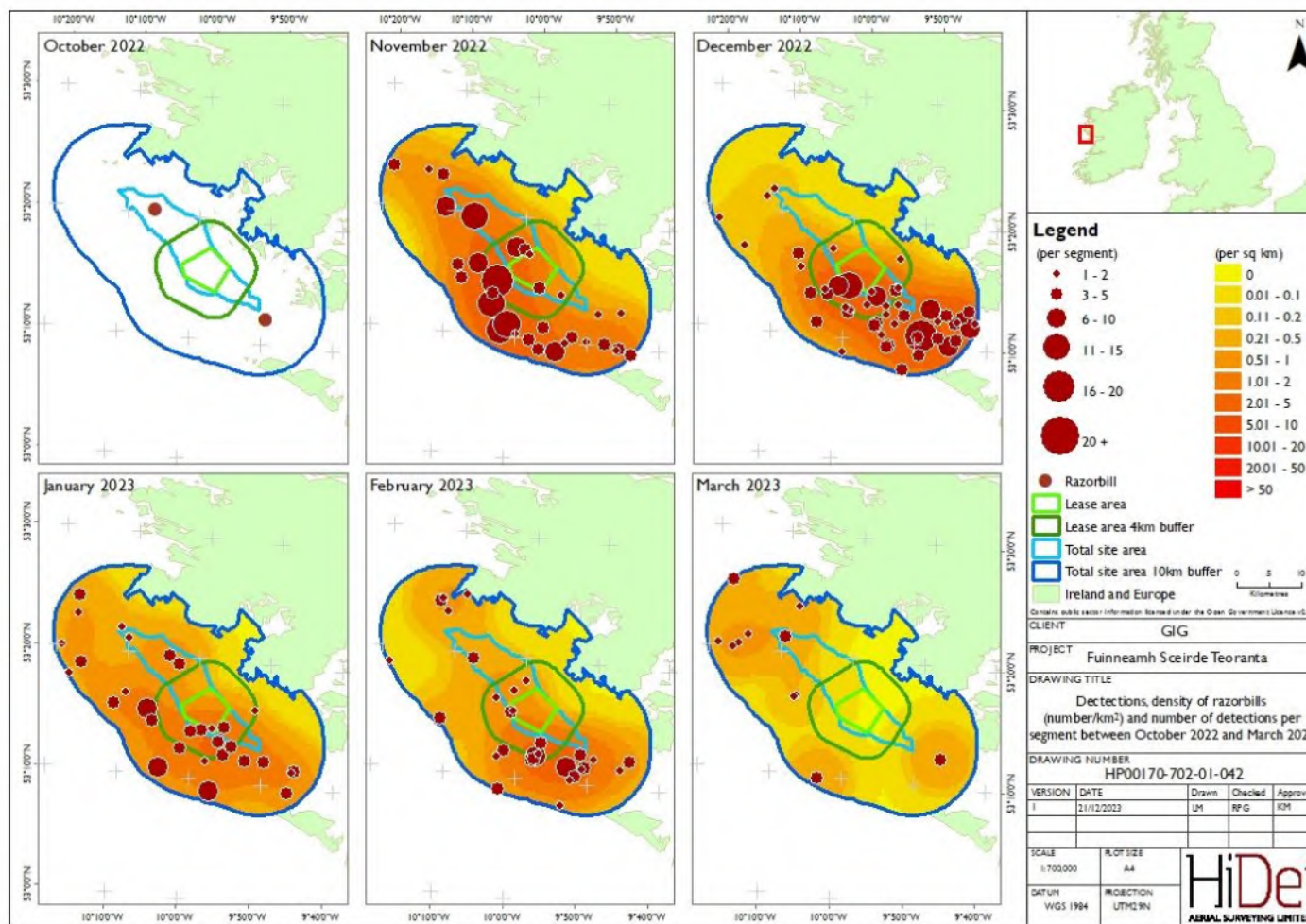


Figure 73 Detections, density (number/km²) and number of detections per segment of razorbills in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

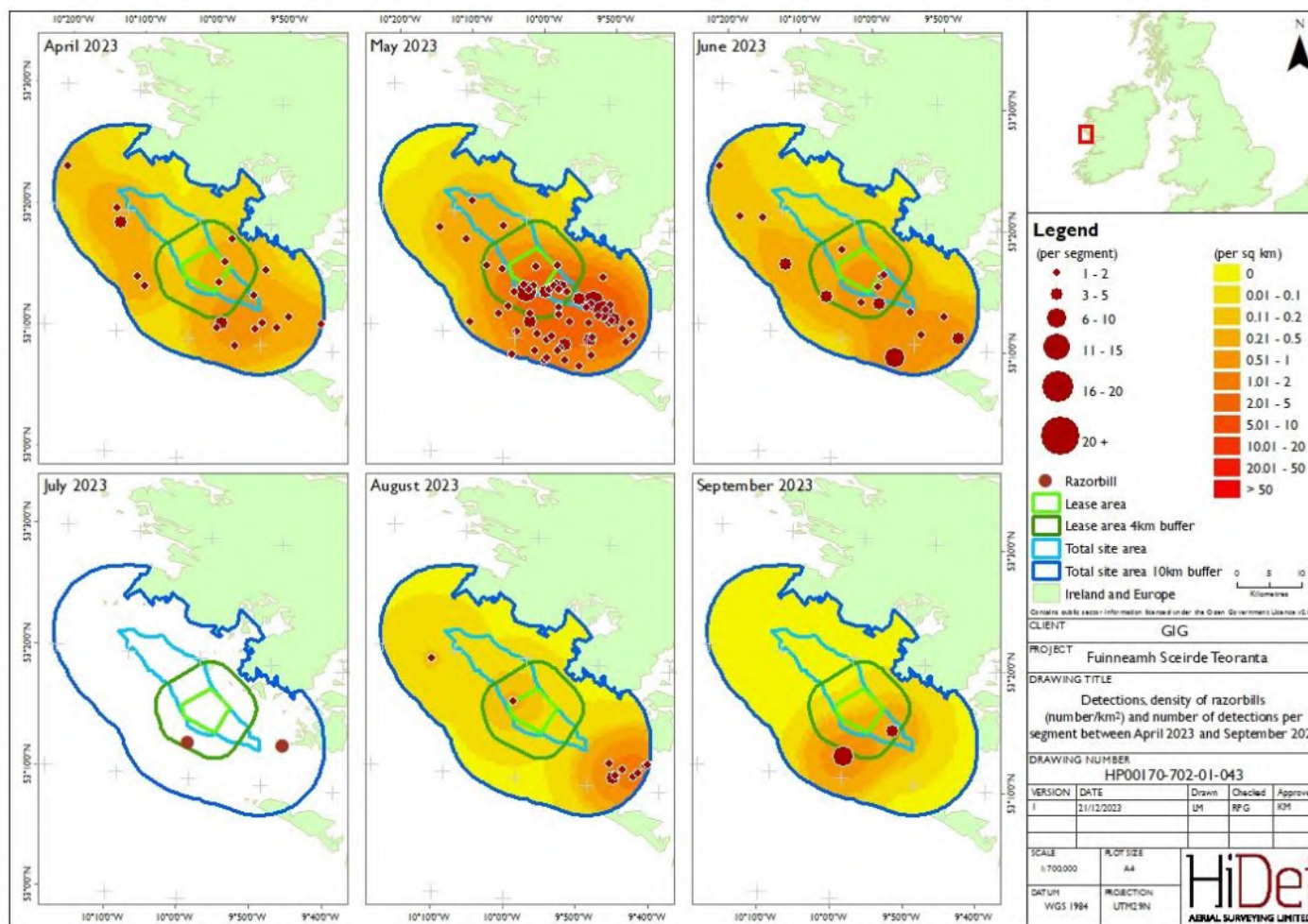
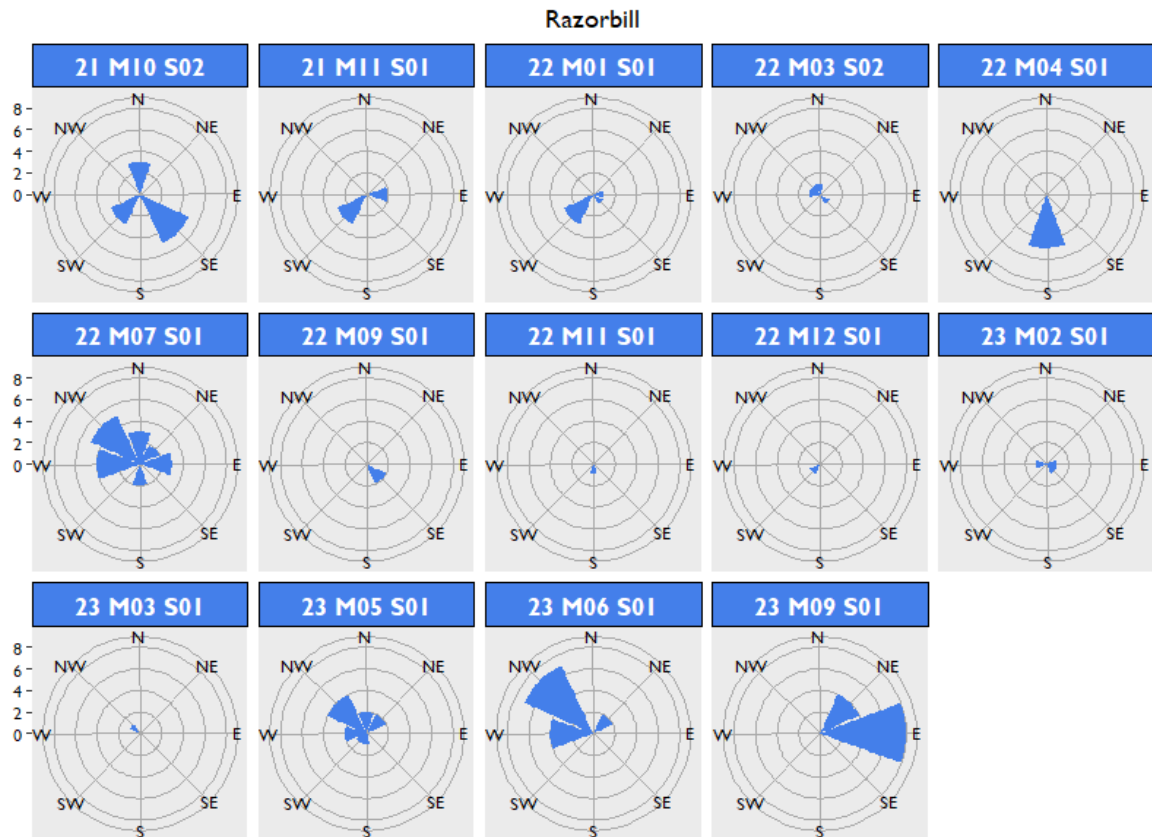


Figure 74 Summarised direction of movement of flying razorbill in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.12 Black guillemot

- 130 Black guillemot was recorded in relatively low numbers across the survey period, with observations peaking in February 2023. More observations were recorded in the second 12-months of surveys than in the first 12 months (Figure 75).
- 131 Density estimates for the species ranged between 0.01 birds/km² (95% CI 0.00 – 0.03) in June 2022 and 0.63 birds/km² (95% CI 0.02 – 1.72) in February 2023 (Figure 76 and Table 34), equating to 10 birds (95% CI 0 – 26) and 596 birds (95% CI 17 – 1,623) respectively.
- 132 Black guillemot was typically found in higher densities towards the coast. Between January 2023 and May 2023 birds were found in higher numbers in the north of the survey area. Whilst in September 2023 birds were found in higher densities in the south east of the survey area (Figure 77 to Figure 80).
- 133 Over the survey period, 1% of birds were recorded flying as individuals in four surveys (Table 35). As expected for the species, most birds throughout the survey period were recorded sitting on the water.
- 134 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 81). Black guillemots were recorded flying west, south-west and north-west in March Survey 01 2022, July 2022 and March 2023 respectively. Flying direction for the single observation in February 2023 could not be determined.

Figure 75 Number of black guillemot recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

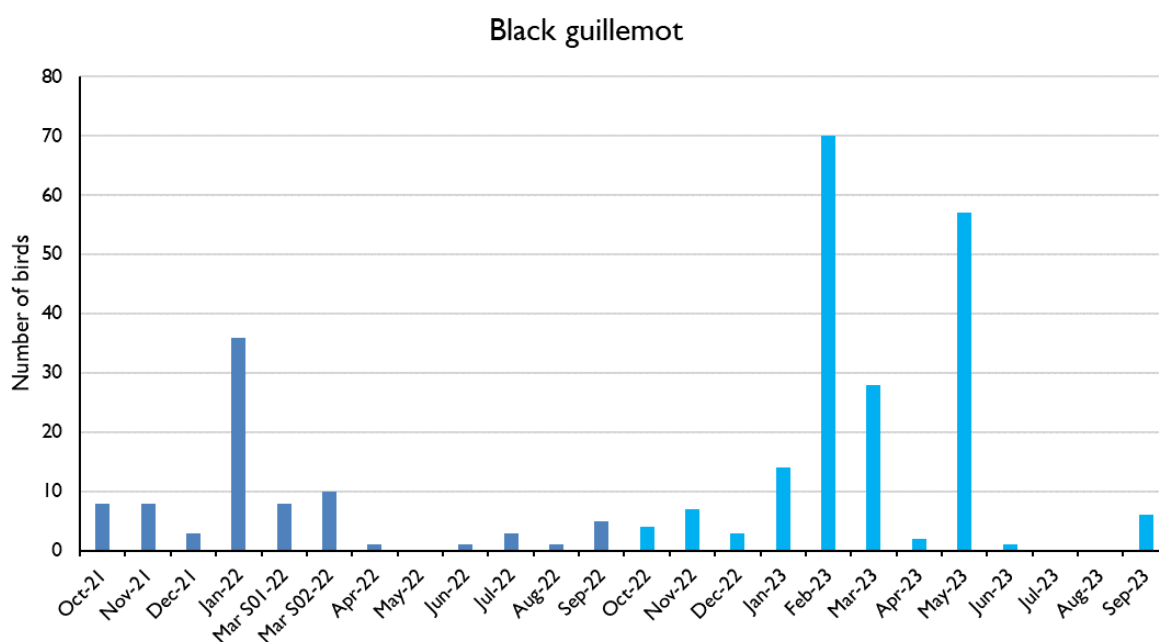


Figure 76 Black guillemot density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

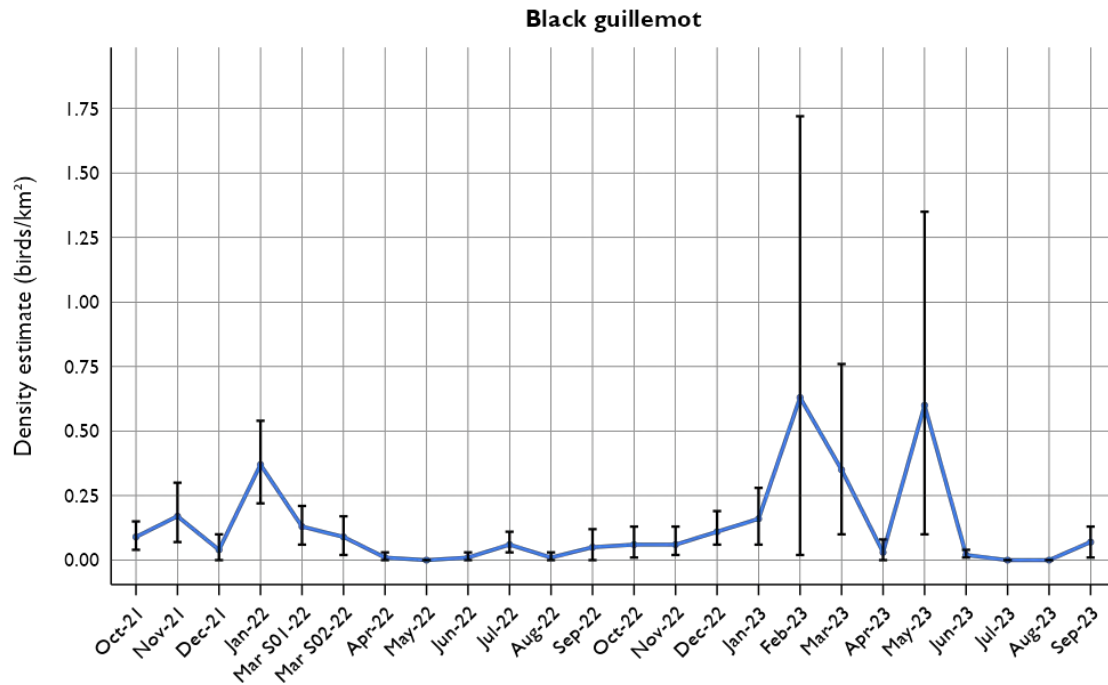


Table 34 **Density and population estimates of black guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.09	83	36	143	28	33.73
27 November 2021	0.17	162	69	280	53	32.25
10 December 2021	0.04	42	0	97	25	59.52
21 January 2022	0.37	350	211	505	72	20.32
01 March 2022	0.13	121	61	195	36	29.75
19 March 2022	0.09	83	19	160	34	40.41
01 April 2022	0.01	14	3	33	9	64.29
27 May 2022	0.00	0	0	0	0	0.00
18 June 2022	0.01	10	0	26	8	80.00
11 July 2022	0.06	60	24	100	20	33.33
06 August 2022	0.01	11	1	28	8	72.73
01 September 2022	0.05	44	0	115	32	72.73
17 October 2022	0.06	57	8	121	30	52.63
29 November 2022	0.06	60	16	123	29	48.33
22 December 2022	0.11	107	52	175	33	30.84
19 January 2023	0.16	149	57	266	54	36.24
09 February 2023	0.63	596	17	1623	530	88.76
04 March 2023	0.35	332	95	720	179	53.64
18 April 2023	0.03	32	4	79	22	68.75
02 May 2023	0.60	564	96	1270	292	51.6
03 June 2023	0.02	17	5	39	10	58.82
19 July 2023	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00
16 September 2023	0.07	63	14	124	29	46.03

Table 35 Summary of black guillemot behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	0	8	0	-	8
27 November 2021	0	0	8	0	-	8
10 December 2021	0	0	3	0	-	3
21 January 2022	0	0	36	0	-	36
01 March 2022	0	1	7	0	12	8
19 March 2022	0	0	10	0	-	10
01 April 2022	0	0	1	0	-	1
27 May 2022	0	0	0	0	-	0
18 June 2022	0	0	1	0	-	1
11 July 2022	0	1	2	0	33	3
06 August 2022	0	0	1	0	-	1
01 September 2022	0	0	5	0	-	5
17 October 2022	0	0	4	0	-	4
29 November 2022	0	0	7	0	-	7
22 December 2022	0	0	3	0	-	3
19 January 2023	0	0	14	0	-	14
09 February 2023	0	1	69	0	1	70
04 March 2023	0	1	27	0	4	28
18 April 2023	0	0	2	0	-	2
02 May 2023	0	0	57	0	-	57
03 June 2023	0	0	1	0	-	1
19 July 2023	0	0	0	0	-	0
17 August 2023	0	0	0	0	-	0
16 September 2023	0	0	6	0	-	6
Total	0	4	272	0	1	276

Figure 77 Detections, density (number/km²) and number of detections per segment of black guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

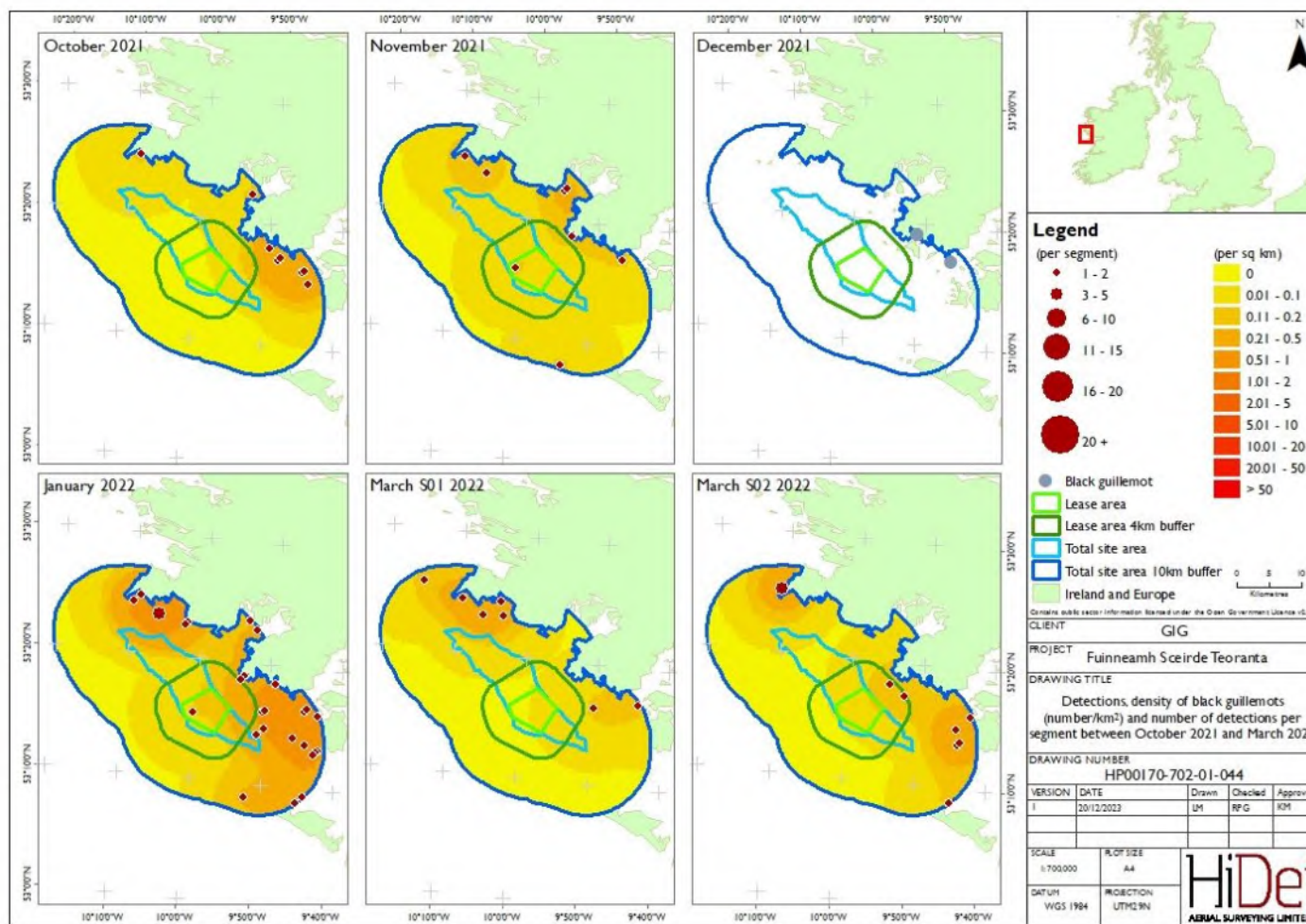


Figure 78 Detections of black guillemots in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

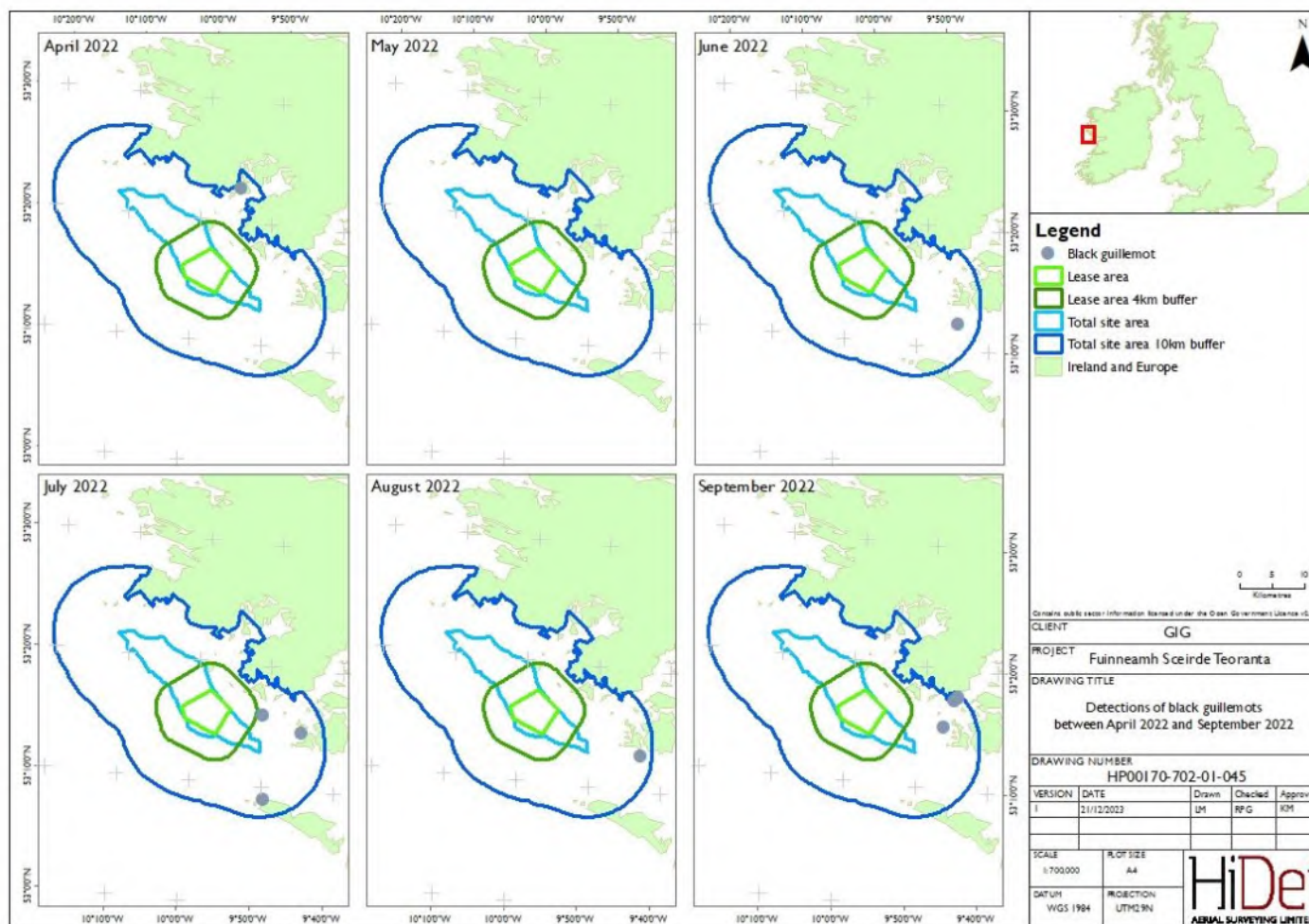


Figure 79 Detections, density (number/km²) and number of detections per segment of black guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

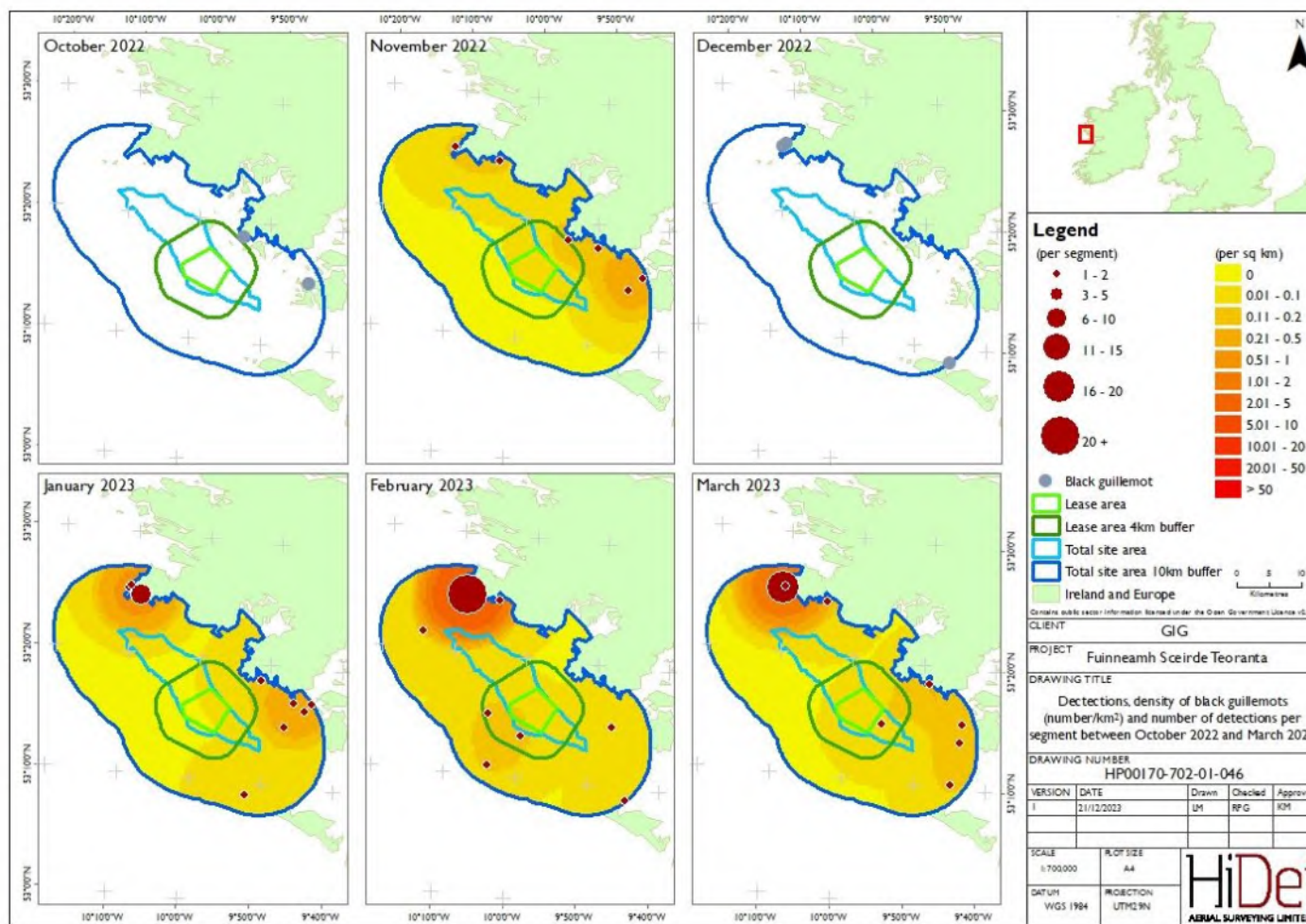


Figure 80 Detections, density (number/km²) and number of detections per segment of black guillemots in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

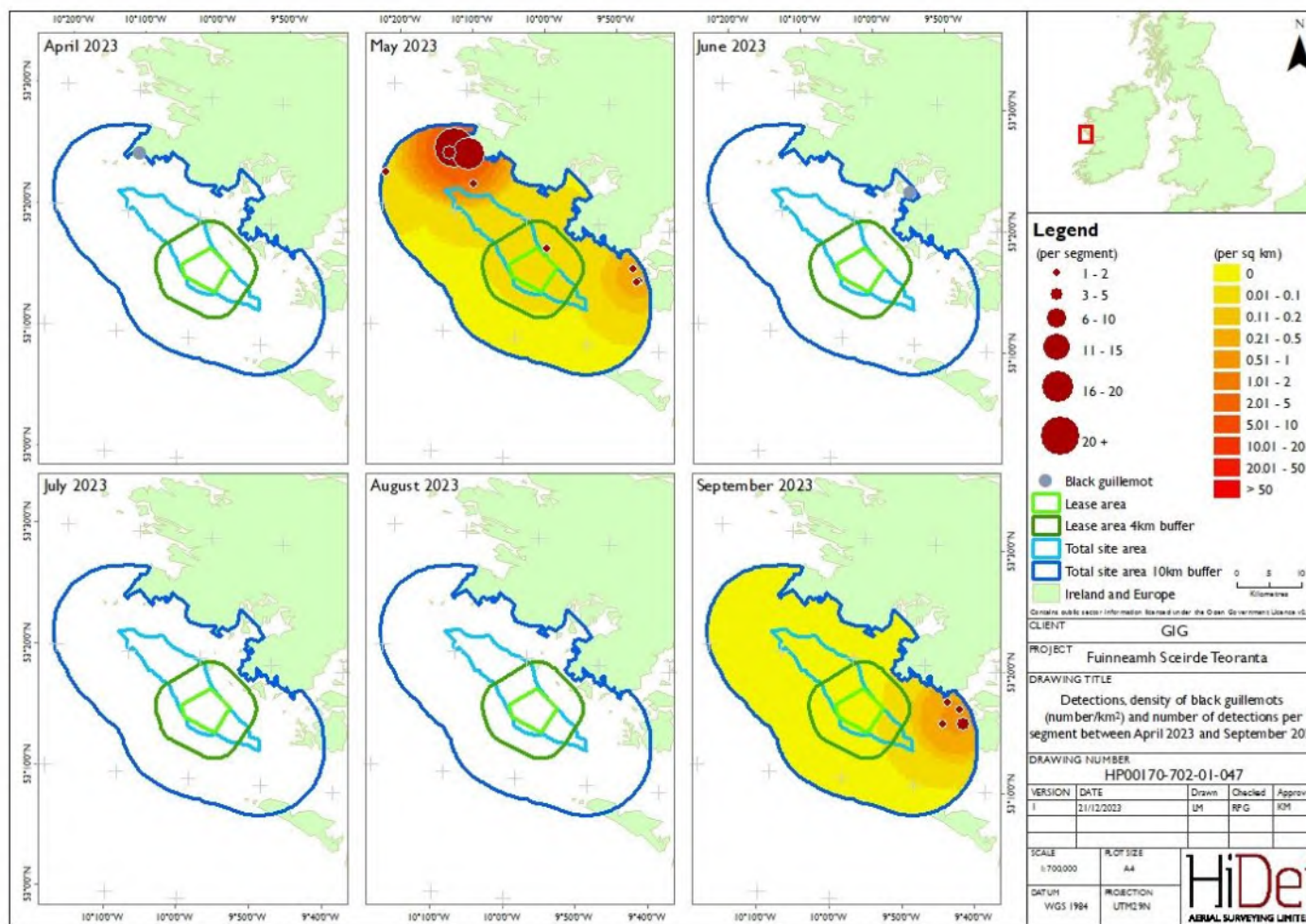
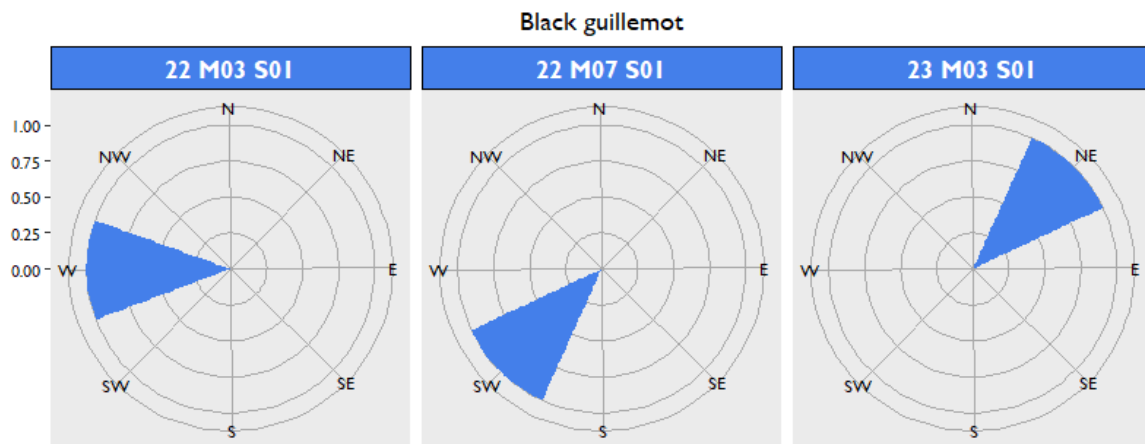


Figure 81 Summarised direction of movement of flying black guillemots in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.13 Puffin

- 135 Puffin was recorded in the highest numbers during the summer months in both years, peaking in July 2023 with 212 birds. Few birds were recorded over the winter months between November 2021 and April 2022 and October 2022 and March 2023 (Figure 82).
- 136 Absolute density estimates for the species when observed ranged between 0.01 birds/km² (95% CI 0.00 – 0.01) in March 2022 and 2.02 birds/km² (95% CI 0.81 – 3.73) in July 2023 (Figure 83 and Table 36), equating to 6 birds (95% CI 0 – 15) and 1,901 birds (95% CI 766 – 3,525), respectively.
- 137 Puffins were recorded in both the development area and the buffer with higher densities typically observed in the buffer. Whilst in July 2023 when records peaked, higher densities were recorded in the west of the survey area, with the lowest numbers observed in the south-east of the survey area (Figure 84 and Figure 86). There were no observations between October 2022 and March 2023, therefore no map has been presented.
- 138 Over the survey period, 12% of birds were recorded flying (Table 37).
- 139 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 87). In July 2023, when records peaked, more of the birds were flying in a north-west direction and in September 2023, the majority of the puffins were flying in south-westerly directions.

Figure 82 Number of puffins recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

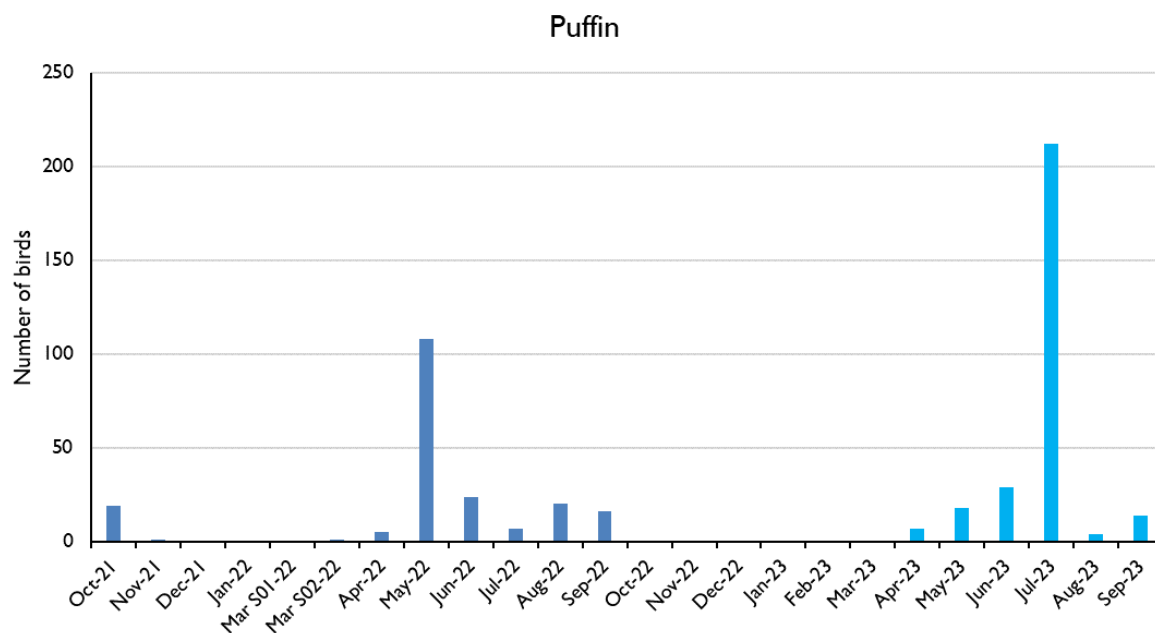


Figure 83 Puffin density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

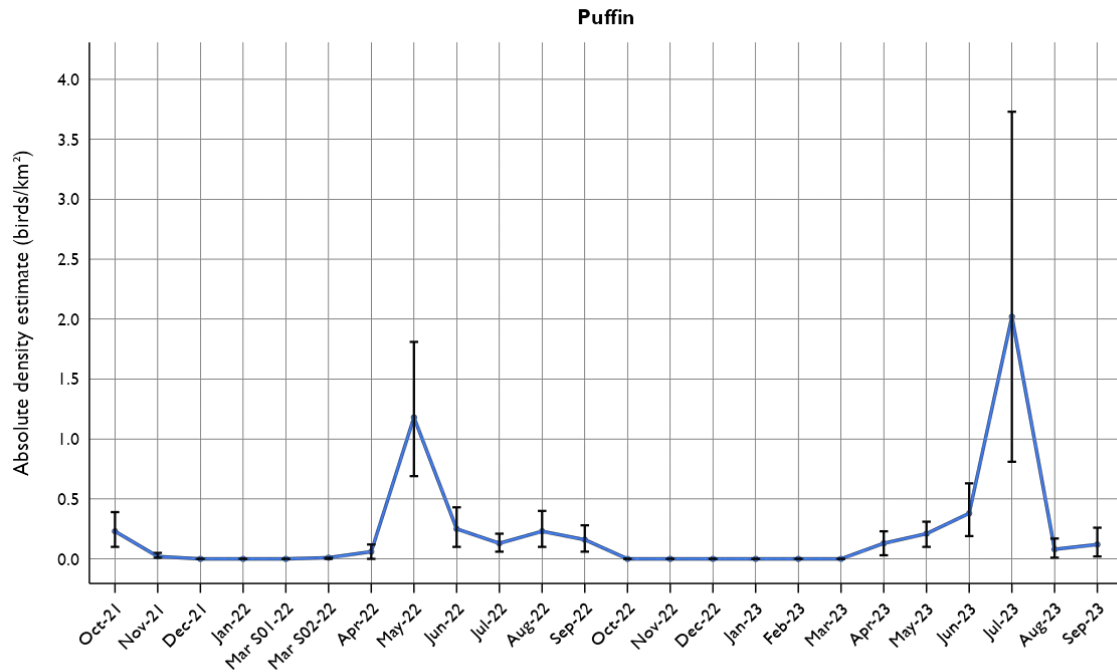


Table 36 Absolute monthly density and population estimates for puffins in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023, accounting for the potential number of birds estimated as being unavailable for detection

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.21	194	89	309	52	26.54	0.23	221	99	364	71	32.13
27 November 2021	0.02	22	6	43	10	45.45	0.02	26	8	49	14	53.85
10 December 2021	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
21 January 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
01 March 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
19 March 2022	0.01	5	0	13	4	80	0.01	6	0	15	6	100.00
01 April 2022	0.05	45	7	99	19	40.79	0.06	51	3	107	27	52.94
27 May 2022	1.03	968	585	1407	180	18.57	1.18	1114	647	1707	259	23.25
18 June 2022	0.22	210	86	351	54	25.6	0.25	241	94	407	76	31.54
11 July 2022	0.11	103	52	167	25	23.98	0.13	119	52	203	36	30.25
06 August 2022	0.20	187	86	315	49	26.12	0.23	218	99	376	68	31.19
01 September 2022	0.14	130	63	217	32	24.14	0.16	144	57	270	43	29.86
17 October 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
29 November 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00

Survey Date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
22 December 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
19 January 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
09 February 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 March 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
18 April 2023	0.11	104	35	191	38	35.90	0.13	116	34	219	54	46.55
02 May 2023	0.18	166	86	251	37	22.22	0.21	193	100	292	52	26.94
03 June 2023	0.32	300	166	457	57	18.82	0.38	355	171	587	82	23.10
19 July 2023	1.74	1647	788	2929	475	28.79	2.02	1901	766	3525	680	35.77
17 August 2023	0.06	61	8	140	35	56.12	0.08	72	9	165	49	68.06
16 September 2023	0.12	117	17	235	58	49.57	0.12	121	17	247	59	48.76

Table 37 Summary of puffin behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	1	18	0	5	19
27 November 2021	0	0	1	0	0	1
10 December 2021	0	0	0	0	-	0
21 January 2022	0	0	0	0	-	0
01 March 2022	0	0	0	0	-	0
19 March 2022	0	0	1	0	0	1
01 April 2022	0	0	5	0	0	5
27 May 2022	0	5	103	0	5	108
18 June 2022	0	2	22	0	8	24
11 July 2022	0	1	6	0	14	7
06 August 2022	0	1	19	0	5	20
01 September 2022	0	2	14	0	12	16
17 October 2022	0	0	0	0	-	0
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	0	0	0	-	0
09 February 2023	0	0	0	0	-	0
04 March 2023	0	0	0	0	-	0
18 April 2023	0	0	7	0	0	7
02 May 2023	0	0	18	0	0	18
03 June 2023	0	5	24	0	17	29
19 July 2023	1	26	185	0	12	212
17 August 2023	0	0	4	0	0	4
16 September 2023	0	13	1	0	93	14
Total	1	56	428	0	12	485

Figure 84 Detections, density (number/km²) and number of detections per segment of puffins in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

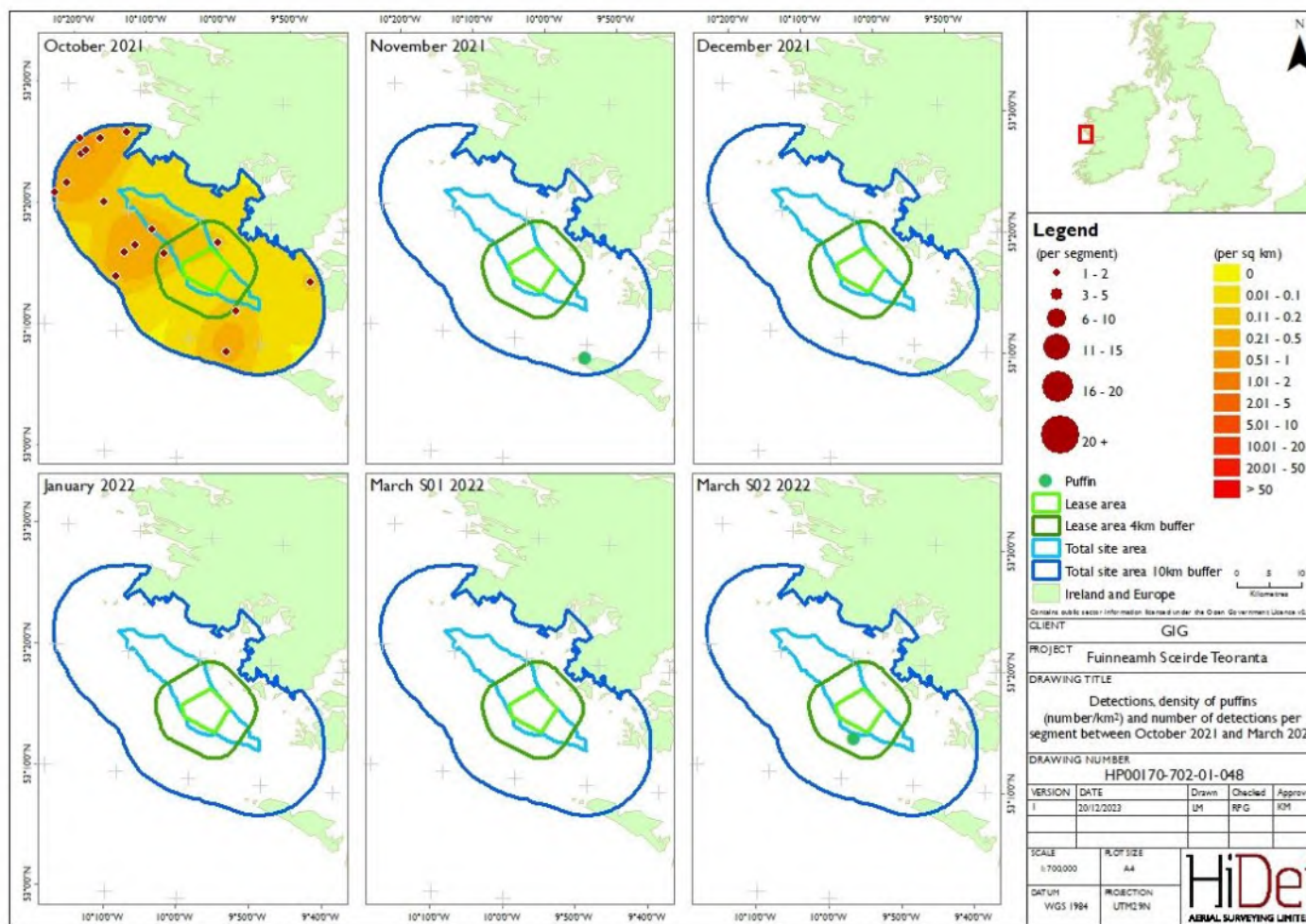


Figure 85 Detections, density (number/km²) and number of detections per segment of puffins in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

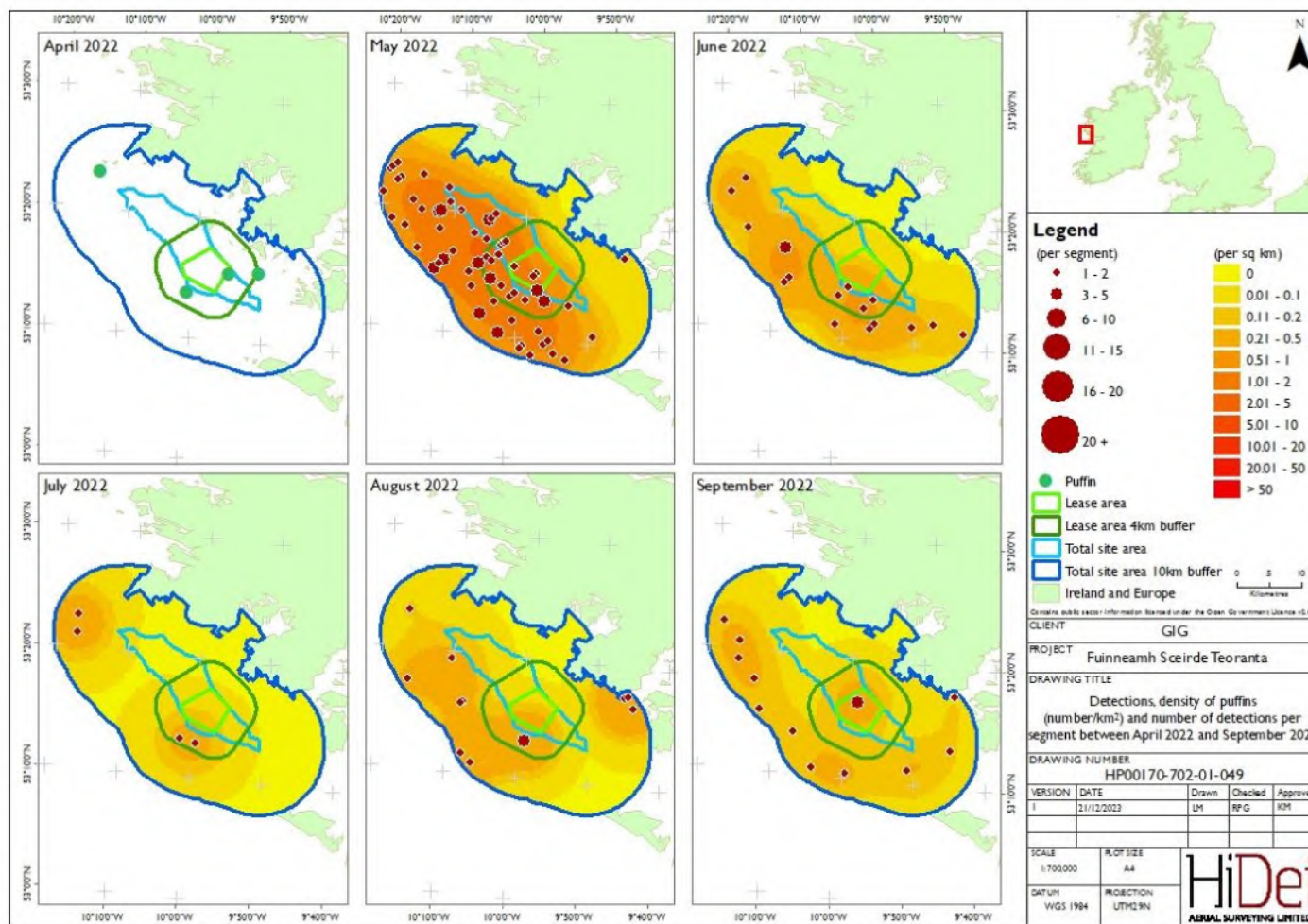


Figure 86 Detections, density (number/km²) and number of detections per segment of puffins in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

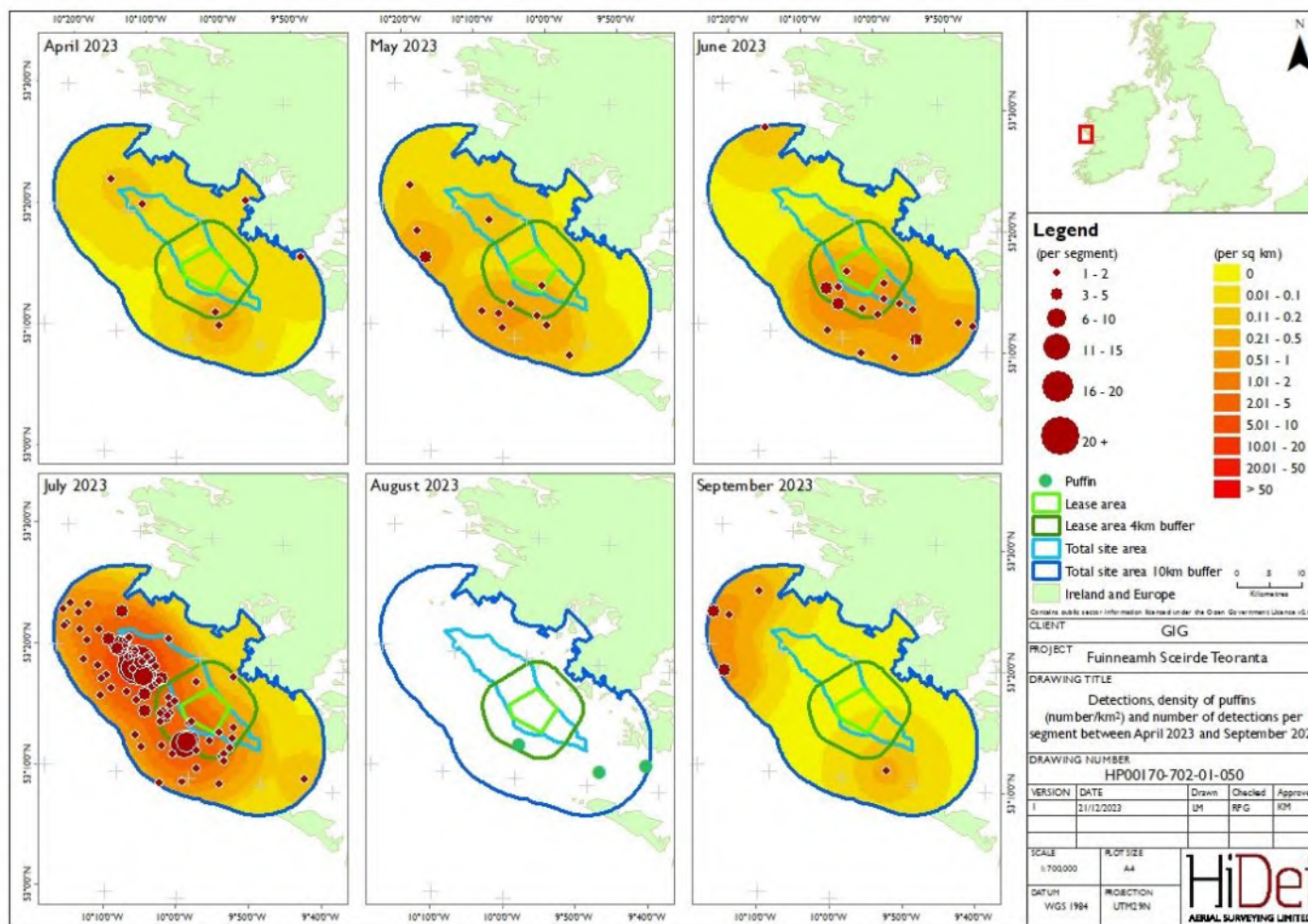
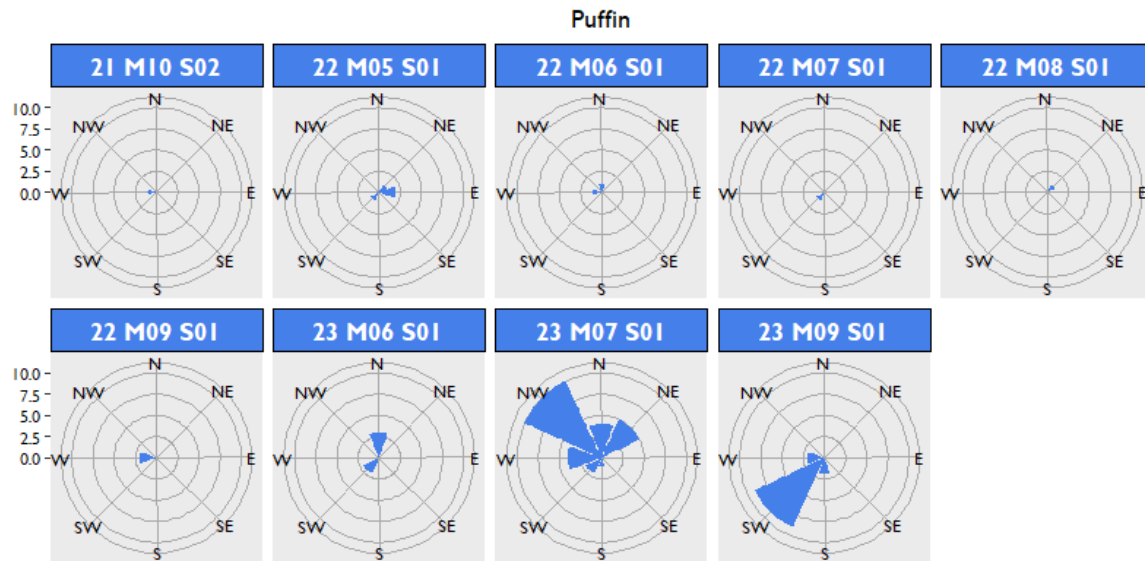


Figure 87 Summarised direction of movement of flying puffins in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.14 Red-throated diver

- 140 Red-throated divers (*Gavia stellata*) were recorded in relatively low numbers across the survey period, with most of the records between October 2021 and June 2022 (Figure 88).
- 141 Density estimates for the species ranged between 0.01 birds/km² (95% CI 0.01 – 0.03) in October 2022 and 0.21 birds/km² (95% CI 0.44 – 0.96) in November 2021 (Figure 89 and Table 38), equating to 8 birds (95% CI 0 – 25) and 194 birds (95% CI 80 – 352) respectively.
- 142 Red-throated divers were typically found close to the coastline within the buffer. In November 2021 higher densities were observed in the south-east of the survey area whilst in March 2022 the highest densities were observed in the north-east of the survey area (Figure 90 to Figure 93).
- 143 Over the survey period, all red-throated diver were recorded as sitting on the water apart from one diving behaviour recorded in November 2021 (Table 39).

Figure 88 Number of red-throated divers recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

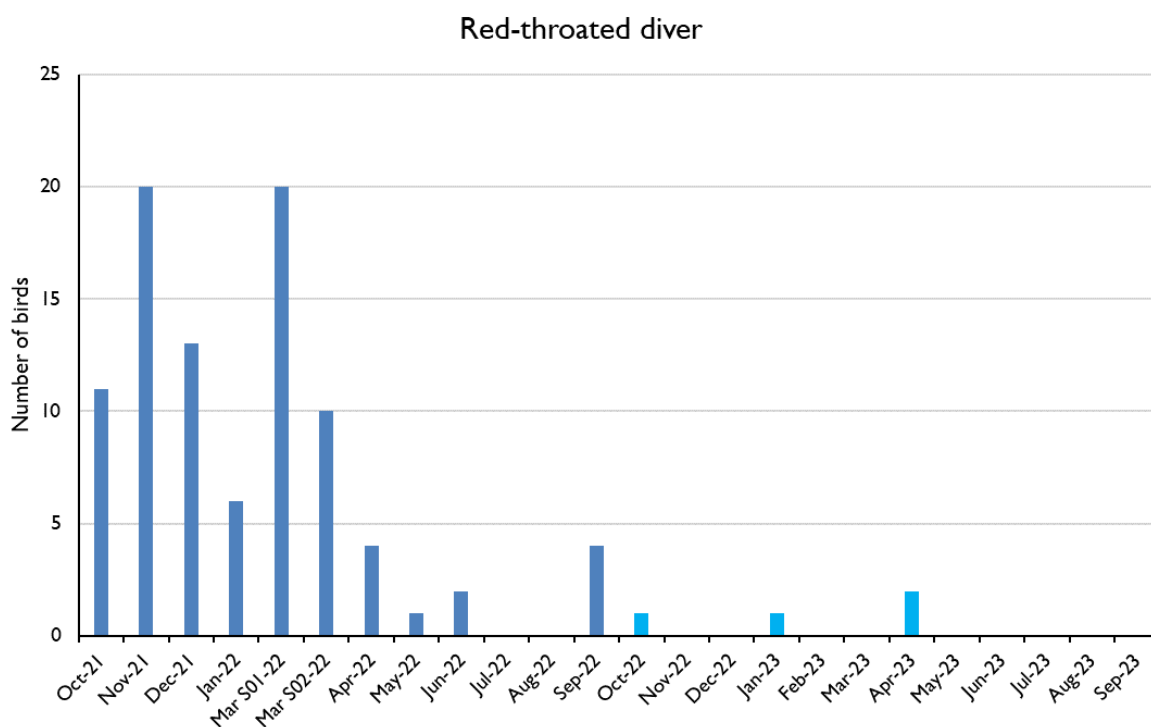


Figure 89 Red-throated diver density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

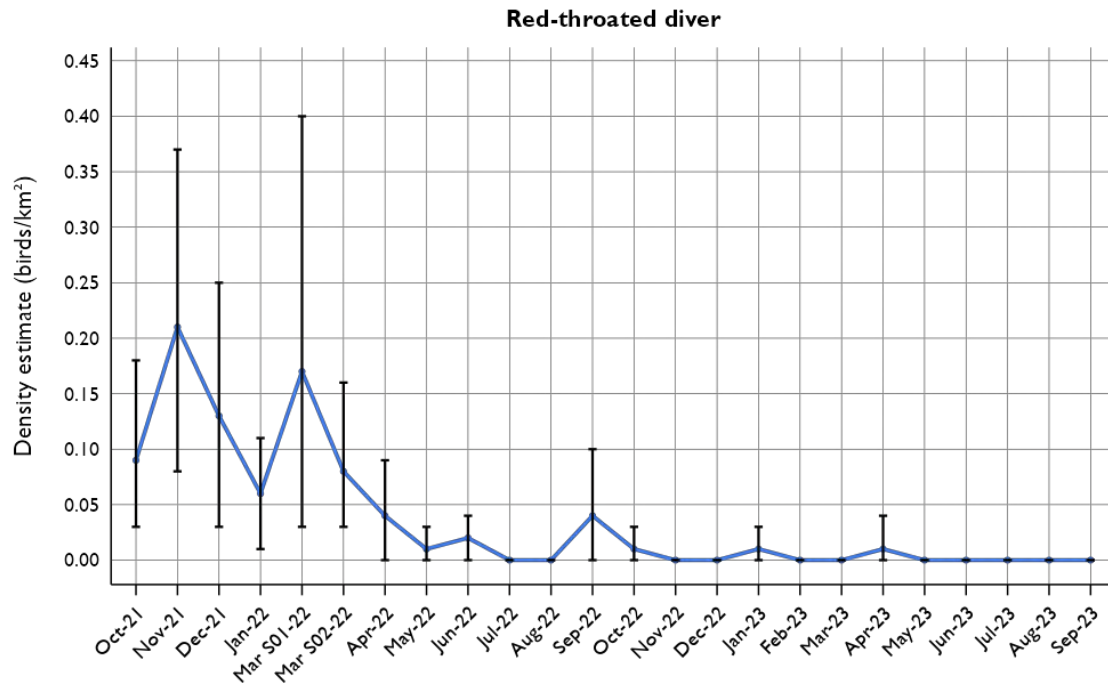


Table 38 **Density and population estimates of red-throated divers in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.09	88	24	172	36	40.03
27 November 2021	0.21	194	80	352	70	36.08
10 December 2021	0.13	118	32	233	44	37.23
21 January 2022	0.06	52	14	103	23	44.23
01 March 2022	0.17	160	24	382	103	64.38
19 March 2022	0.08	78	24	147	30	37.53
01 April 2022	0.04	35	1	81	22	62.86
27 May 2022	0.01	10	0	26	8	80.00
18 June 2022	0.02	17	0	41	11	64.71
11 July 2022	0.00	0	0	0	0	0.00
06 August 2022	0.00	0	0	0	0	0.00
01 September 2022	0.04	40	0	98	26	65.00
17 October 2022	0.01	8	0	25	9	112.50
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.00	0	0	0	0	0.00
19 January 2023	0.01	9	0	26	9	100
09 February 2023	0.00	0	0	0	0	0.00
04 March 2023	0.00	0	0	0	0	0.00
18 April 2023	0.01	14	0	38	10	67.39
02 May 2023	0.00	0	0	0	0	0.00
03 June 2023	0.00	0	0	0	0	0.00
19 July 2023	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00
16 September 2023	0.00	0	0	0	0	0.00

Table 39 Summary of red-throated diver behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	0	11	0	0	11
27 November 2021	1	0	19	0	0	20
10 December 2021	0	0	13	0	0	13
21 January 2022	0	0	6	0	0	6
01 March 2022	0	0	20	0	0	20
19 March 2022	0	0	10	0	0	10
01 April 2022	0	0	4	0	0	4
27 May 2022	0	0	1	0	0	1
18 June 2022	0	0	2	0	0	2
11 July 2022	0	0	0	0	-	0
06 August 2022	0	0	0	0	-	0
01 September 2022	0	0	4	0	0	4
17 October 2022	0	0	1	0	0	1
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	0	1	0	0	1
09 February 2023	0	0	0	0	-	0
04 March 2023	0	0	0	0	-	0
18 April 2023	0	0	2	0	0	2
02 May 2023	0	0	0	0	-	0
03 June 2023	0	0	0	0	-	0
19 July 2023	0	0	0	0	-	0
17 August 2023	0	0	0	0	-	0
16 September 2023	0	0	0	0	-	0
Total	1	0	94	0	0	95

Figure 90 Density (number/km²) and number of detections per segment of red-throated divers in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

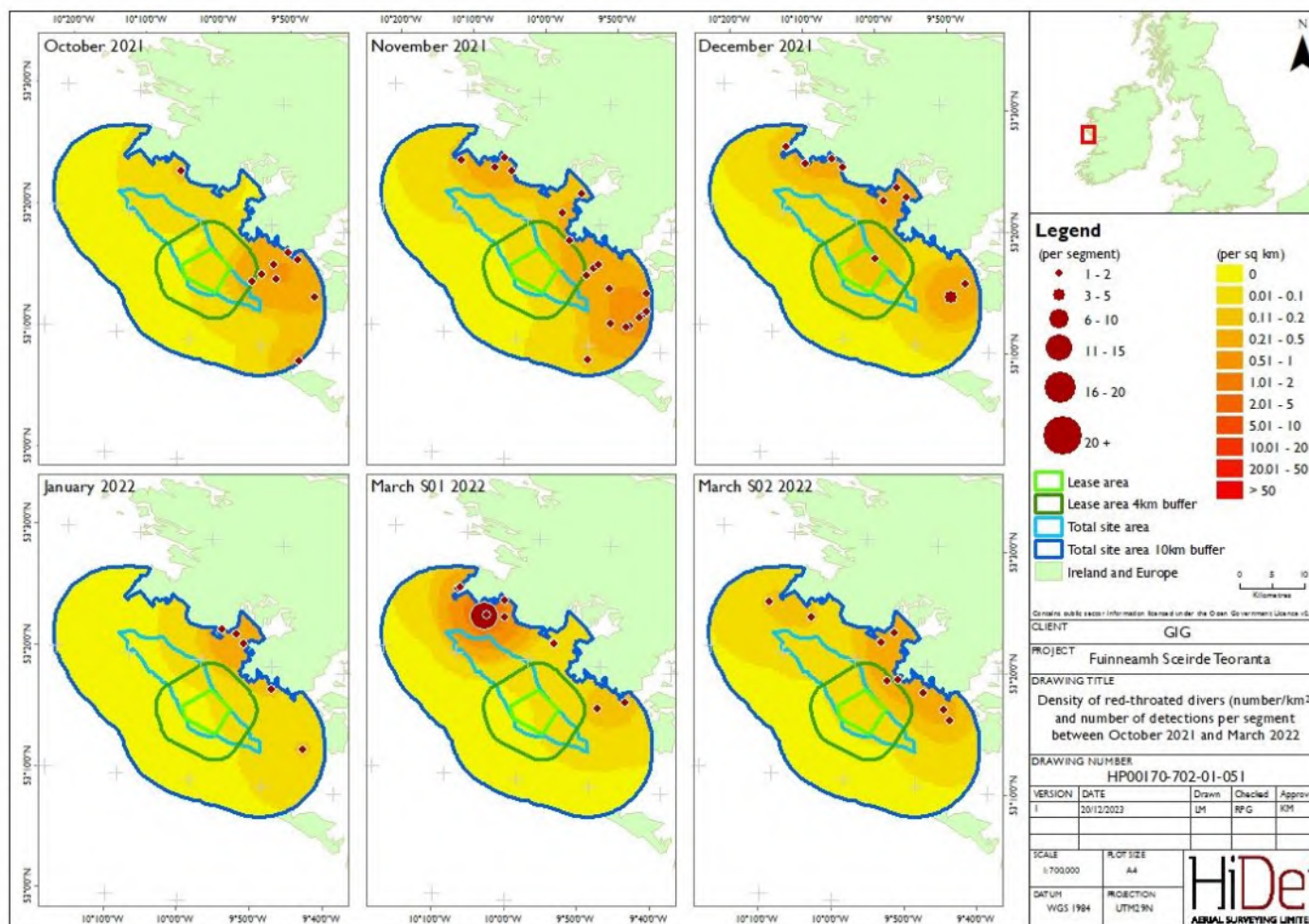


Figure 91 Detections of red-throated divers in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

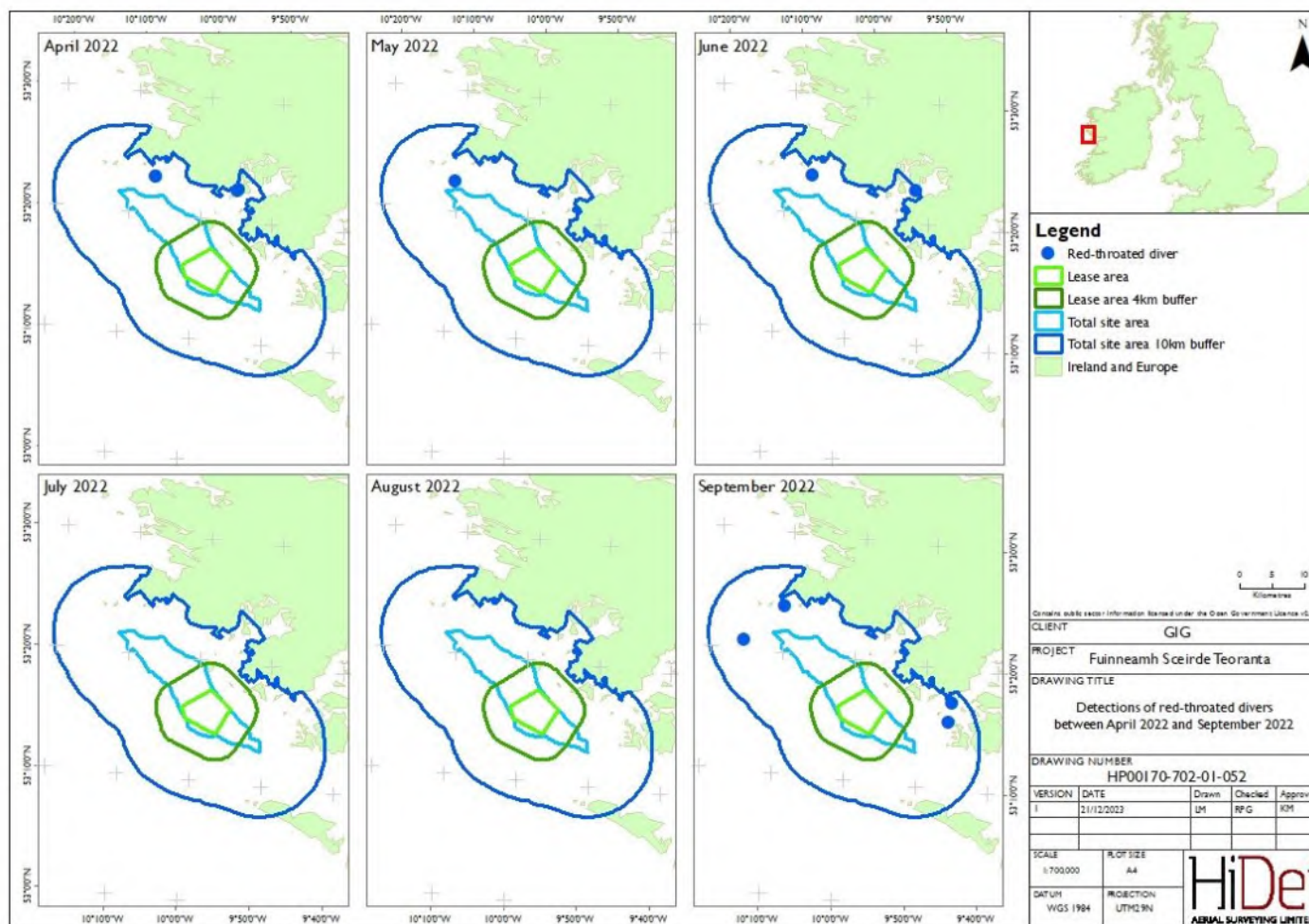


Figure 92 Detections of red-throated divers in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

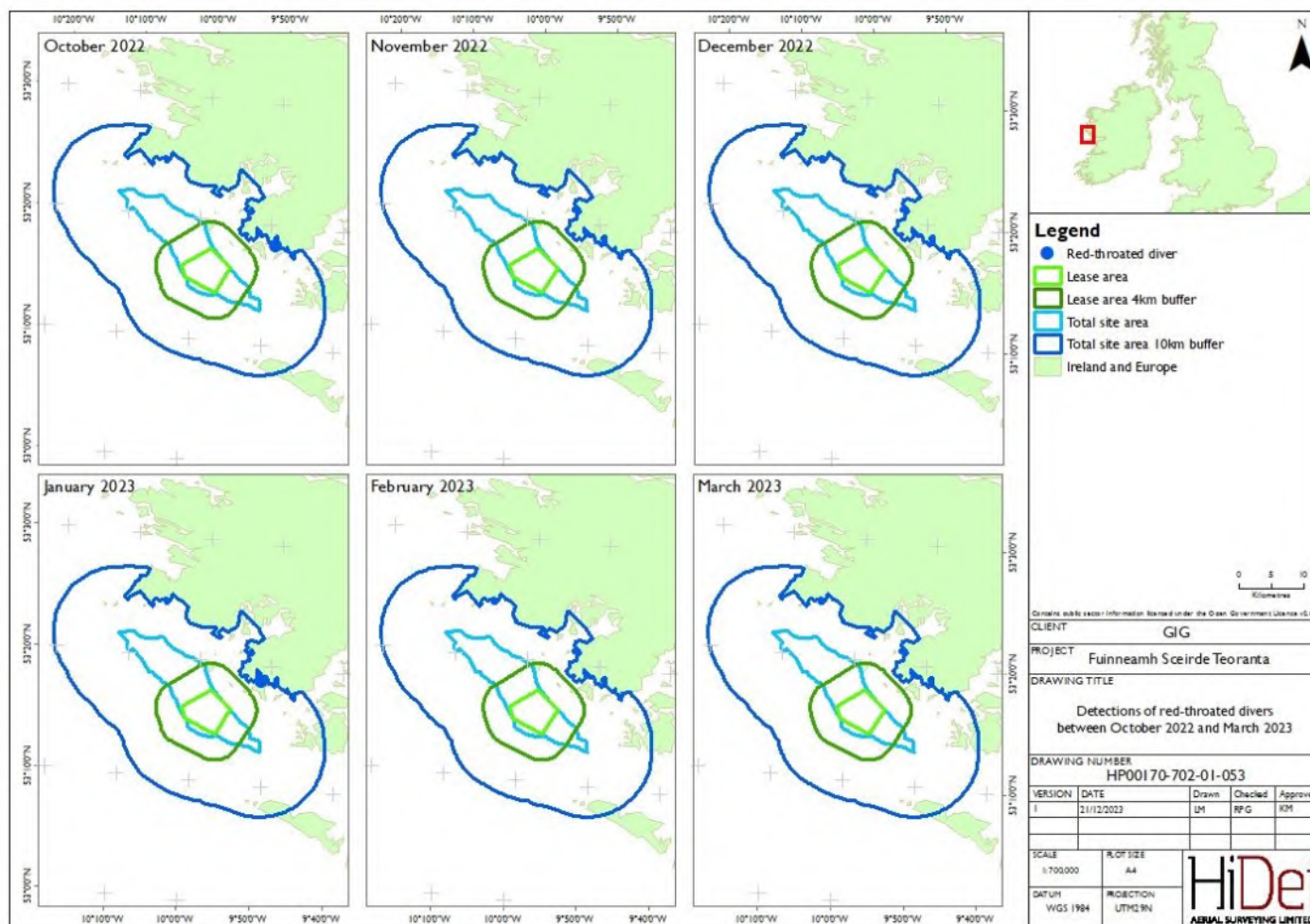
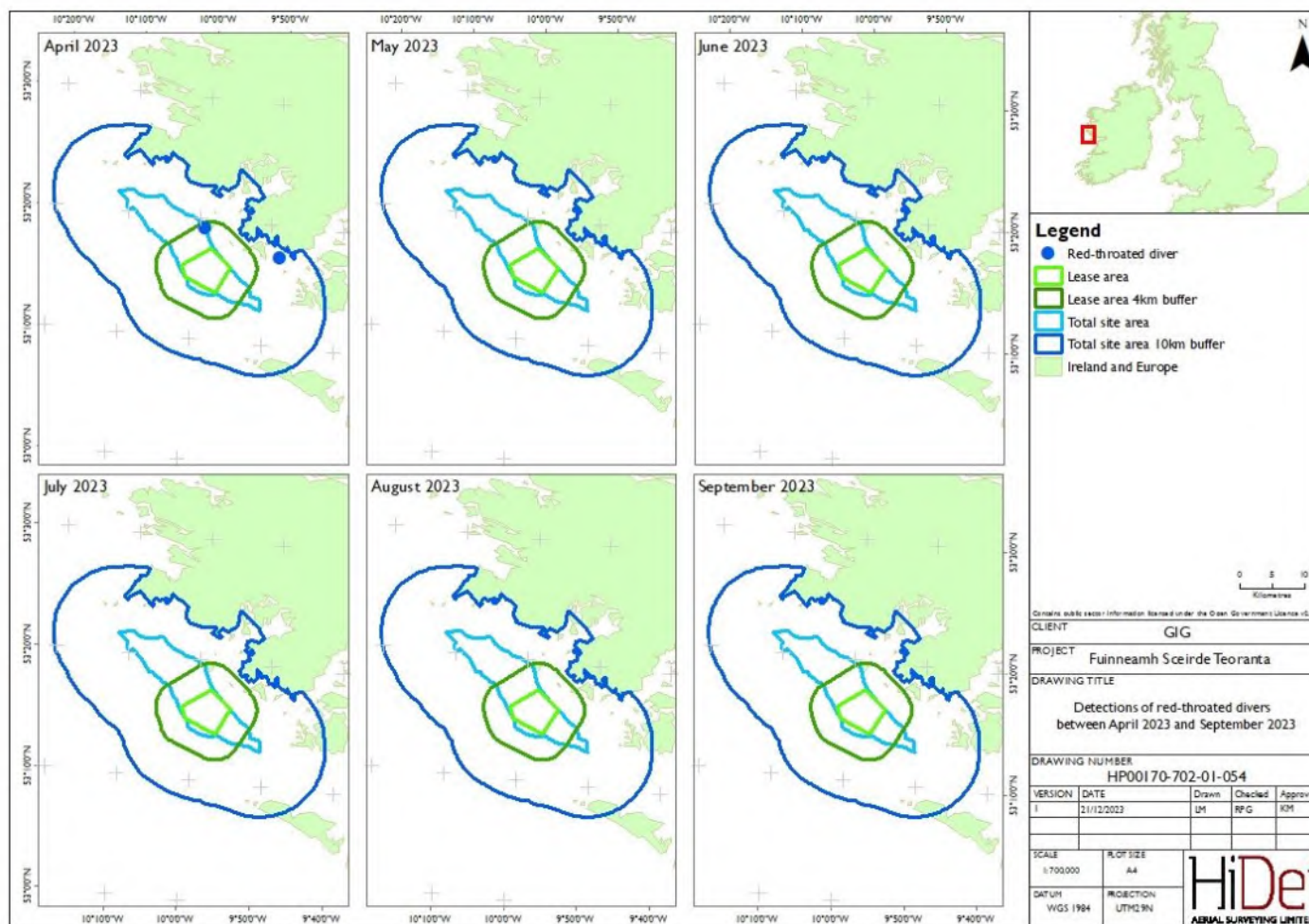


Figure 93 Detections of red-throated divers in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.15 Great northern diver

- 144 Great northern diver numbers were relatively low between October 2021 and December 2021, increasing in numbers between January 2022 and April 2022. No observations were recorded in the summer months of 2022. In the winter months between December 2022 and April 2023, numbers increased, peaking in March 2023 with 72 birds recorded (Figure 94).
- 145 Density estimates for the species ranged between 0.02 birds/km² (95% CI 0.00 – 0.04) in October 2022 and 0.60 birds/km² (95% CI 0.29 – 0.97) in February 2023 (Figure 95 and Table 40), equating to 17 birds (95% CI 0 – 41) and 567 birds (95% CI 278 – 914) respectively.
- 146 Great northern divers were found in higher densities closer to the coastline throughout the survey period, whilst in May 2022 birds were found throughout the central and northern regions of the site (Figure 96 to Figure 99).
- 147 Over the survey period, there was a single record of a flying great northern diver in October 2021; all other birds were recorded sitting on the water (Table 41). The flying individual was recorded moving in a north-westerly direction; no wind-rose plot has been presented.

Figure 94 Number of great northern divers recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

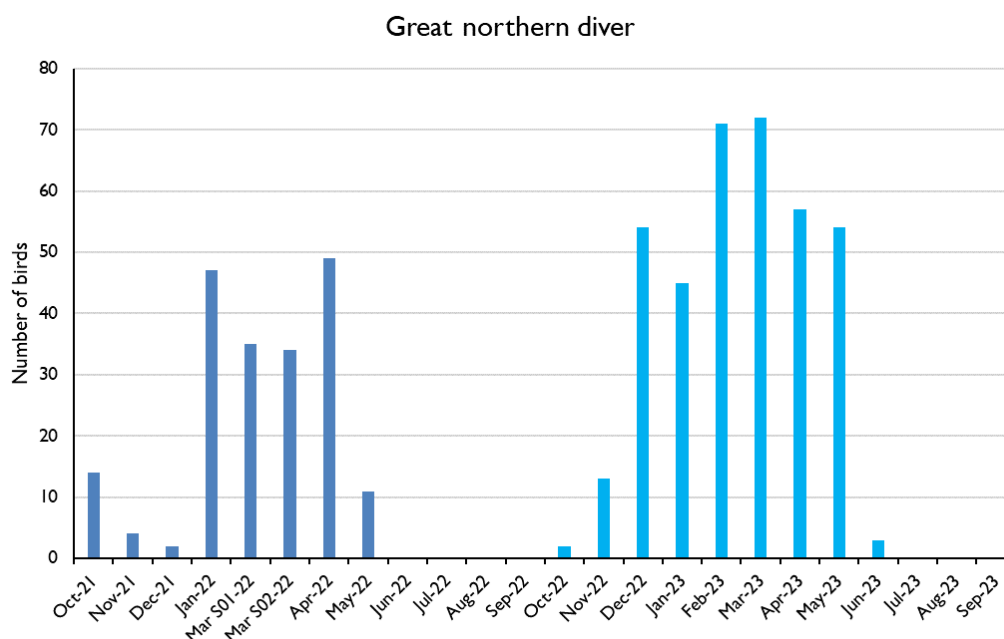


Figure 95 Great northern diver density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

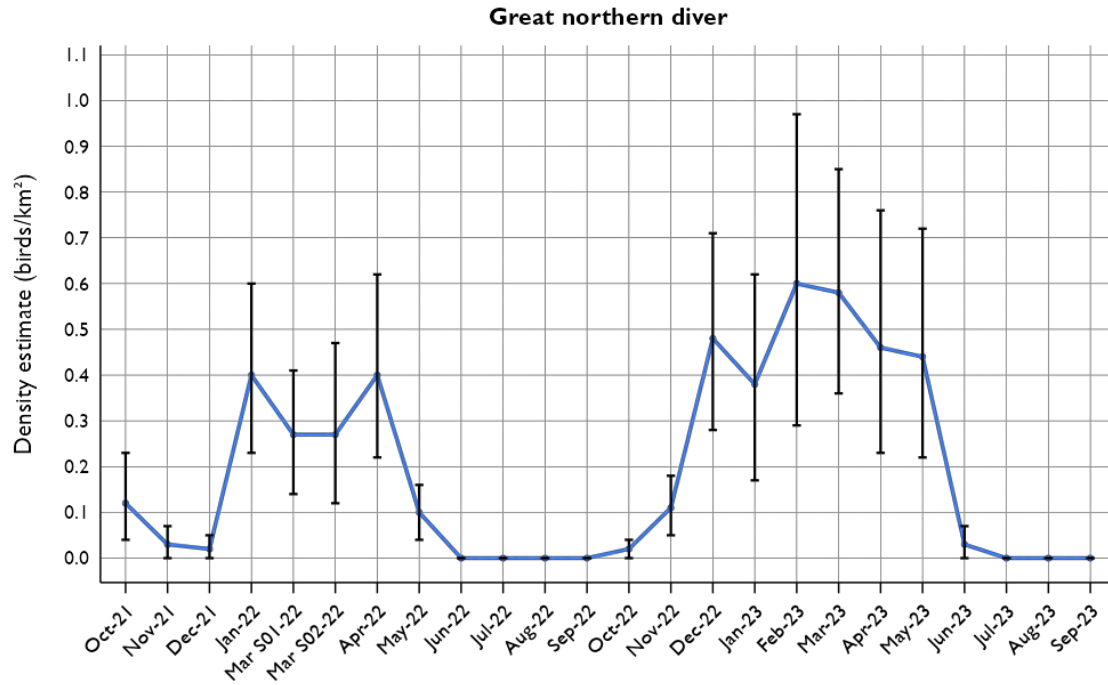


Table 40 **Density and population estimates of great northern diver in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.12	115	37	220	47	40.15
27 November 2021	0.03	31	3	68	15	46.97
10 December 2021	0.02	19	0	45	12	63.16
21 January 2022	0.40	382	217	570	81	21.14
01 March 2022	0.27	254	128	390	57	22.25
19 March 2022	0.27	258	115	443	79	30.35
01 April 2022	0.40	381	211	589	85	22.31
27 May 2022	0.10	90	39	155	26	28.57
18 June 2022	0.00	0	0	0	0	0.00
11 July 2022	0.00	0	0	0	0	0.00
06 August 2022	0.00	0	0	0	0	0.00
01 September 2022	0.00	0	0	0	0	0.00
17 October 2022	0.02	17	0	41	12	70.59
29 November 2022	0.11	105	49	169	29	26.94
22 December 2022	0.48	449	263	667	85	18.75
19 January 2023	0.38	359	164	584	102	28.27
09 February 2023	0.60	567	278	914	154	27.04
04 March 2023	0.58	545	339	798	116	21.17
18 April 2023	0.46	431	217	717	118	27.29
02 May 2023	0.44	417	203	677	114	27.23
03 June 2023	0.03	26	0	65	18	69.23
19 July 2023	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00
16 September 2023	0.00	0	0	0	0	0.00

Table 41 Summary of great northern diver behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	1	13	0	7	14
27 November 2021	0	0	4	0	0	4
10 December 2021	0	0	2	0	0	2
21 January 2022	0	0	47	0	0	47
01 March 2022	0	0	35	0	0	35
19 March 2022	0	0	34	0	0	34
01 April 2022	0	0	49	0	0	49
27 May 2022	0	0	11	0	0	11
18 June 2022	0	0	0	0	-	0
11 July 2022	0	0	0	0	-	0
06 August 2022	0	0	0	0	-	0
01 September 2022	0	0	0	0	-	0
17 October 2022	0	0	2	0	0	2
29 November 2022	0	0	13	0	0	13
22 December 2022	0	0	54	0	0	54
19 January 2023	0	0	45	0	0	45
09 February 2023	0	0	71	0	0	71
04 March 2023	0	0	72	0	0	72
18 April 2023	0	0	57	0	0	57
02 May 2023	0	0	54	0	0	54
03 June 2023	0	0	3	0	0	3
19 July 2023	0	0	0	0	-	0
17 August 2023	0	0	0	0	-	0
16 September 2023	0	0	0	0	-	0
Total	0	1	566	0	0	567

Figure 96 Detections, density (number/km²) and number of detections per segment of great northern divers in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

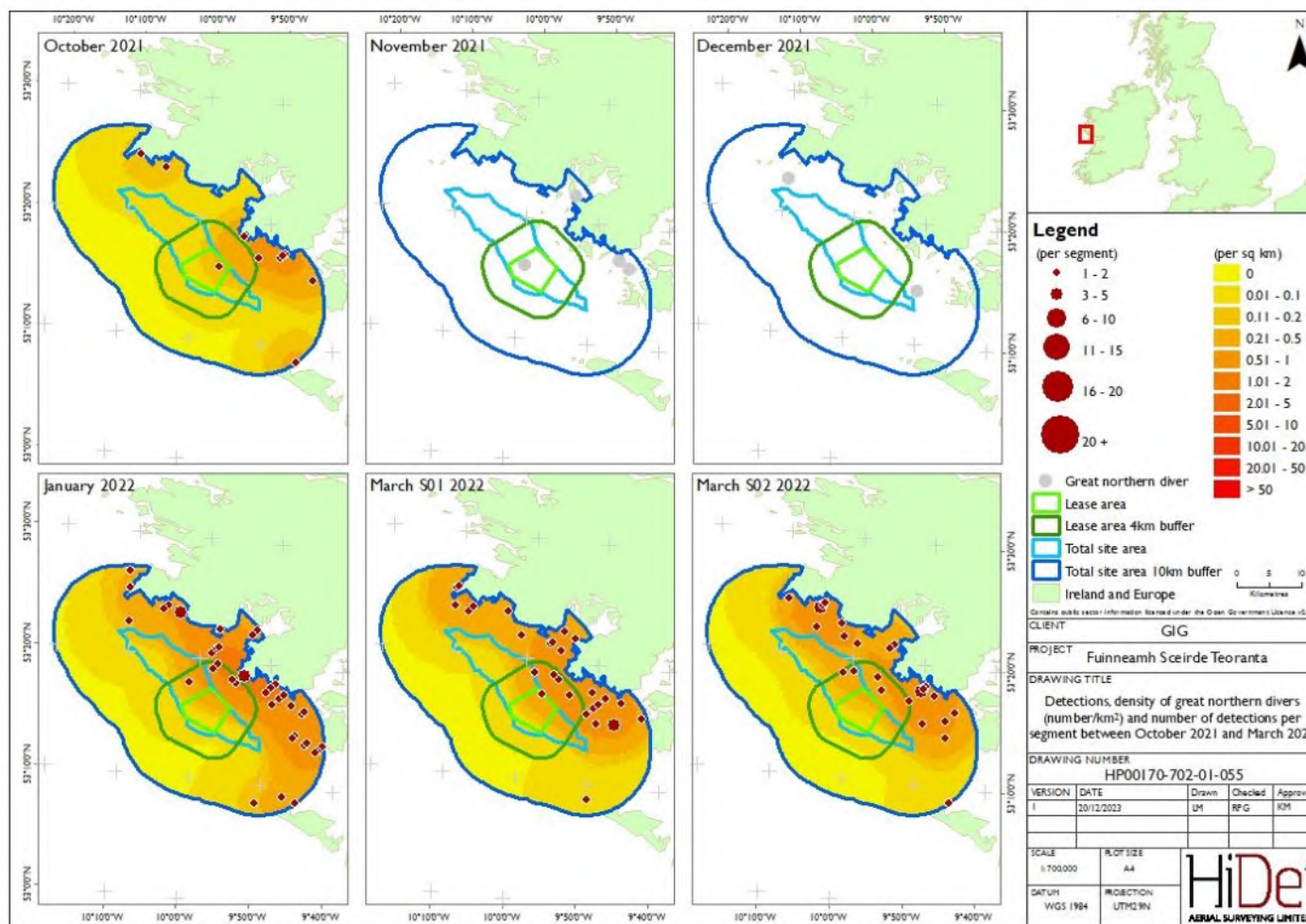


Figure 97 Detections, density (number/km²) and number of detections per segment of great northern divers in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

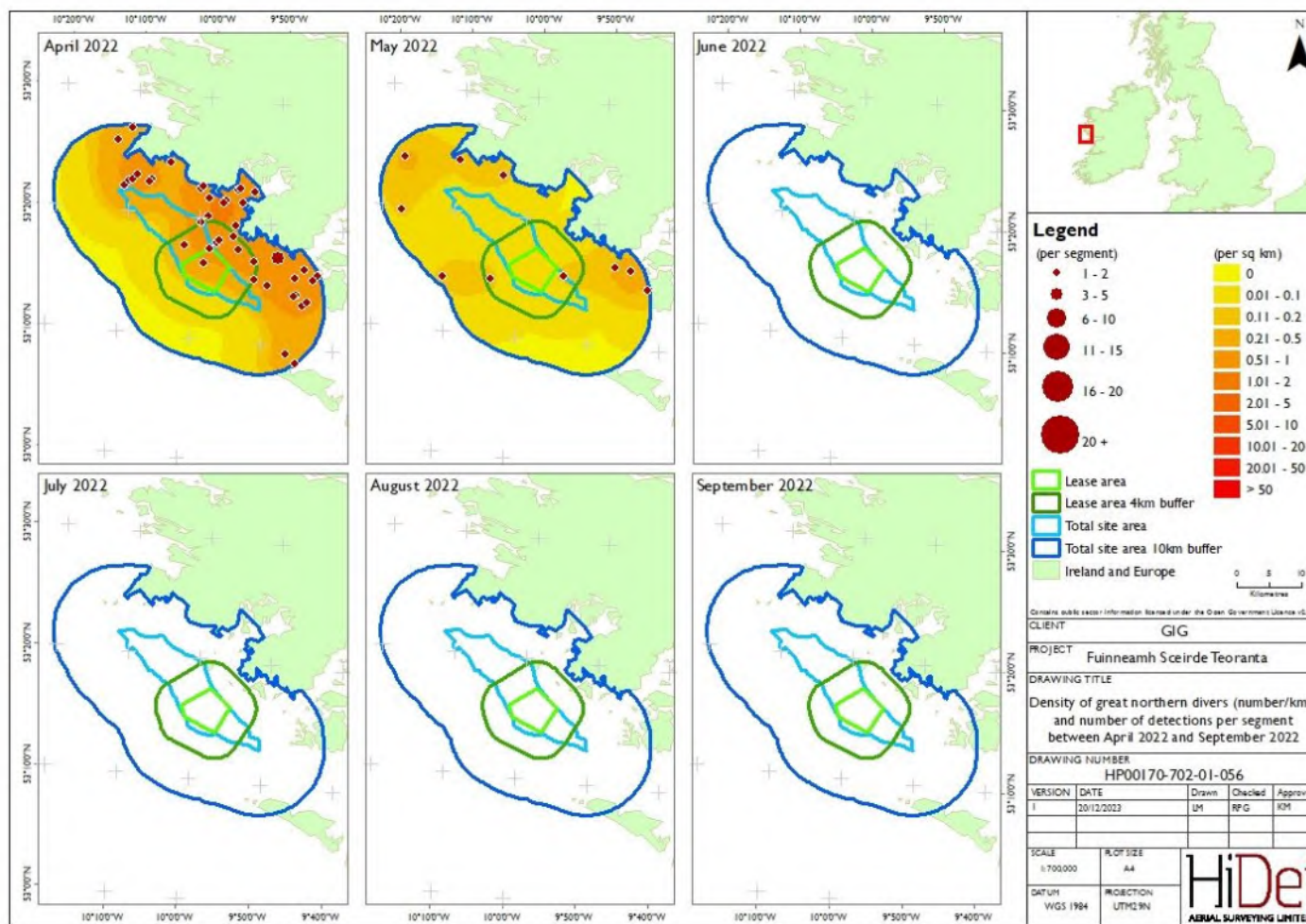


Figure 98 Detections, density (number/km²) and number of detections per segment of great northern divers in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

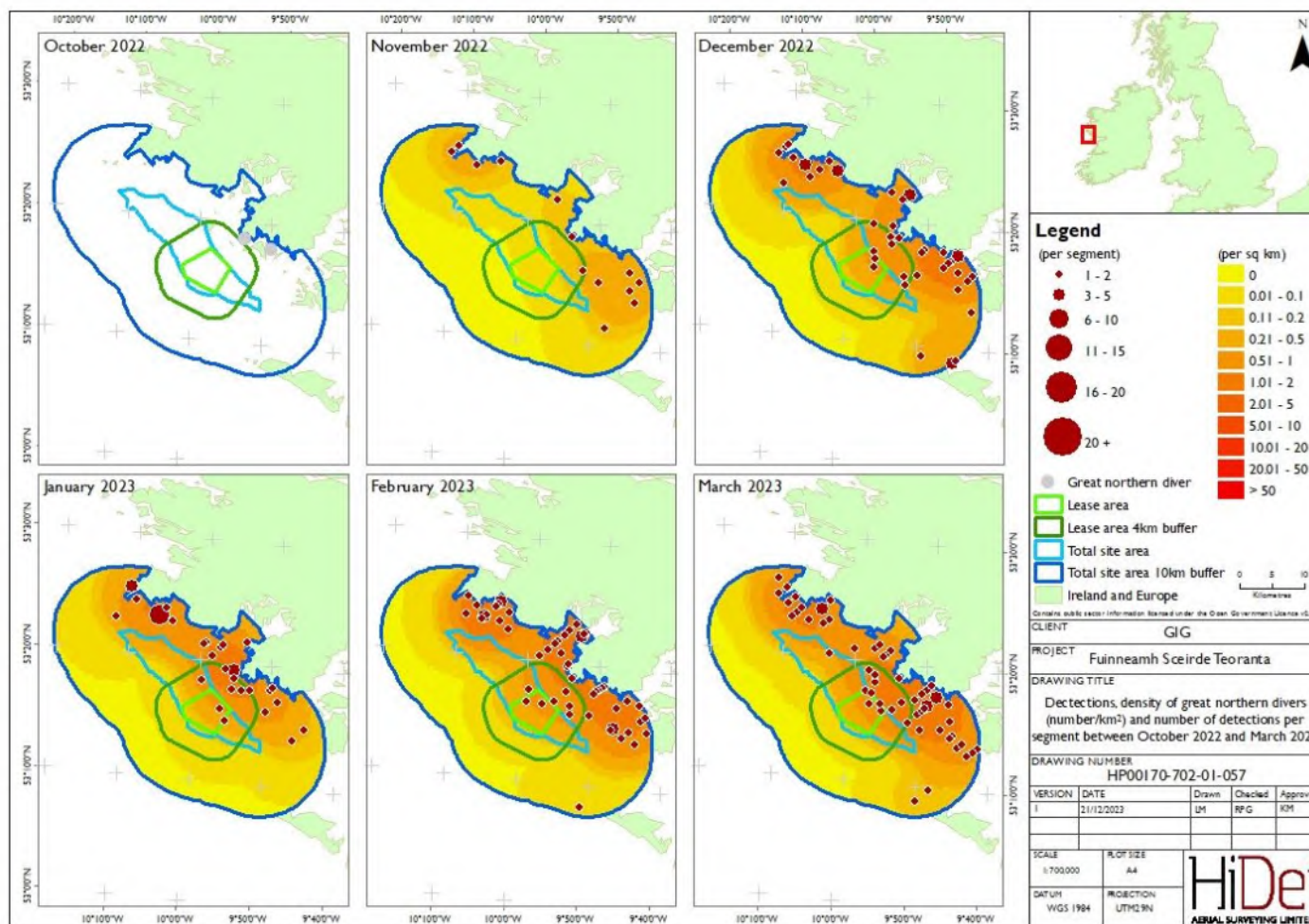
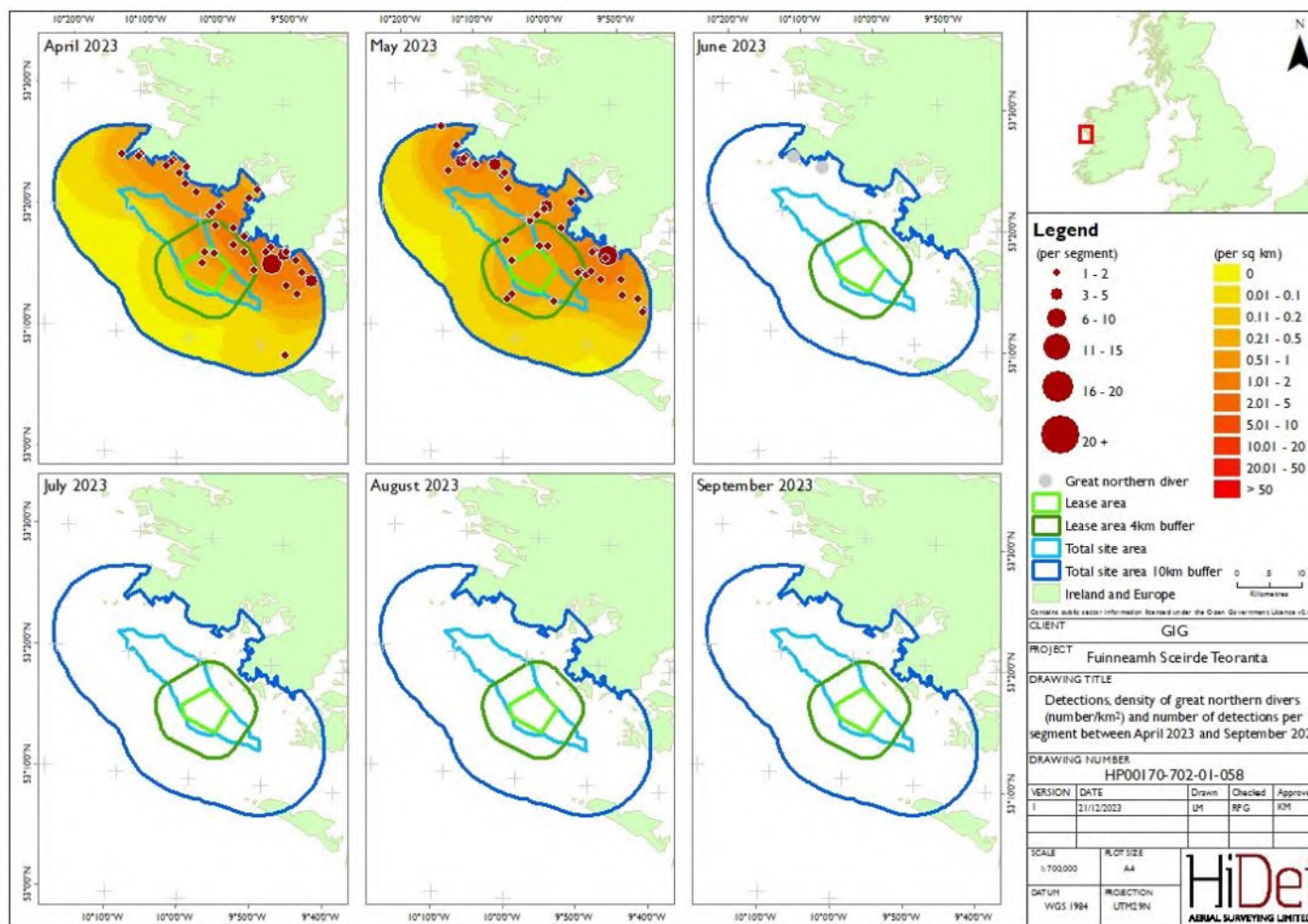


Figure 99 Detections, density (number/km²) and number of detections per segment of great northern divers in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.16 Fulmar

- 148 Fulmar was recorded in relatively consistent numbers throughout the survey period, except for a notable peak in December 2021 with 72 birds recorded (Figure 100).
- 149 Density estimates for the species ranged between 0.01 birds/km² (95% CI 0.00 – 0.03) in January 2022 and 0.57 birds/km² (95% CI 0.33 – 0.83) in December 2021 (Figure 101 and Table 42), equating to 9 birds (95% CI 0 – 24) and 541 birds (95% CI 312 – 787) respectively.
- 150 Fulmars were found throughout the survey area but the majority were recorded away from in-shore waters. In December 2021, when numbers peaked, the highest densities were observed in the west of the site in the buffer region. Whilst in September 2022 higher densities were found in the lease area and total site area (Figure 102 to Figure 105).
- 151 Over the survey period, 81% of birds were recorded flying (Table 43).
- 152 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 106). Fulmars were recorded flying in many directions for most surveys with most flying south-east and east in December 2021 when records peaked.

Figure 100 Number of fulmars recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

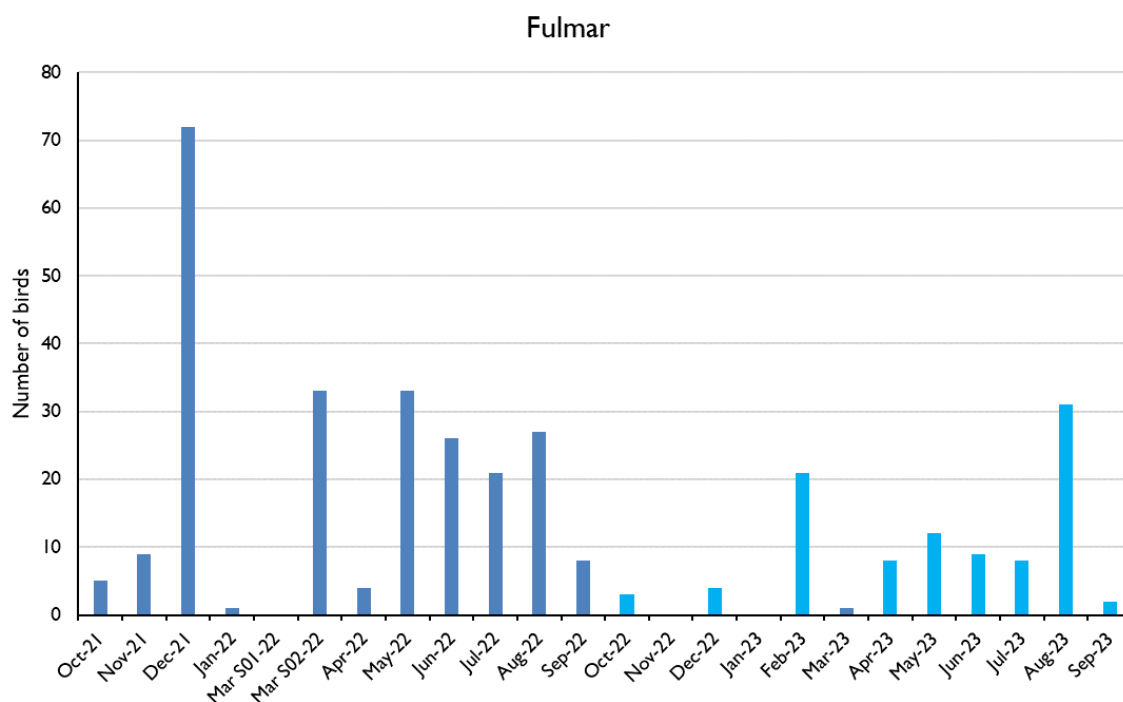


Figure 101 Fulmar density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

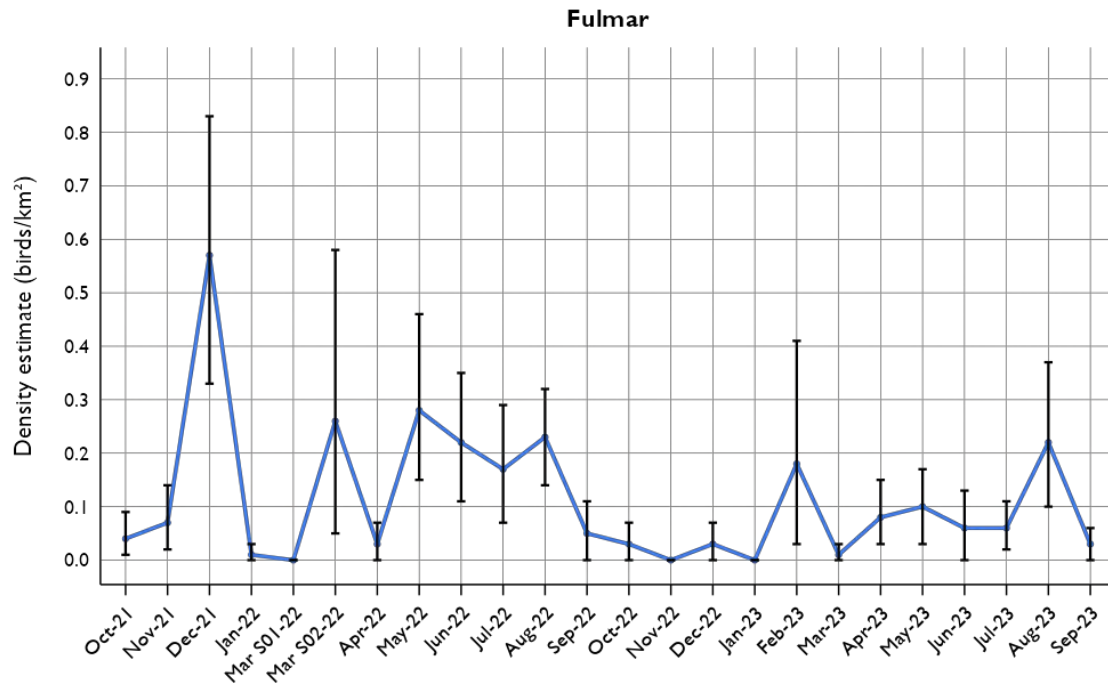


Table 42 **Density and population estimates of fulmar in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.04	41	8	82	20	48.78
27 November 2021	0.07	69	16	134	29	40.99
10 December 2021	0.57	541	312	787	114	20.91
21 January 2022	0.01	9	0	24	8	88.89
01 March 2022	0.00	0	0	0	0	0.00
19 March 2022	0.26	243	46	546	124	50.94
01 April 2022	0.03	33	0	68	14	42.21
27 May 2022	0.28	269	137	433	73	26.97
18 June 2022	0.22	204	107	329	51	24.90
11 July 2022	0.17	162	69	270	44	26.80
06 August 2022	0.23	214	128	305	42	19.44
01 September 2022	0.05	46	4	104	20	41.76
17 October 2022	0.03	24	0	64	18	75
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.03	29	0	67	14	46.90
19 January 2023	0.00	0	0	0	0	0.00
09 February 2023	0.18	172	33	385	90	52.33
04 March 2023	0.01	9	0	32	9	100.00
18 April 2023	0.08	79	24	145	30	37.06
02 May 2023	0.10	91	32	158	28	30.39
03 June 2023	0.06	58	4	126	23	38.75
19 July 2023	0.06	61	23	106	19	30.14
17 August 2023	0.22	211	91	348	56	26.11
16 September 2023	0.03	25	0	57	14	56.00

Table 43 Summary of fulmar behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	4	1	0	80	5
27 November 2021	0	8	1	0	89	9
10 December 2021	0	71	1	0	99	72
21 January 2022	0	1	0	0	100	1
01 March 2022	0	0	0	0	-	0
19 March 2022	0	32	1	0	97	33
01 April 2022	0	3	1	0	75	4
27 May 2022	0	19	14	0	58	33
18 June 2022	0	21	5	0	81	26
11 July 2022	0	11	10	0	52	21
06 August 2022	0	18	9	0	67	27
01 September 2022	0	5	2	1	62	8
17 October 2022	0	3	0	0	100	3
29 November 2022	0	0	0	0	-	0
22 December 2022	0	3	1	0	75	4
19 January 2023	0	0	0	0	-	0
09 February 2023	0	20	1	0	95	21
04 March 2023	0	0	1	0	0	1
18 April 2023	0	5	3	0	62	8
02 May 2023	0	9	3	0	75	12
03 June 2023	0	2	7	0	22	9
19 July 2023	0	8	0	0	100	8
17 August 2023	0	28	3	0	90	31
16 September 2023	0	2	0	0	100	2
Total	0	273	64	1	81	338

Figure 102 Detections, density (number/km²) and number of detections per segment of fulmars in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

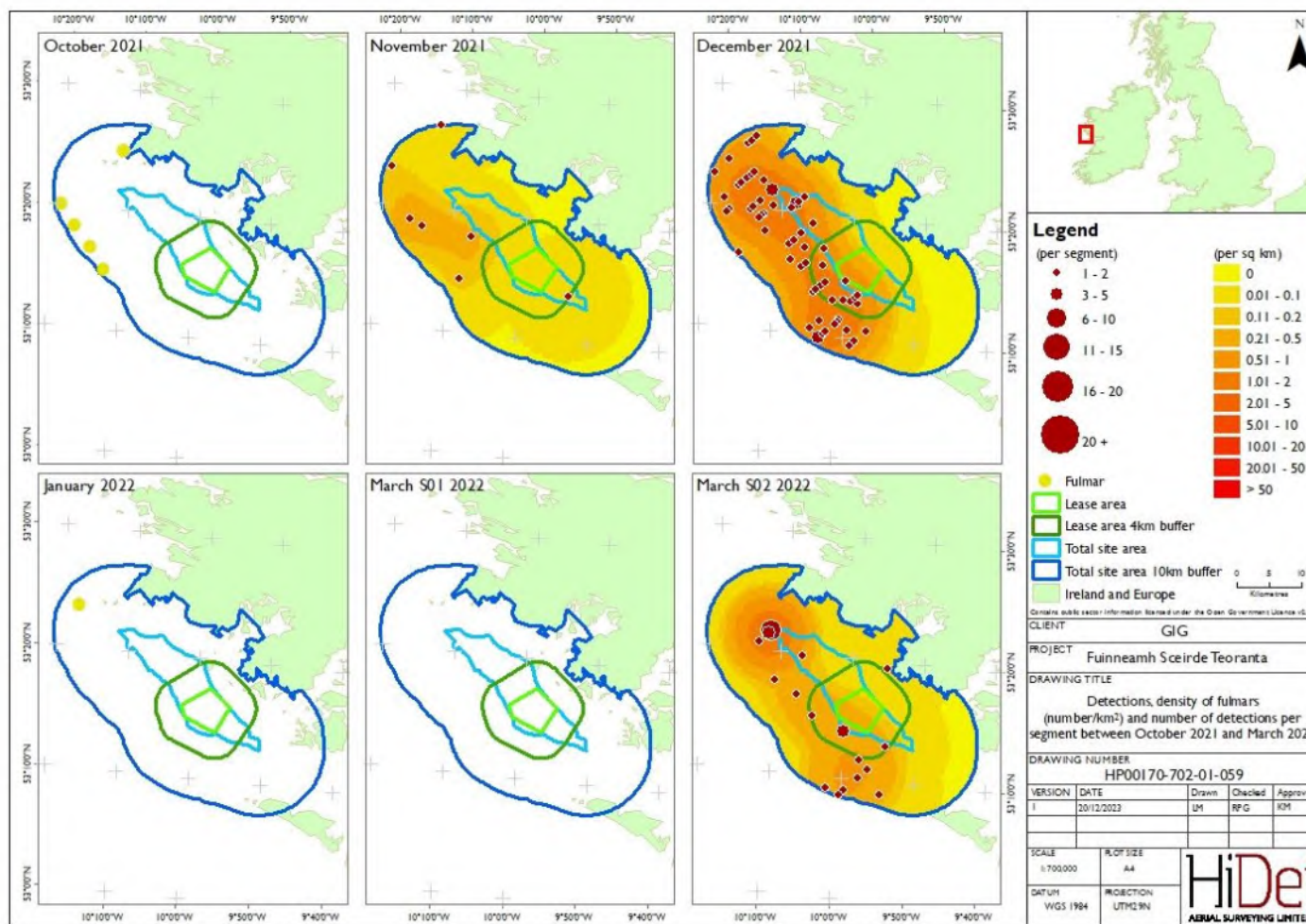


Figure 103 Detections, density (number/km²) and number of detections per segment of fulmars in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

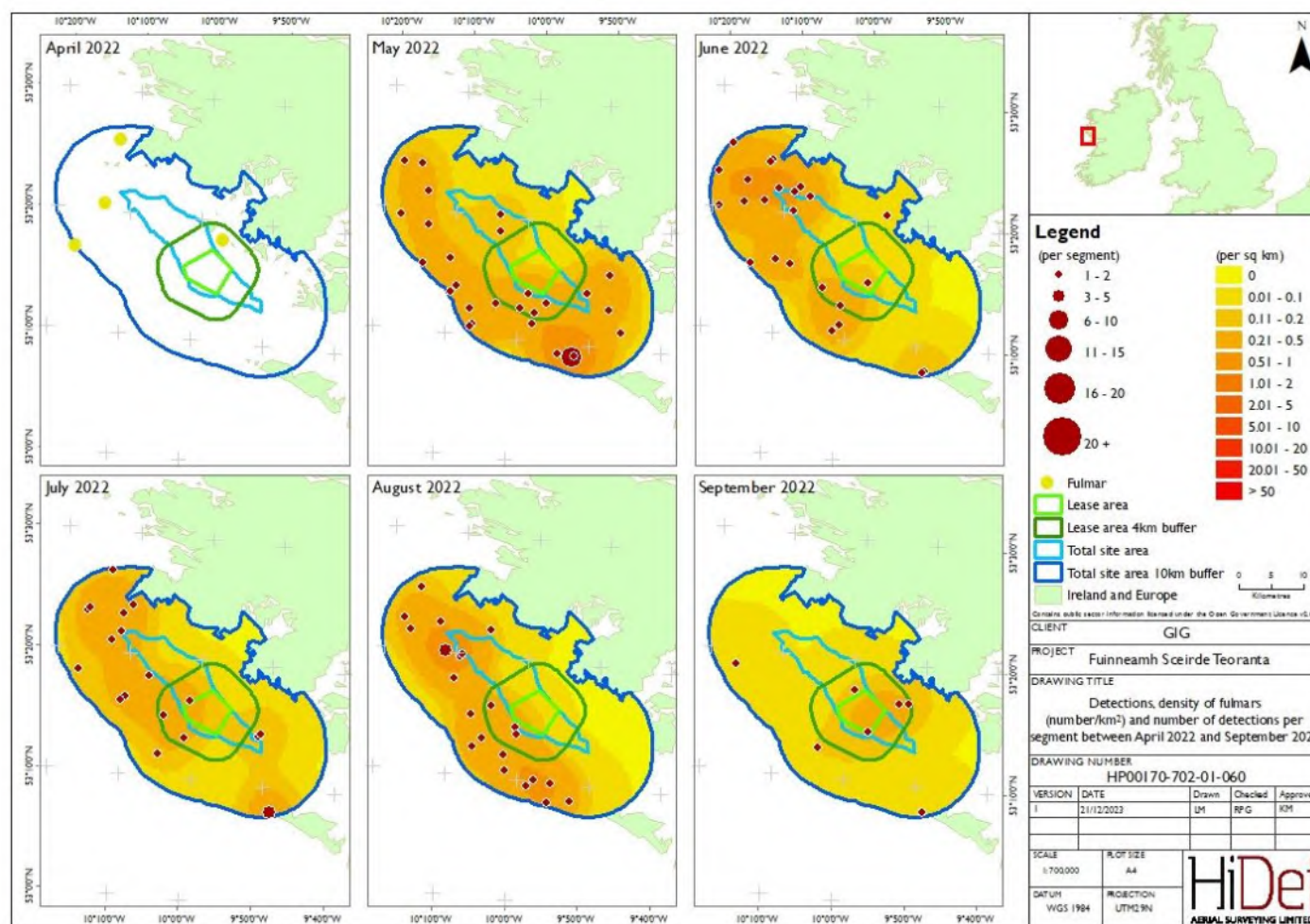


Figure 104 Detections, density (number/km²) and number of detections per segment of fulmars in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

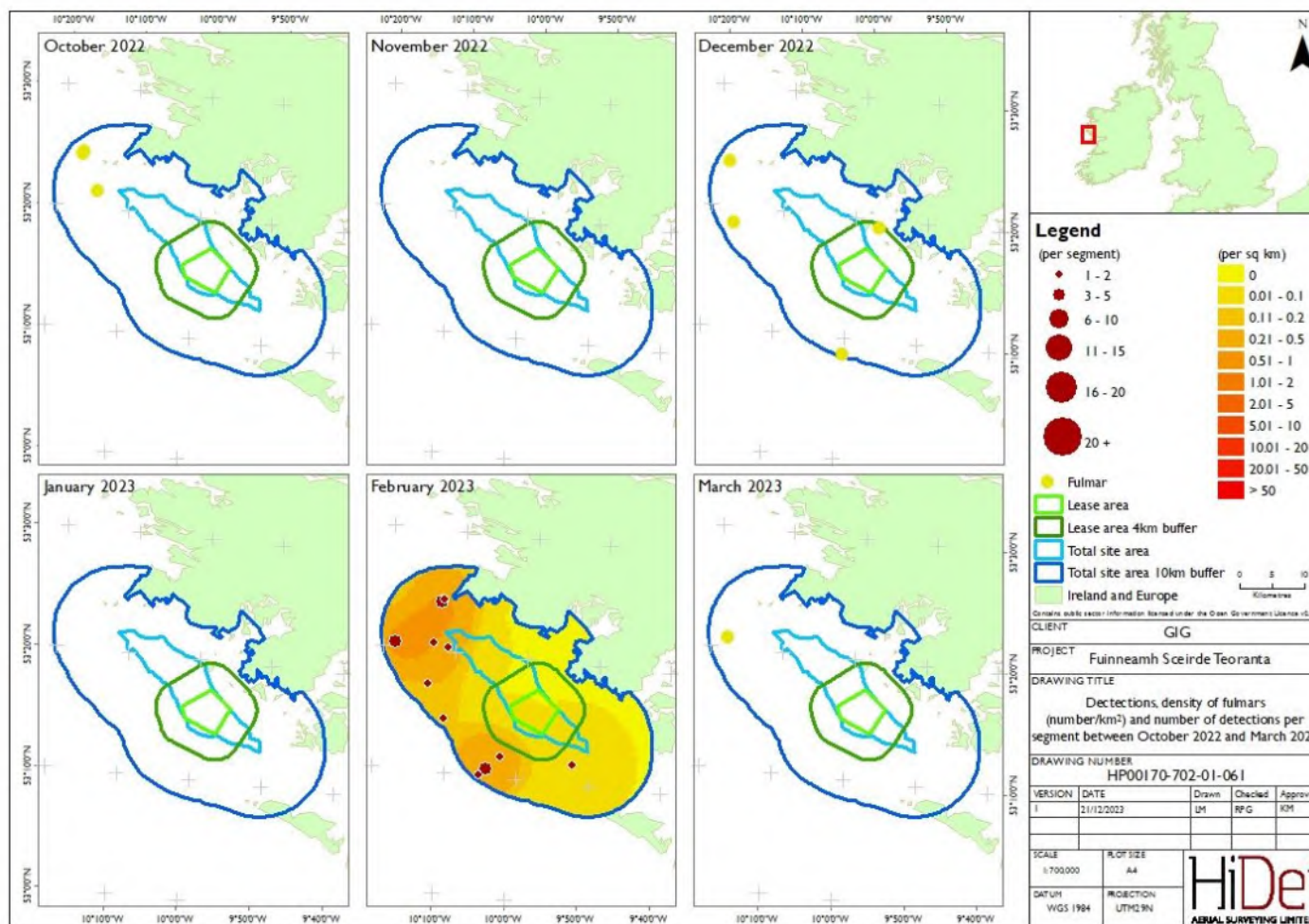


Figure 105 Density (number/km²) and number of detections per segment of fulmars in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

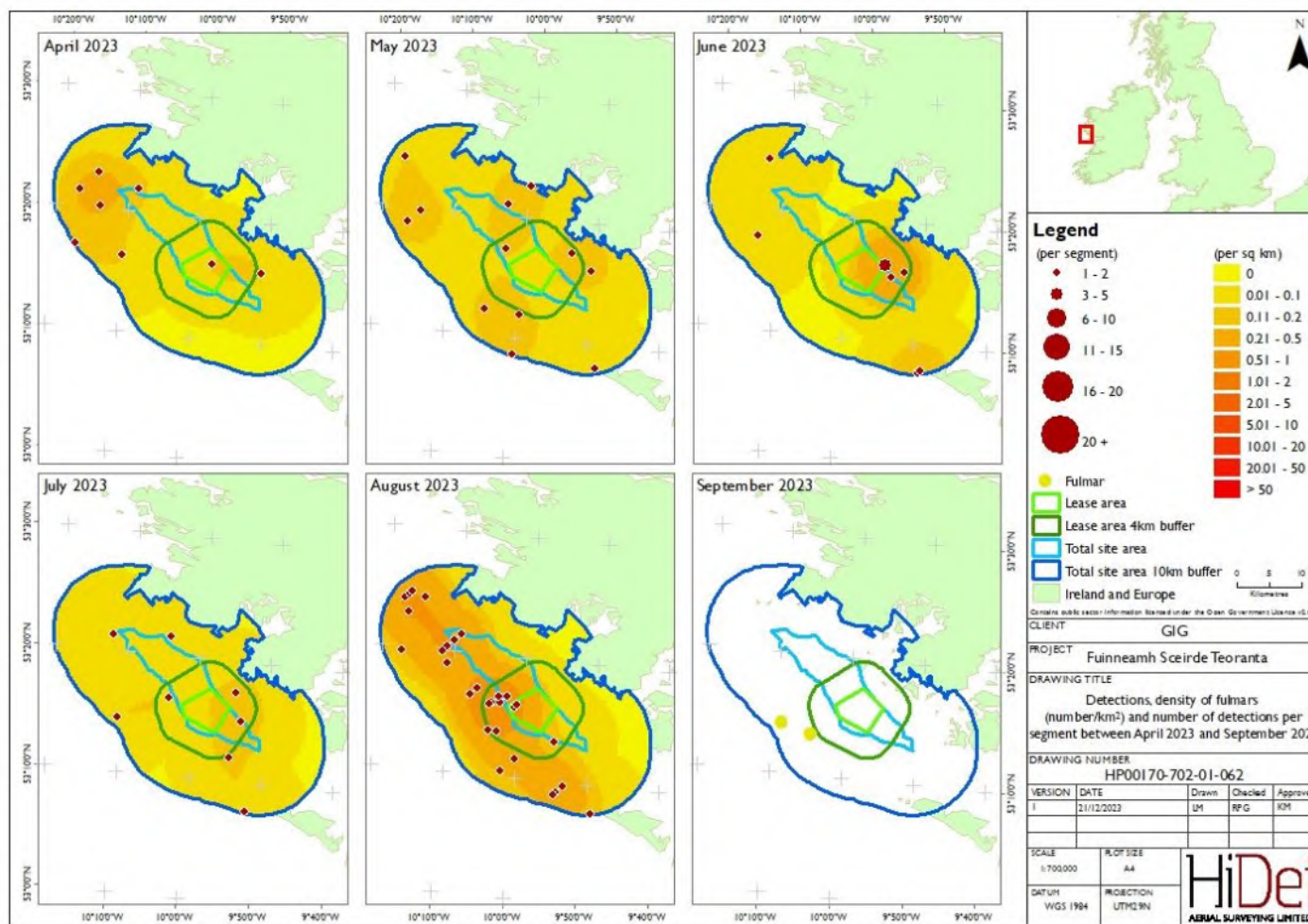
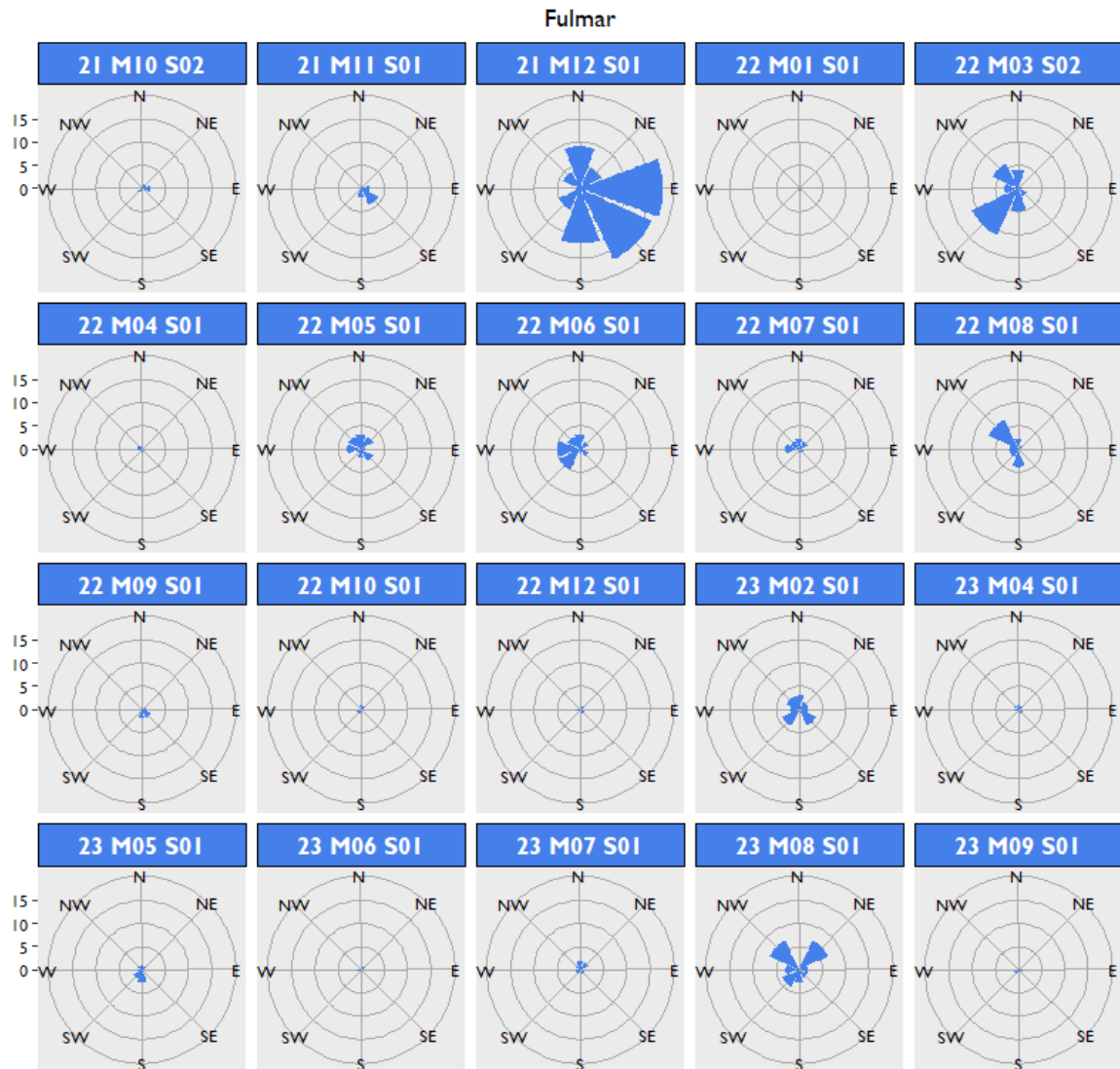


Figure 106 Summarised direction of movement of flying fulmar in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.17 Manx shearwater

- 153 Manx shearwater was mainly recorded in the summer months between March and September, with peaks in May 2022 (6,458 birds) and May 2023 (3,696) (Figure 107). There were ten records covering the two winter survey periods.
- 154 Density estimates for the species when observed ranged between 0.01 birds/km² (95% CI 0.00 – 0.03) in October 2022 and 39.31 birds/km² (95% CI 13.30 – 72.03) in May 2022 (Figure 108 and Table 44), equating to 8 birds (95% CI 0 – 24) and 37,103 birds (95% CI 12,551 – 67,989) respectively.
- 155 Manx shearwater was recorded throughout the survey area, but mostly in offshore waters. In May 2022 when records peaked, the higher densities were observed in the lease area and the total site area. A similar distribution was observed in May 2023, whilst in August 2022, higher densities were observed to the west of the survey area within the buffer (Figure 109 and Figure 112).
- 156 Over the 12-month survey period, 52% of birds were recorded flying, with a large proportion of birds recorded sitting on the water in July 2022 (52%), May (66%) June (58%) and July 2023 (80%) (Table 45). Three Manx shearwaters were recorded diving and 1,048 recorded as taking off.
- 157 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 113). In May 2022, when numbers peaked, birds were mainly flying west.

Figure 107 Number of Manx shearwaters recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

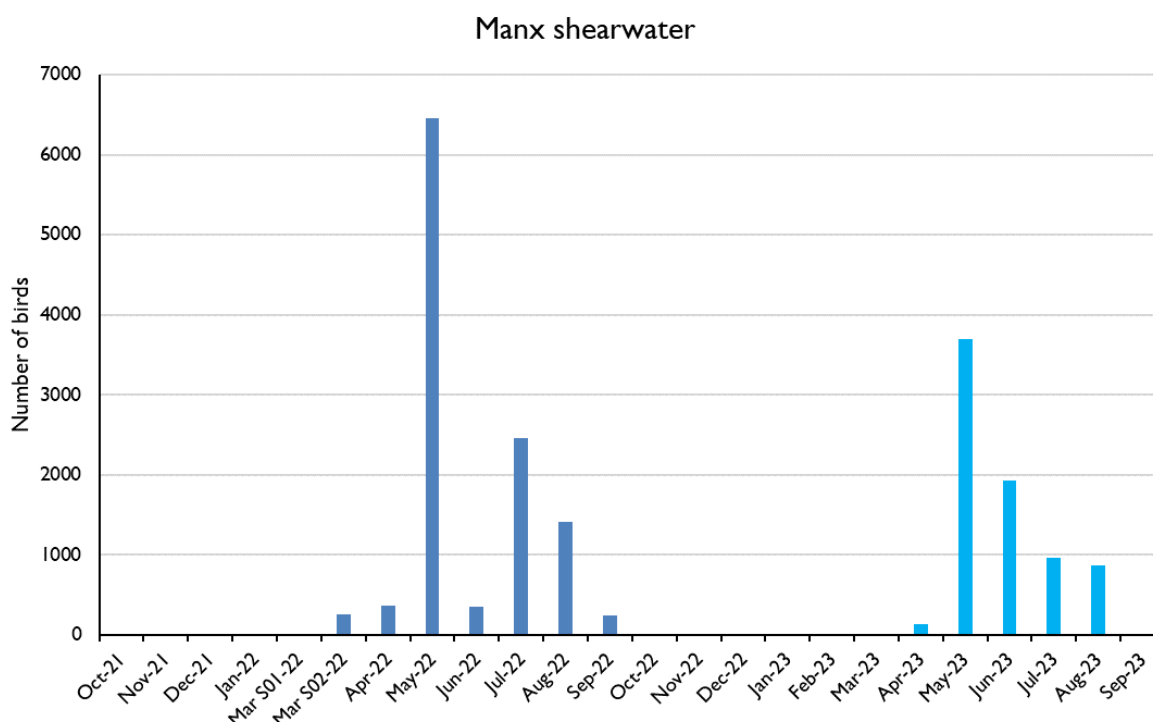


Figure 108 Manx shearwater density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

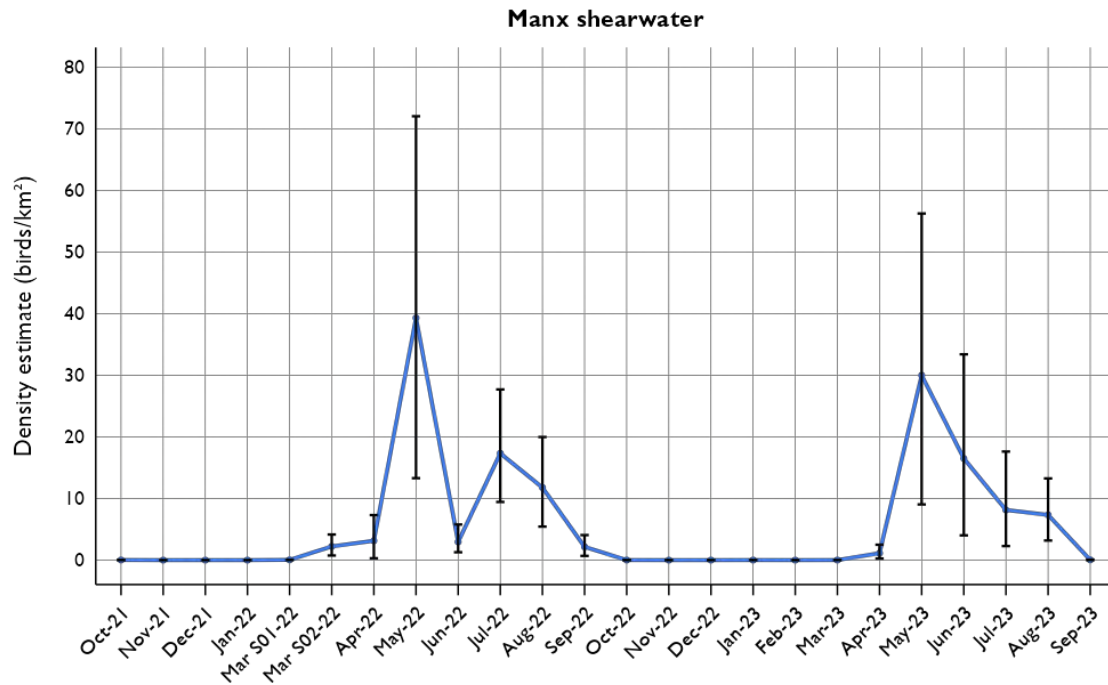


Table 44 **Density and population estimates of Manx shearwater in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.02	16	0	41	11	68.75
27 November 2021	0.00	0	0	0	0	0.00
10 December 2021	0.00	0	0	0	0	0.00
21 January 2022	0.00	0	0	0	0	0.00
01 March 2022	0.04	35	0	86	19	53.68
19 March 2022	2.22	2099	709	3926	827	39.36
01 April 2022	3.15	2975	286	6896	1695	56.94
27 May 2022	39.31	37103	12551	67989	10433	28.12
18 June 2022	2.96	2797	1210	5456	1051	37.56
11 July 2022	17.33	16361	8911	26143	3726	22.77
06 August 2022	11.78	11119	5132	18856	3523	31.68
01 September 2022	2.16	2038	656	3838	793	38.88
17 October 2022	0.01	8	0	24	8	100
29 November 2022	0.00	0	0	0	0	0.00
22 December 2022	0.00	0	0	0	0	0.00
19 January 2023	0.01	9	0	25	8	88.89
09 February 2023	0.00	0	0	0	0	0.00
04 March 2023	0.01	8	0	25	8	100.00
18 April 2023	1.13	1064	247	2358	553	51.89
02 May 2023	29.99	28311	8530	53094	10751	37.97
03 June 2023	16.50	15578	3790	31524	6702	43.02
19 July 2023	8.14	7681	2153	16635	3657	47.60
17 August 2023	7.34	6931	2998	12516	2392	34.50
16 September 2023	0.04	37	0	88	20	53.10

Table 45 Summary of Manx shearwater behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	2	0	0	100	2
27 November 2021	0	0	0	0	-	0
10 December 2021	0	0	0	0	-	0
21 January 2022	0	0	0	0	-	0
01 March 2022	0	3	2	0	60	5
19 March 2022	0	224	32	4	86	260
01 April 2022	0	94	263	10	26	367
27 May 2022	0	5343	725	390	83	6458
18 June 2022	0	164	175	6	48	345
11 July 2022	0	1103	1270	82	45	2455
06 August 2022	2	546	758	99	39	1405
01 September 2022	0	176	60	7	72	243
17 October 2022	0	1	0	0	100	1
29 November 2022	0	0	0	0	-	0
22 December 2022	0	0	0	0	-	0
19 January 2023	0	1	0	0	100	1
09 February 2023	0	0	0	0	-	0
04 March 2023	0	1	0	0	100	1
18 April 2023	0	54	57	24	40	135
02 May 2023	0	1120	2436	140	30	3696
03 June 2023	0	545	1125	254	28	1924
19 July 2023	0	175	767	15	18	957
17 August 2023	1	321	530	17	37	869
16 September 2023	0	5	0	0	100	5
Total	3	9878	8200	1048	52	19129

Figure 109 Detections, density (number/km²) and number of detections per segment of Manx shearwaters in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

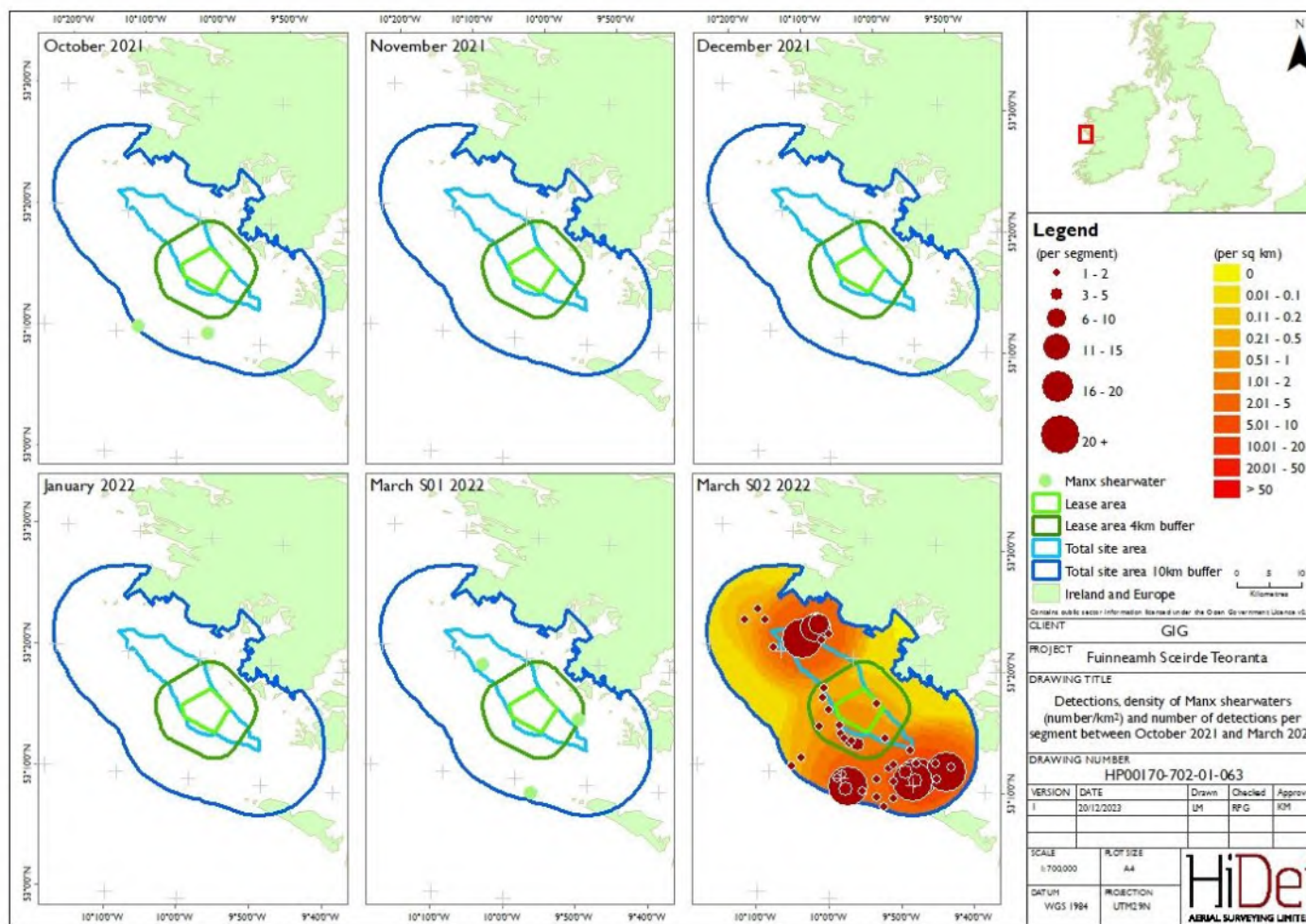


Figure I10 Density (number/km²) and number of detections per segment of Manx shearwaters in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

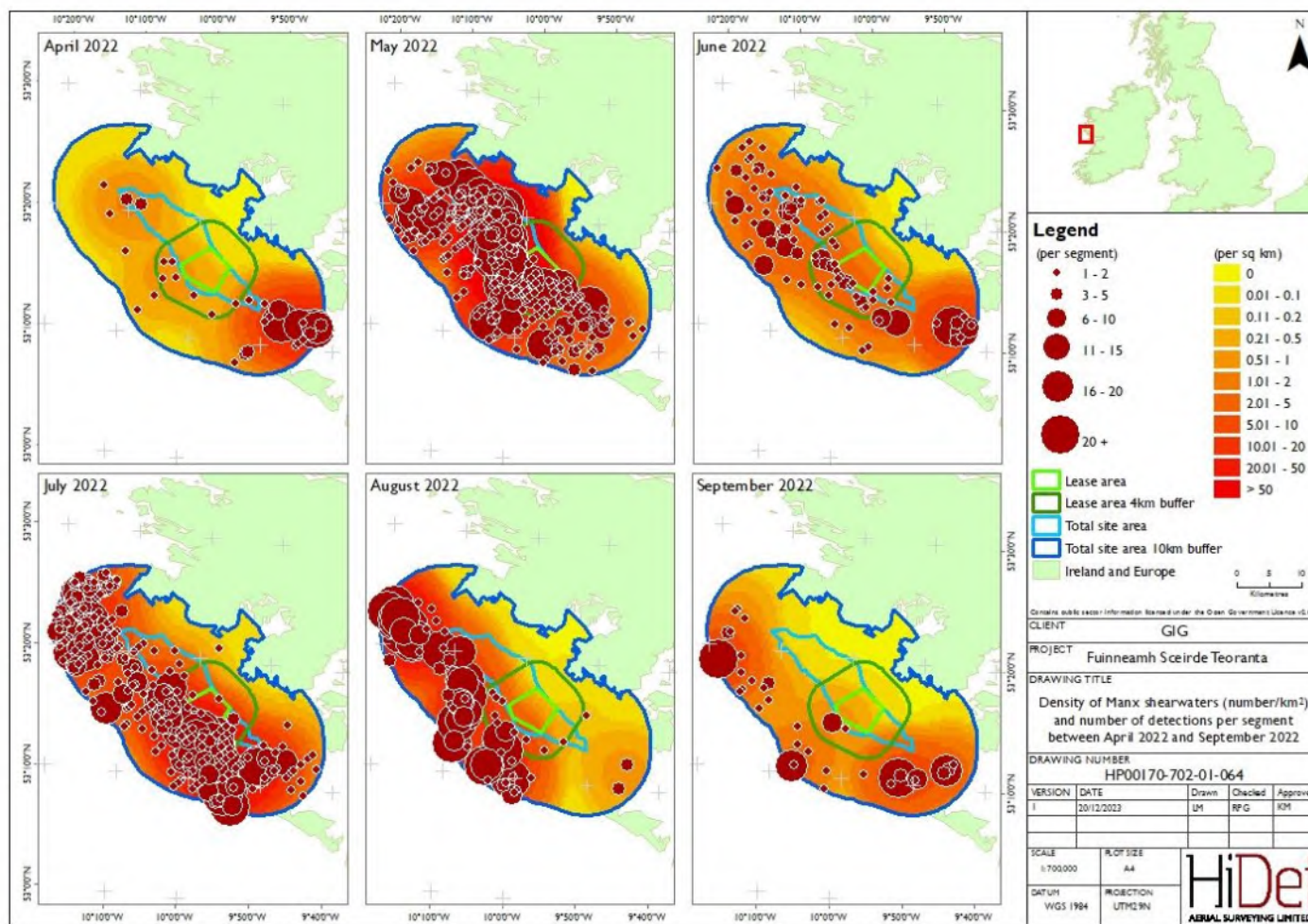


Figure III Detections of Manx shearwaters in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

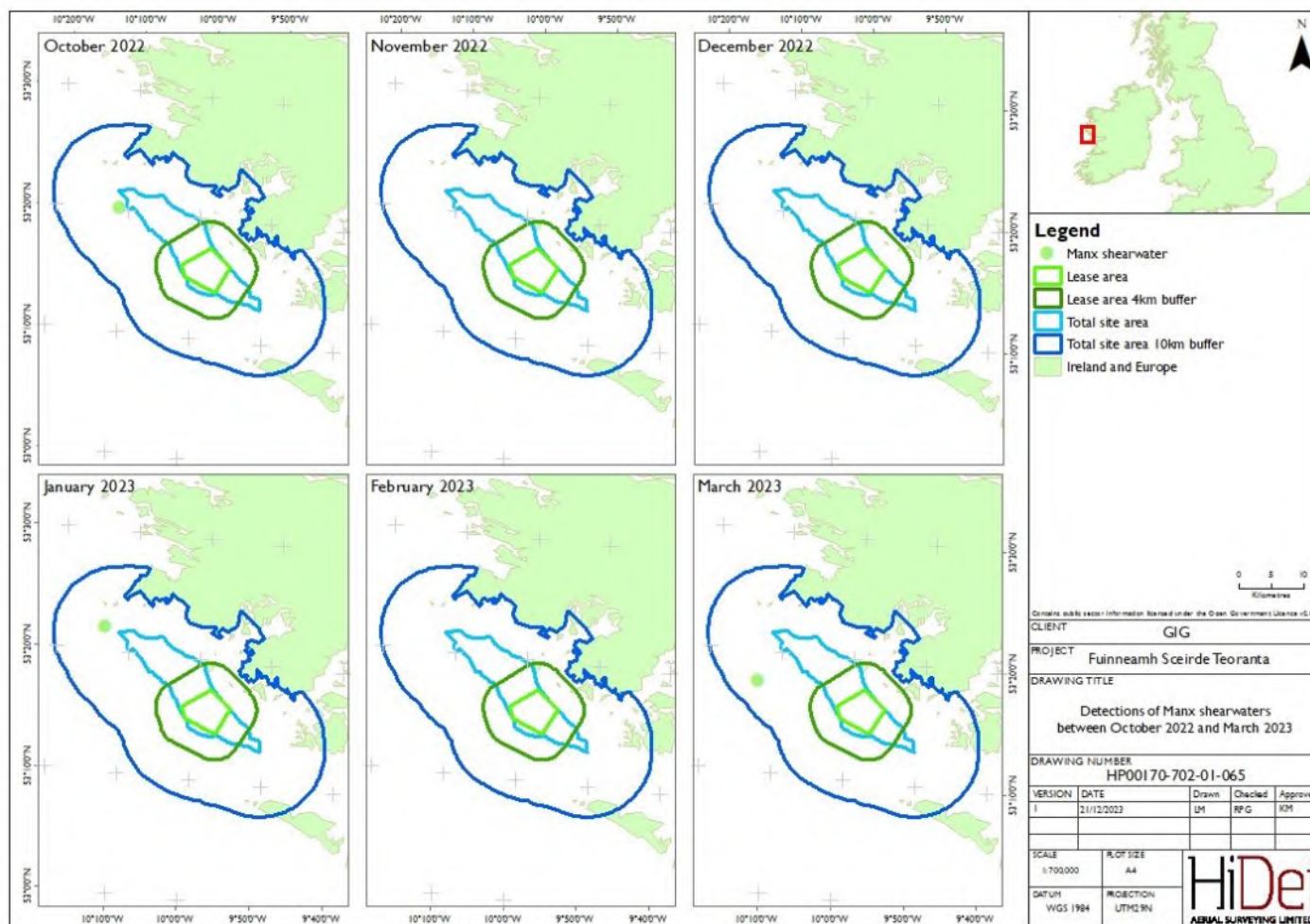


Figure I 12 Detections, density (number/km²) and number of detections per segment of Manx shearwaters in the Fuinneamh Sceilde Teoranta survey area between April and September 2023

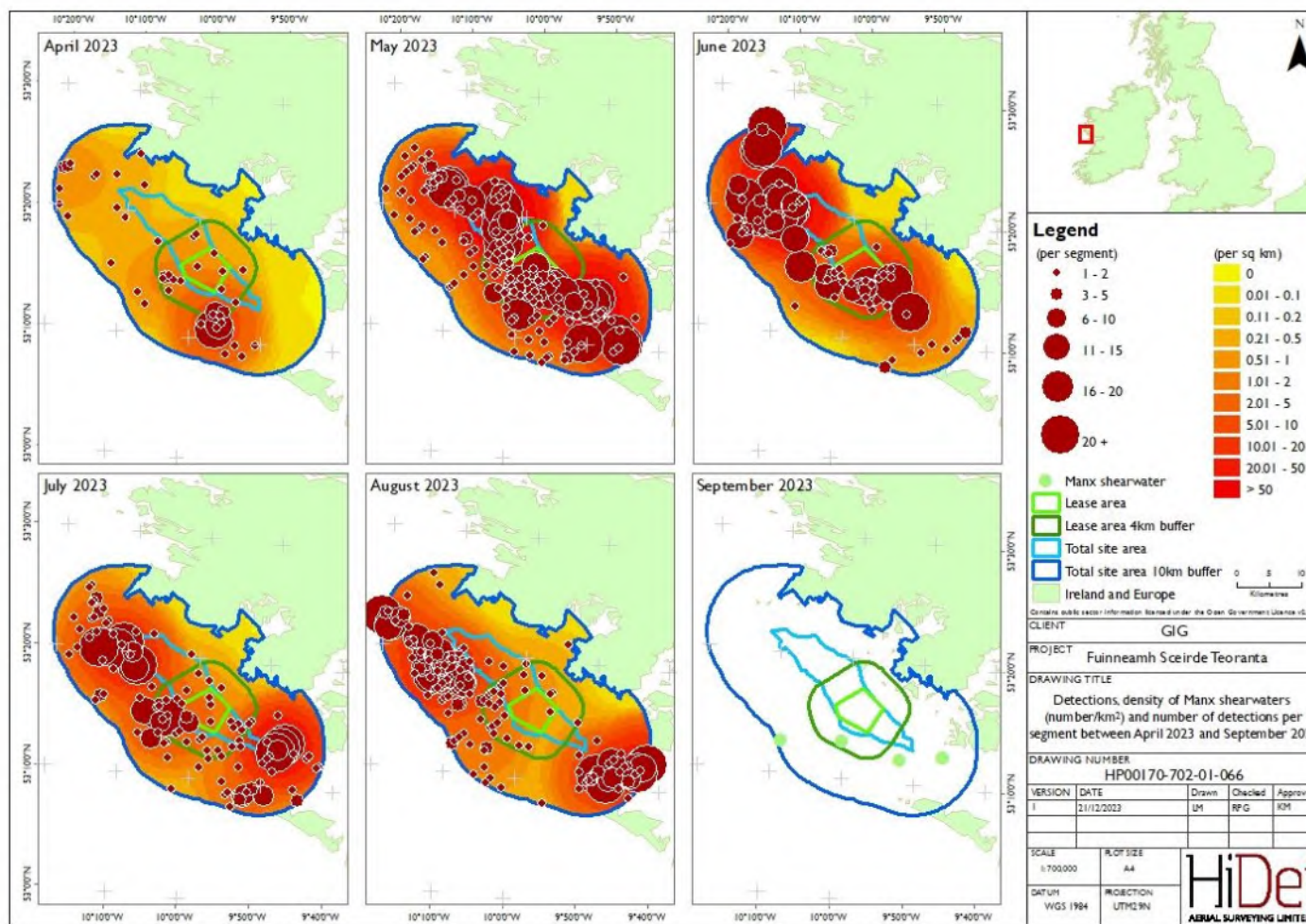
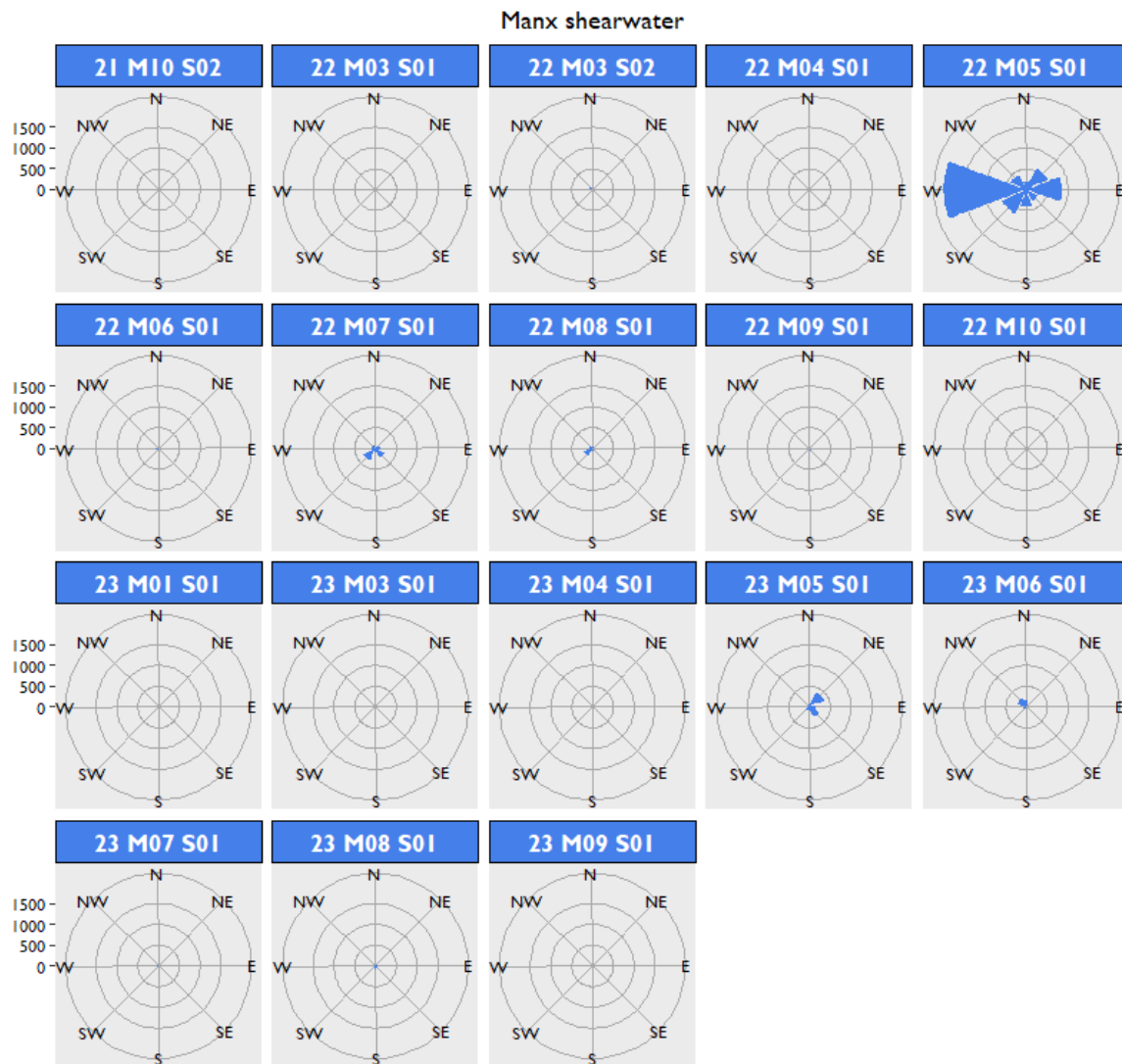


Figure 113 Summarised direction of movement of flying Manx shearwater in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.18 Gannet

- 158 Gannet was recorded in relatively low numbers throughout the survey period, peaking in November 2021 with 75 birds (Figure 114). The species was observed in every month of the survey period. In addition, one dead bird was observed in September 2022.
- 159 Density estimates for the species ranged between 0.01 birds/km² (95% CI 0.00 – 0.01) in December 2021 and 0.50 birds/km² (95% CI 0.12 – 1.10) in November 2021 (Figure 115 and Table 46), equating to 5 birds (95% CI 0 – 12) and 473 birds (95% CI 64 – 1,034) respectively.
- 160 Gannet was found throughout the survey area. In November 2021 when records peaked, density was higher in the south of the survey area, whilst in August 2023 densities were higher in the north and central regions of the survey area. In October 2022 the highest densities were recorded in the north-west of the survey area (Figure 116 and Figure 119).
- 161 Of the birds that could be aged, 74% were recorded as adults, with the highest numbers of immature and juvenile birds recorded in August 2023 (Table 47).
- 162 Over the survey period, 62% of birds were recorded flying (Table 48). In May 2023 and August 2023, one and two birds were recorded taking off and one gannet was recorded diving in November 2022.
- 163 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 120). In November 2021, when records peaked, the birds were mainly flying in south-easterly to southerly directions. Gannets were mainly flying in southerly directions in October 2022, May 2023 and August 2023.

Figure 114 Number of gannets recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

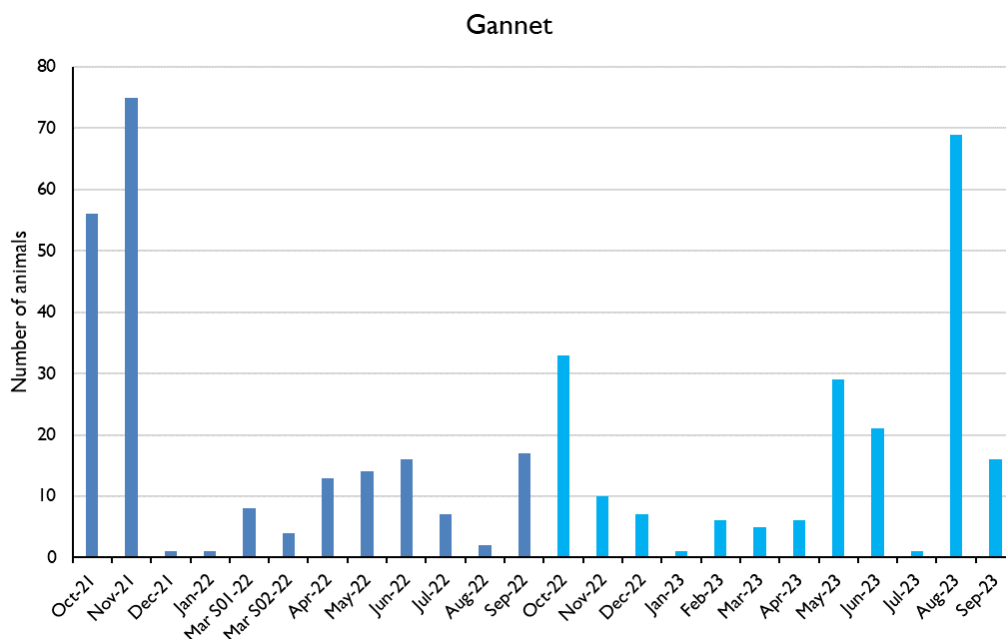


Figure 115 Gannet density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

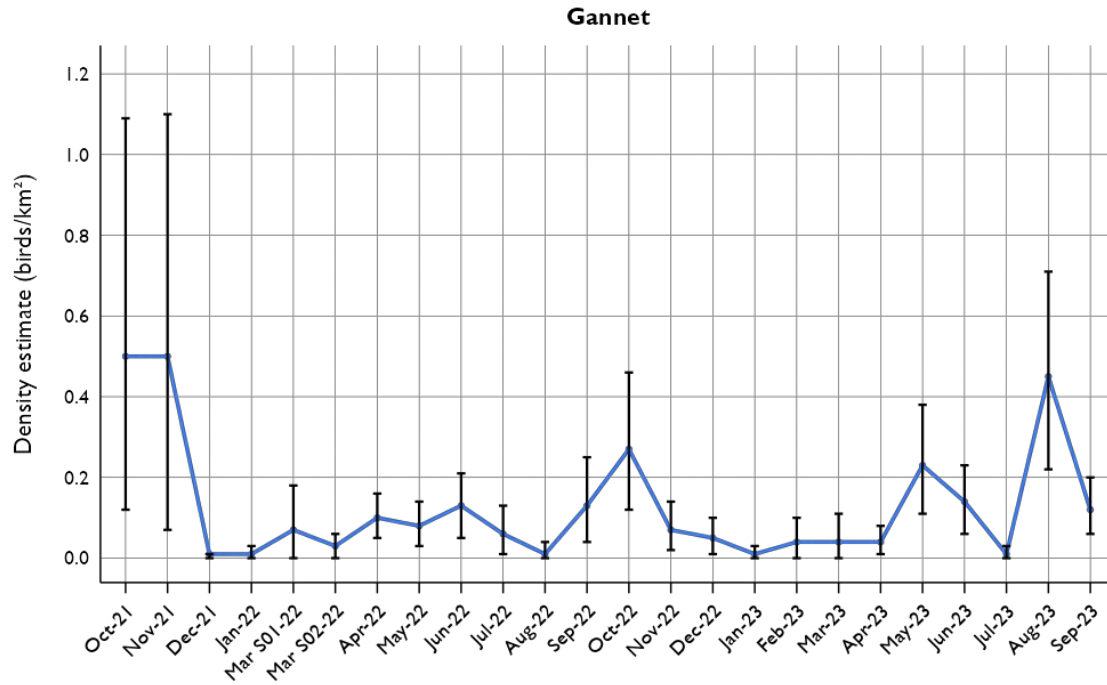


Table 46 **Density and population estimates of gannet in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.50	468	111	1028	257	54.91
27 November 2021	0.50	473	64	1034	189	39.91
10 December 2021	0.01	5	0	12	4	80.00
21 January 2022	0.01	9	0	24	8	88.89
01 March 2022	0.07	63	0	167	47	74.60
19 March 2022	0.03	30	0	61	14	45.34
01 April 2022	0.10	96	47	154	24	24.52
27 May 2022	0.08	76	28	135	22	27.97
18 June 2022	0.13	119	45	195	35	29.01
11 July 2022	0.06	58	8	118	29	50.00
06 August 2022	0.01	14	0	37	9	63.89
01 September 2022	0.13	126	41	233	42	33.31
17 October 2022	0.27	258	110	432	85	32.60
29 November 2022	0.07	68	17	136	24	34.96
22 December 2022	0.05	44	8	93	17	38.64
19 January 2023	0.01	9	0	25	9	100.00
09 February 2023	0.04	41	0	93	20	47.92
04 March 2023	0.04	38	0	100	26	66.63
18 April 2023	0.04	35	5	73	15	41.21
02 May 2023	0.23	216	102	358	60	27.56
03 June 2023	0.14	131	53	221	34	25.28
19 July 2023	0.01	9	0	25	9	100.00
17 August 2023	0.45	426	209	668	89	20.85
16 September 2023	0.12	114	53	186	29	25.26

Table 47 Summary of gannet ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	53	2	1	0	95	56
27 November 2021	54	0	0	21	100	75
10 December 2021	1	0	0	0	100	1
21 January 2022	1	0	0	0	100	1
01 March 2022	8	0	0	0	100	8
19 March 2022	3	0	0	1	100	4
01 April 2022	11	0	0	2	100	13
27 May 2022	0	0	0	14	0	14
18 June 2022	6	9	0	1	40	16
11 July 2022	4	2	0	1	67	7
06 August 2022	1	1	0	0	50	2
01 September 2022	10	5	0	2	67	17
17 October 2022	33	0	0	0	100	33
29 November 2022	9	1	0	0	90	10
22 December 2022	6	0	0	1	100	7
19 January 2023	1	0	0	0	100	1
09 February 2023	5	1	0	0	83	6
04 March 2023	5	0	0	0	100	5
18 April 2023	6	0	0	0	100	6
02 May 2023	25	0	0	4	100	29
03 June 2023	12	9	0	0	57	21
19 July 2023	1	0	0	0	100	1
17 August 2023	10	44	10	5	16	69
16 September 2023	5	11	0	0	31	16
Total	270	85	11	52	74	418

Table 48 Summary of gannet behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	16	40	0	29	56
27 November 2021	0	30	45	0	40	75
10 December 2021	0	1	0	0	100	1
21 January 2022	0	1	0	0	100	1
01 March 2022	0	8	0	0	100	8
19 March 2022	0	3	1	0	75	4
01 April 2022	0	11	2	0	85	13
27 May 2022	0	8	6	0	57	14
18 June 2022	0	15	1	0	94	16
11 July 2022	0	6	1	0	86	7
06 August 2022	0	2	0	0	100	2
01 September 2022	0	11	6	0	65	17
17 October 2022	0	21	12	0	64	33
29 November 2022	1	9	0	0	90	10
22 December 2022	0	7	0	0	100	7
19 January 2023	0	1	0	0	100	1
09 February 2023	0	6	0	0	100	6
04 March 2023	0	5	0	0	100	5
18 April 2023	0	3	3	0	50	6
02 May 2023	0	15	13	1	52	29
03 June 2023	0	17	4	0	81	21
19 July 2023	0	1	0	0	100	1
17 August 2023	0	47	20	2	68	69
16 September 2023	0	16	0	0	100	16
Total	1	260	154	3	62	418

Figure I16 Detections, density (number/km²) and number of detections per segment of gannets in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

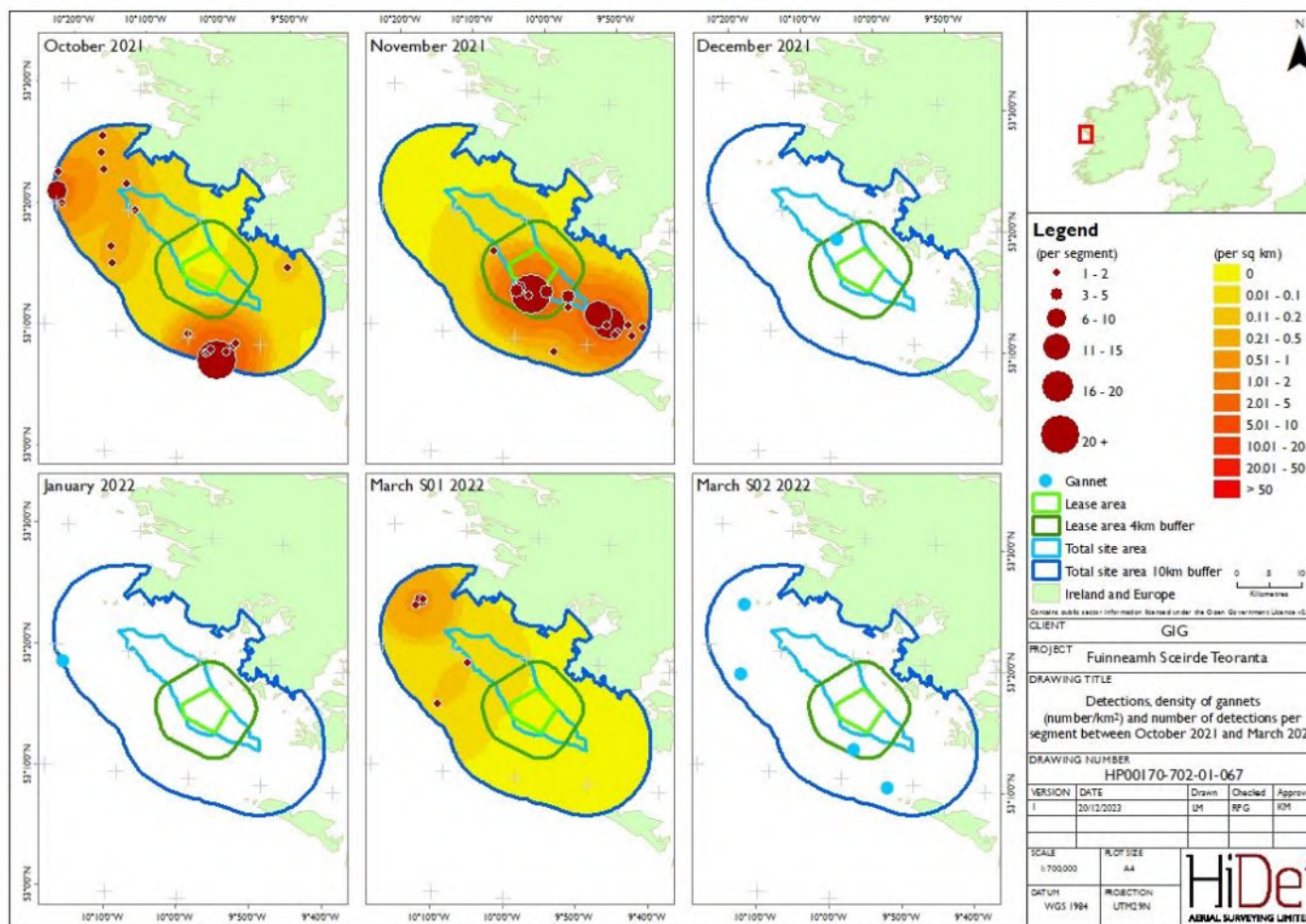


Figure I17 Detections, density (number/km²) and number of detections per segment of gannets in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

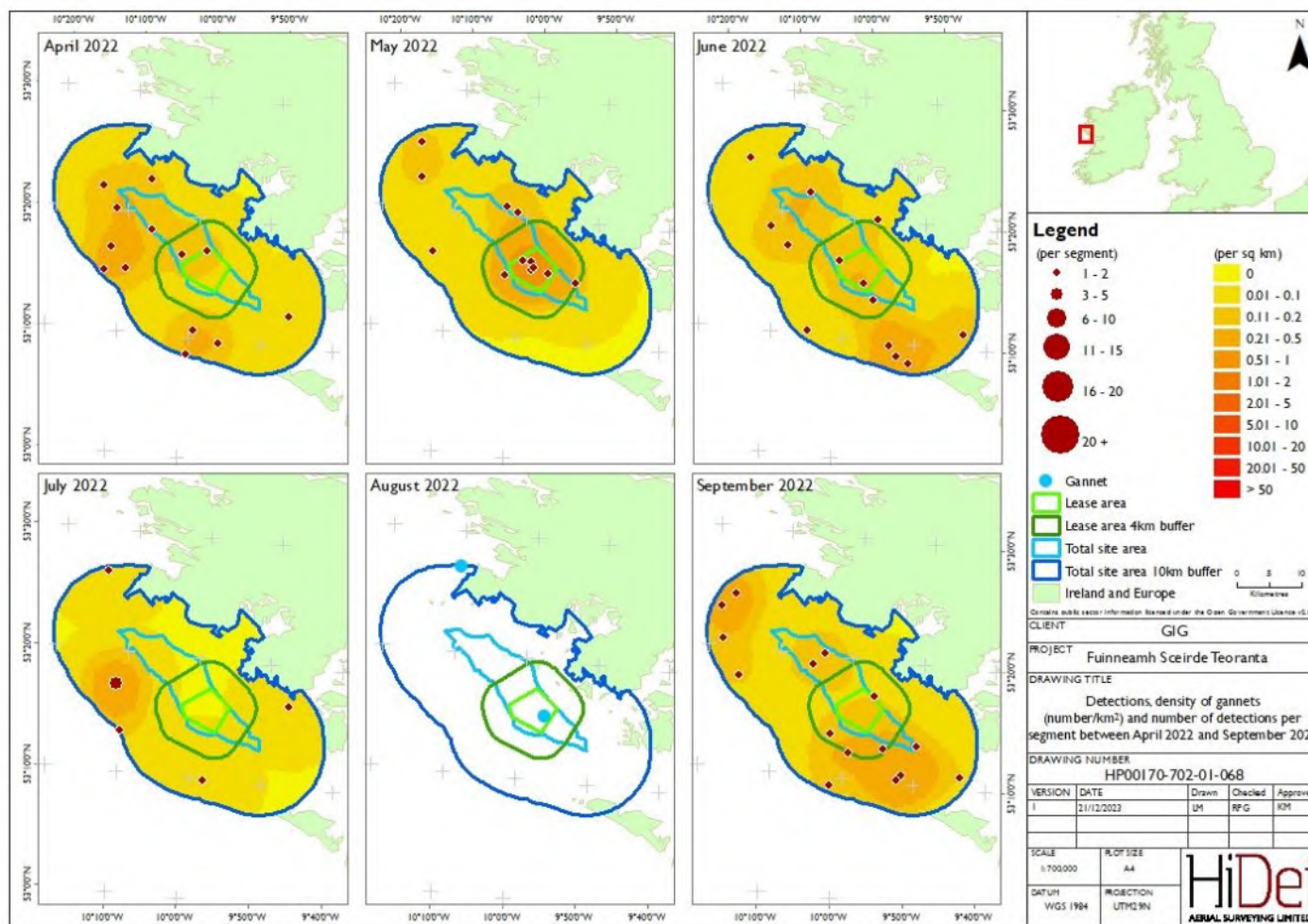


Figure I18 Detections, density (number/km²) and number of detections per segment of gannets in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

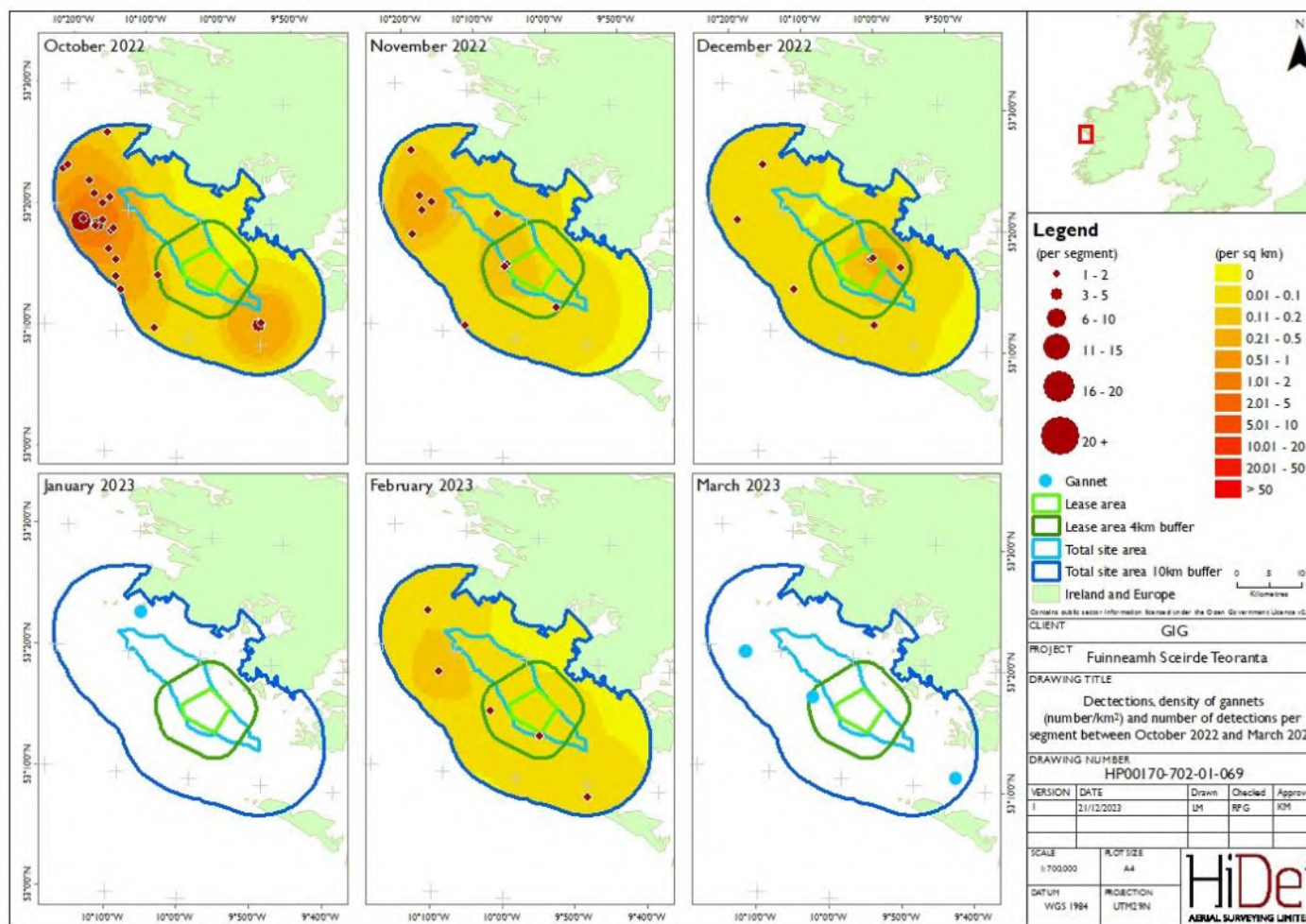


Figure I19 Detections, density (number/km²) and number of detections per segment of gannets in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

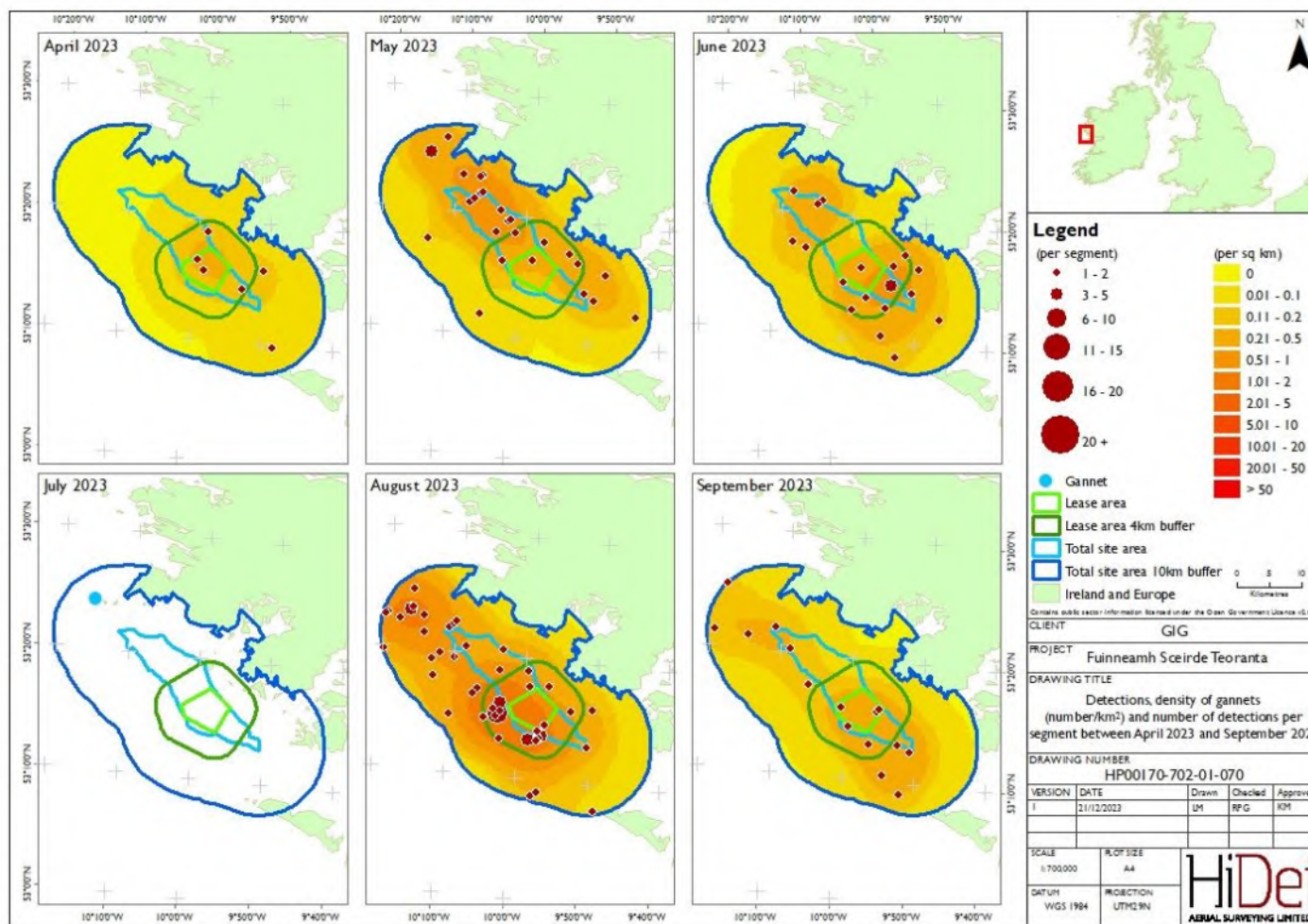
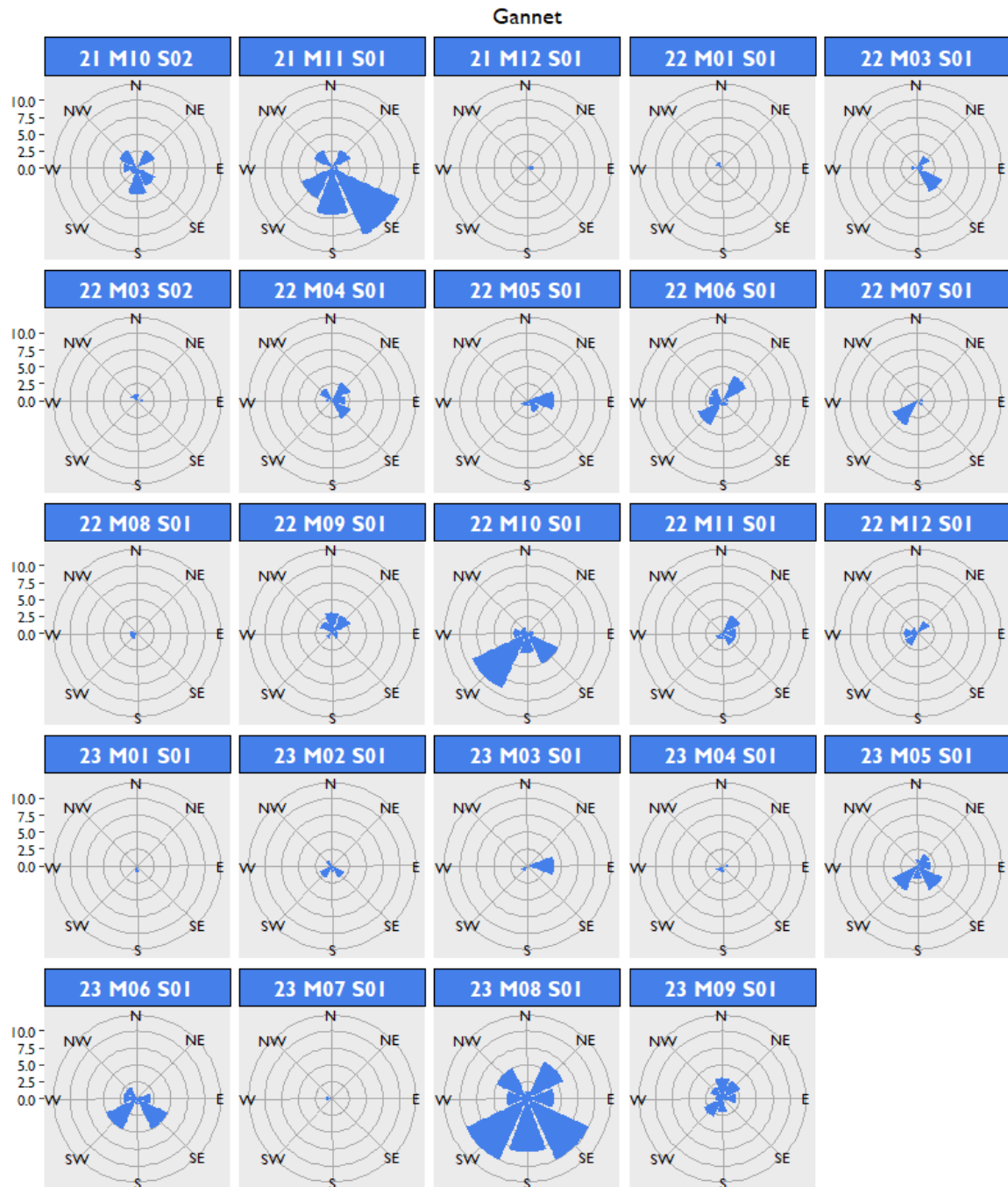


Figure 120 Summarised direction of movement of flying gannet in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.19 Shag

- 164 Shag was recorded in all months throughout the survey period, peaking in February 2023 with 48 observations (Figure 121) followed closely by 47 and 46 observations in March Survey 01 2022 and January 2023, respectively.
- 165 Density estimates for the species ranged between 0.03 birds/km² (95% CI 0.01 – 0.07) in May 2022 and 0.40 birds/km² (95% CI 0.04 – 1.03) in February 2023 (Figure 122 and Table 49), equating to 33 birds (95% CI 8 – 68) and 376 birds (95% CI 40 – 975), respectively.
- 166 Shags were typically observed in the buffer, closer to the coastline. In February 2023 when numbers peaked, the highest density of birds were observed in the north of the survey buffer area, with higher densities also being observed in the lease area. In November 2021 the highest density of shags was recorded in the south-east of the buffer (Figure 123 and Figure 126).
- 167 Of the birds that could be aged, 74% were recorded as adults with only 23 birds recorded as immature and one as juvenile (Table 50).
- 168 Over the survey period, 24% of birds were recorded flying, with the highest proportion of sitting birds recorded between November 2022 and February 2023 (Table 51).
- 169 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 127). In March Survey 01 2022 and January and February 2023, when numbers peaked, birds were flying in westerly to north-westerly directions, north-easterly and east to south-west directions, respectively.

Figure 121 Number of shags recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

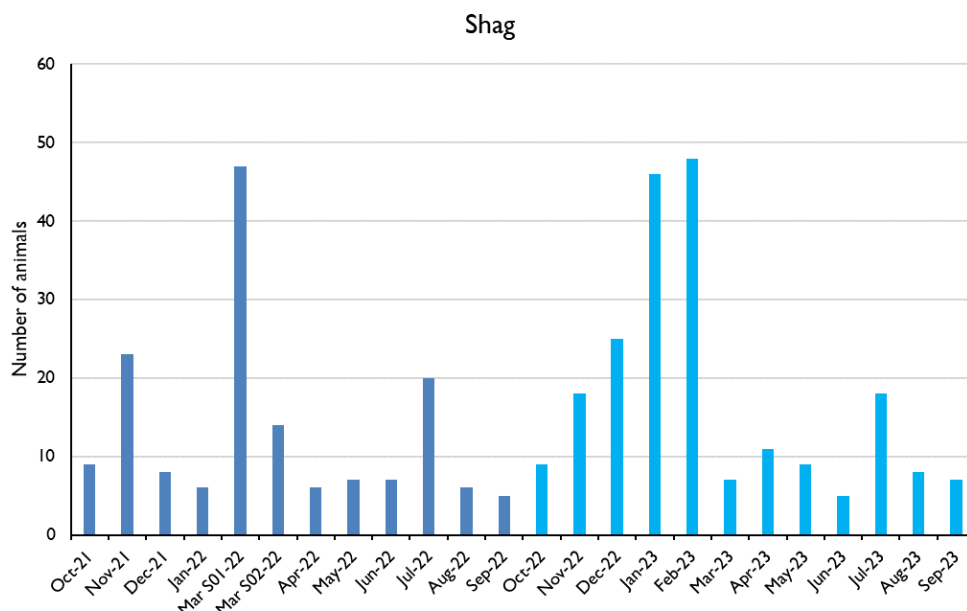


Figure 122 Shag density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

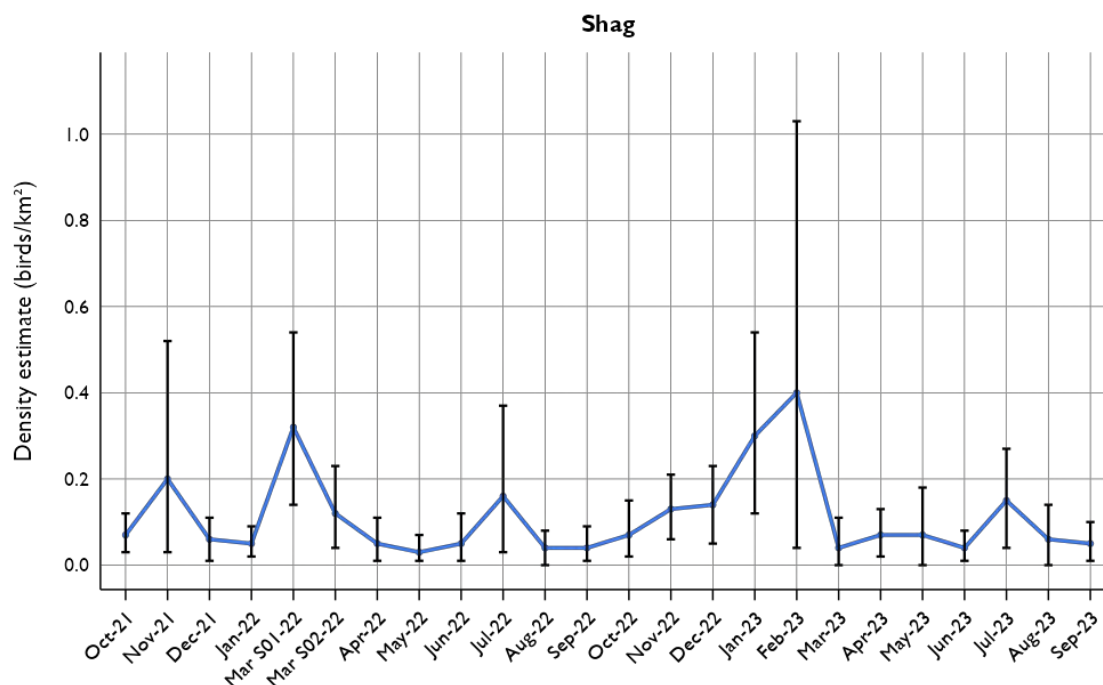


Table 49 Density and population estimates of shag in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.07	67	25	115	19	28.32
27 November 2021	0.20	192	24	488	129	67.19
10 December 2021	0.06	53	9	108	20	36.63
21 January 2022	0.05	43	16	83	17	38.35
01 March 2022	0.32	304	130	513	82	26.81
19 March 2022	0.12	111	40	213	44	38.91
01 April 2022	0.05	46	8	100	22	46.47
27 May 2022	0.03	33	8	68	13	38.57
18 June 2022	0.05	50	8	109	22	43.68
11 July 2022	0.16	153	32	347	85	55.04
06 August 2022	0.04	37	4	79	16	41.17
01 September 2022	0.04	41	8	82	20	48.78
17 October 2022	0.07	69	16	141	31	43.86
29 November 2022	0.13	120	54	195	27	22.44
22 December 2022	0.14	134	49	218	32	23.24
19 January 2023	0.30	286	113	511	74	25.67
09 February 2023	0.40	376	40	975	269	71.32
04 March 2023	0.04	37	0	100	22	59.34
18 April 2023	0.07	65	17	123	21	31.57
02 May 2023	0.07	68	0	166	42	60.94
03 June 2023	0.04	37	8	78	17	44.57
19 July 2023	0.15	142	41	256	49	34.39
17 August 2023	0.06	59	0	130	29	48.21
16 September 2023	0.05	49	13	94	18	34.87

Table 50 Summary of shag ages in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
28 October 2021	2	0	0	7	100	9
27 November 2021	2	0	0	21	100	23
10 December 2021	0	0	0	8	0	8
21 January 2022	4	0	0	2	100	6
01 March 2022	1	9	0	37	10	47
19 March 2022	10	2	0	2	83	14
01 April 2022	0	1	0	5	0	6
27 May 2022	0	0	0	7	0	7
18 June 2022	5	0	0	2	100	7
11 July 2022	4	0	0	16	100	20
06 August 2022	1	0	0	5	100	6
01 September 2022	2	1	1	1	50	5
17 October 2022	3	3	0	3	50	9
29 November 2022	3	0	0	15	100	18
22 December 2022	2	0	0	23	100	25
19 January 2023	1	1	0	44	50	46
09 February 2023	8	0	0	40	100	48
04 March 2023	2	0	0	5	100	7
18 April 2023	1	5	0	5	17	11
02 May 2023	2	0	0	7	100	9
03 June 2023	3	0	0	2	100	5
19 July 2023	9	1	0	8	90	18
17 August 2023	3	0	0	5	100	8
16 September 2023	1	0	0	6	100	7
Total	69	23	1	276	74	369

Table 51 Summary of shag behaviours in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
28 October 2021	0	3	6	0	33	9
27 November 2021	0	6	17	0	26	23
10 December 2021	0	5	3	0	62	8
21 January 2022	0	4	2	0	67	6
01 March 2022	0	7	40	0	15	47
19 March 2022	0	4	10	0	29	14
01 April 2022	0	3	3	0	50	6
27 May 2022	0	1	6	0	14	7
18 June 2022	0	3	4	0	43	7
11 July 2022	1	6	13	0	30	20
06 August 2022	0	4	2	0	67	6
01 September 2022	0	2	3	0	40	5
17 October 2022	0	4	5	0	44	9
29 November 2022	0	2	15	1	11	18
22 December 2022	0	2	23	0	8	25
19 January 2023	0	3	43	0	7	46
09 February 2023	0	5	43	0	10	48
04 March 2023	0	2	5	0	29	7
18 April 2023	0	3	8	0	27	11
02 May 2023	0	2	7	0	22	9
03 June 2023	0	2	3	0	40	5
19 July 2023	0	7	10	1	39	18
17 August 2023	0	5	3	0	62	8
16 September 2023	0	4	3	0	57	7
Total	1	89	277	2	24	369

Figure 123 Density of shags (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

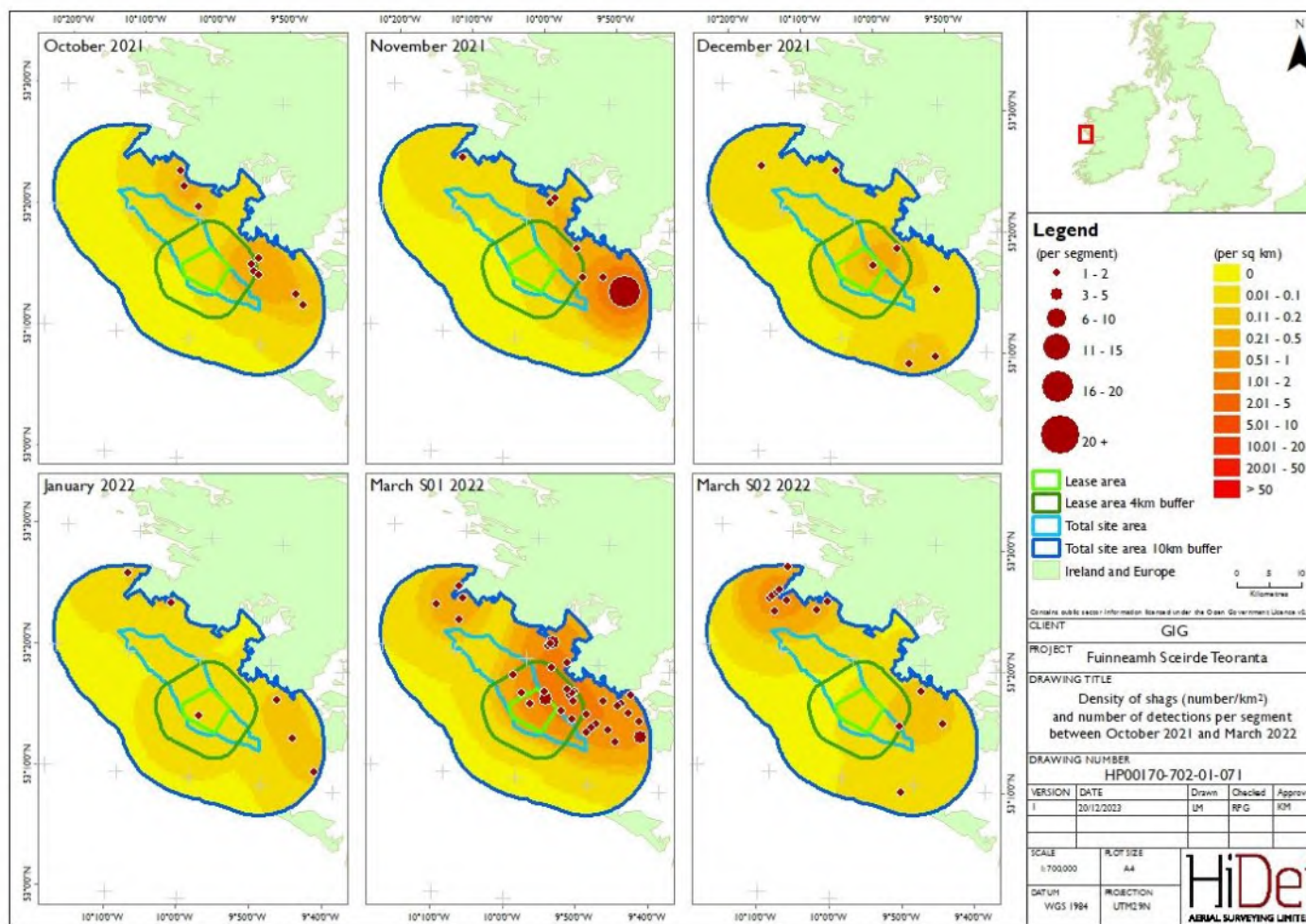


Figure 124 Detections, density of shags (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

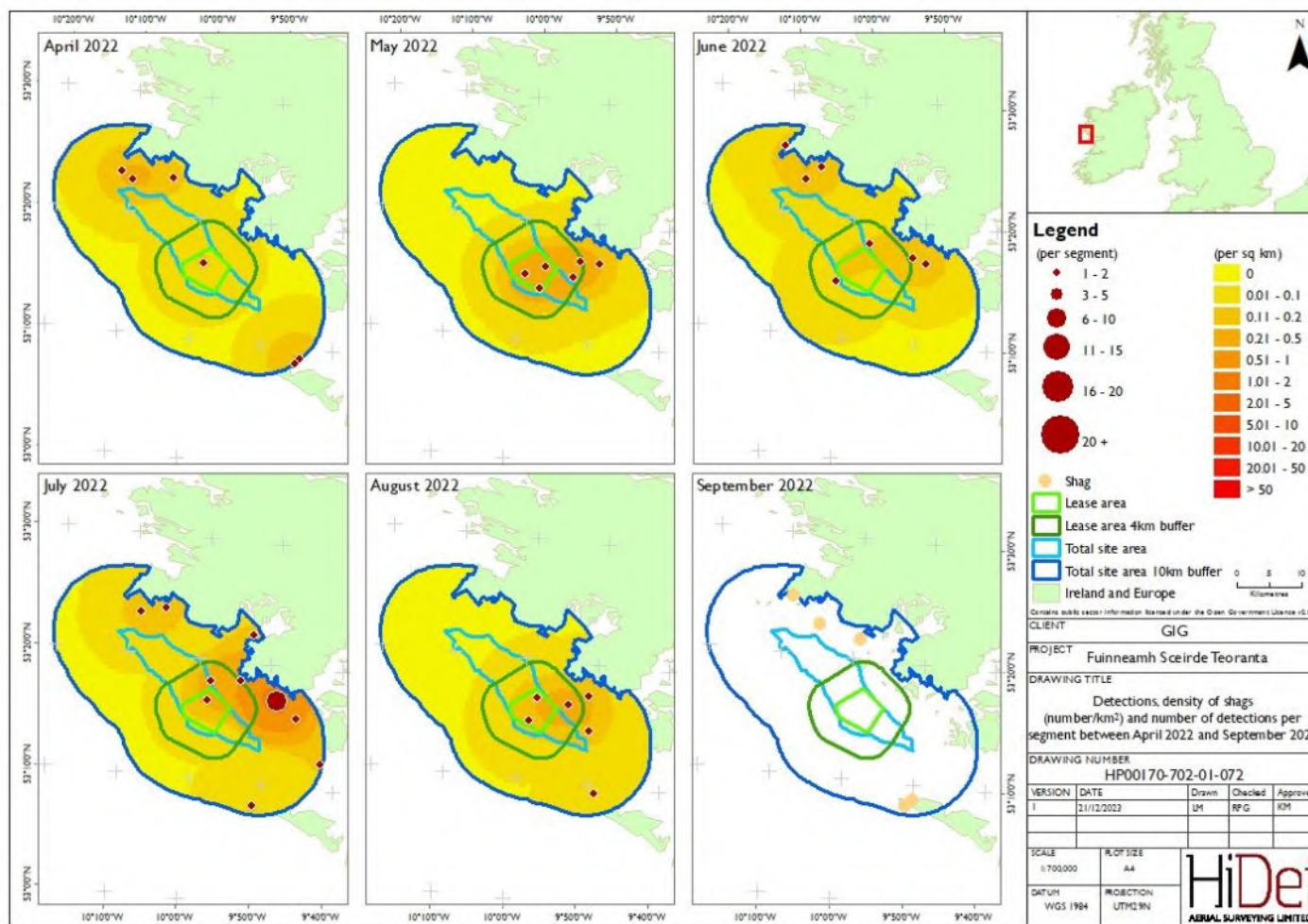


Figure 125 Density of shags (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

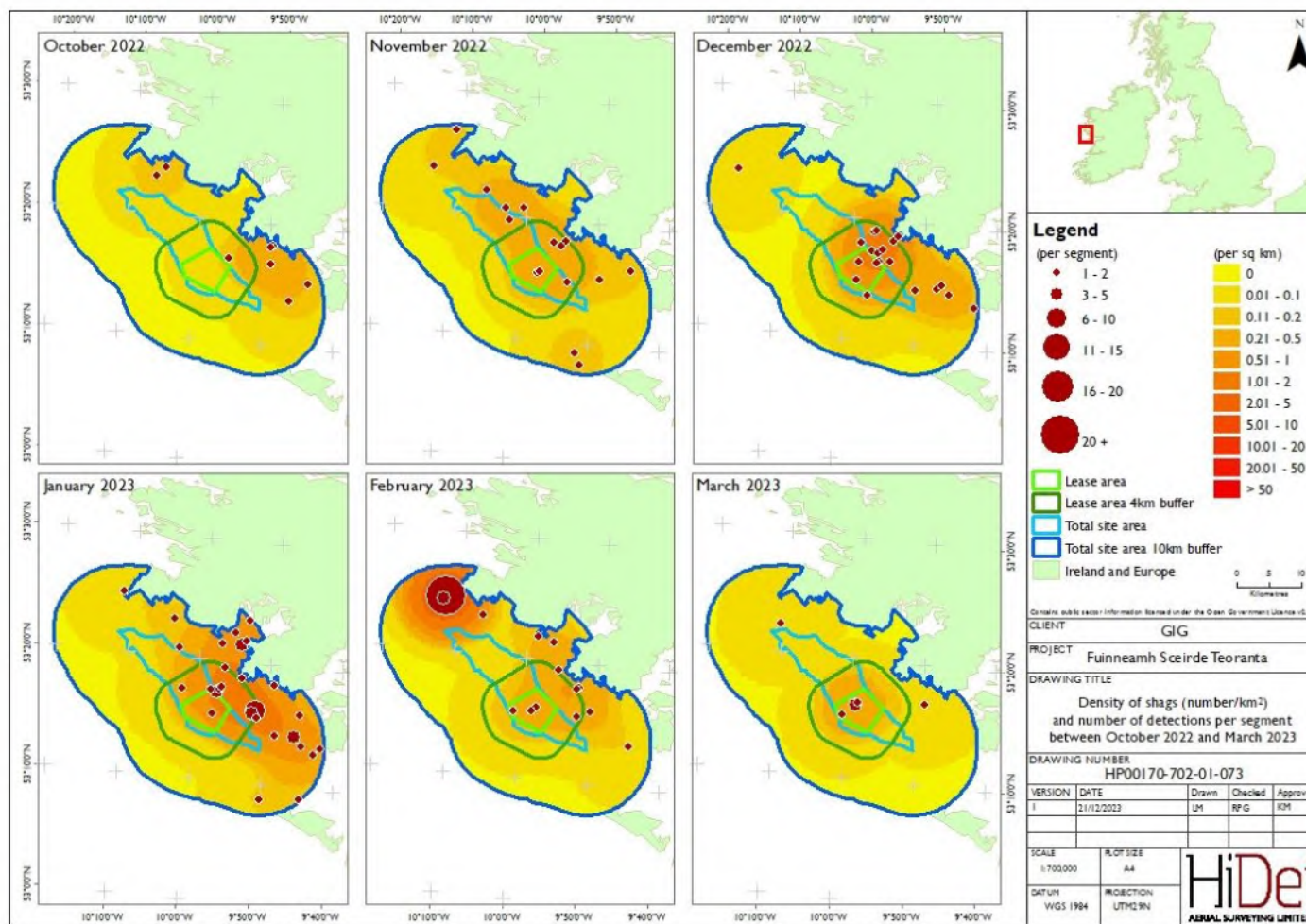


Figure 126 Detections, density of shags (number/km²) and number of detections per segment in the Fuinneamh Sceirde Teoranta survey area between April and September 2023

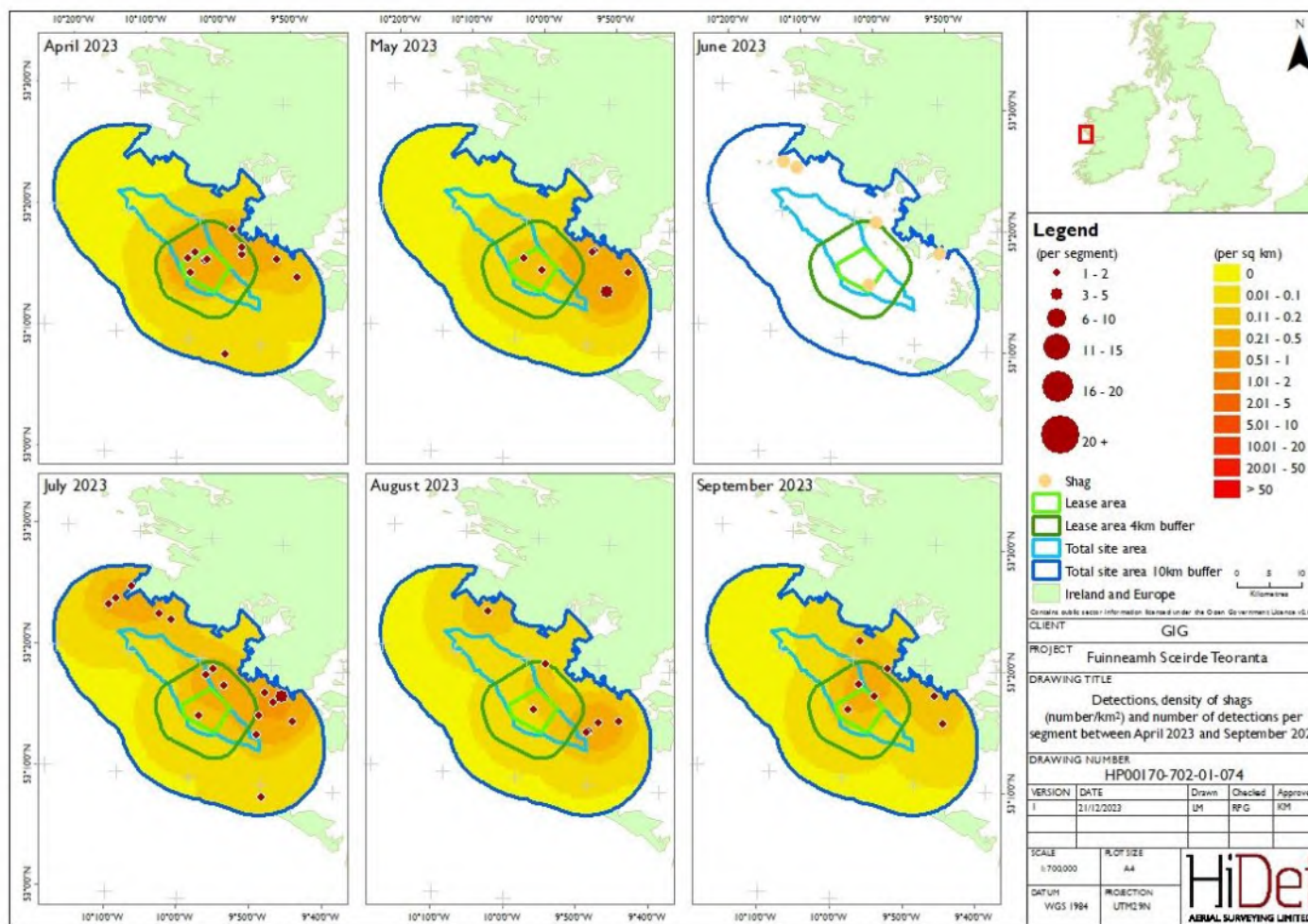
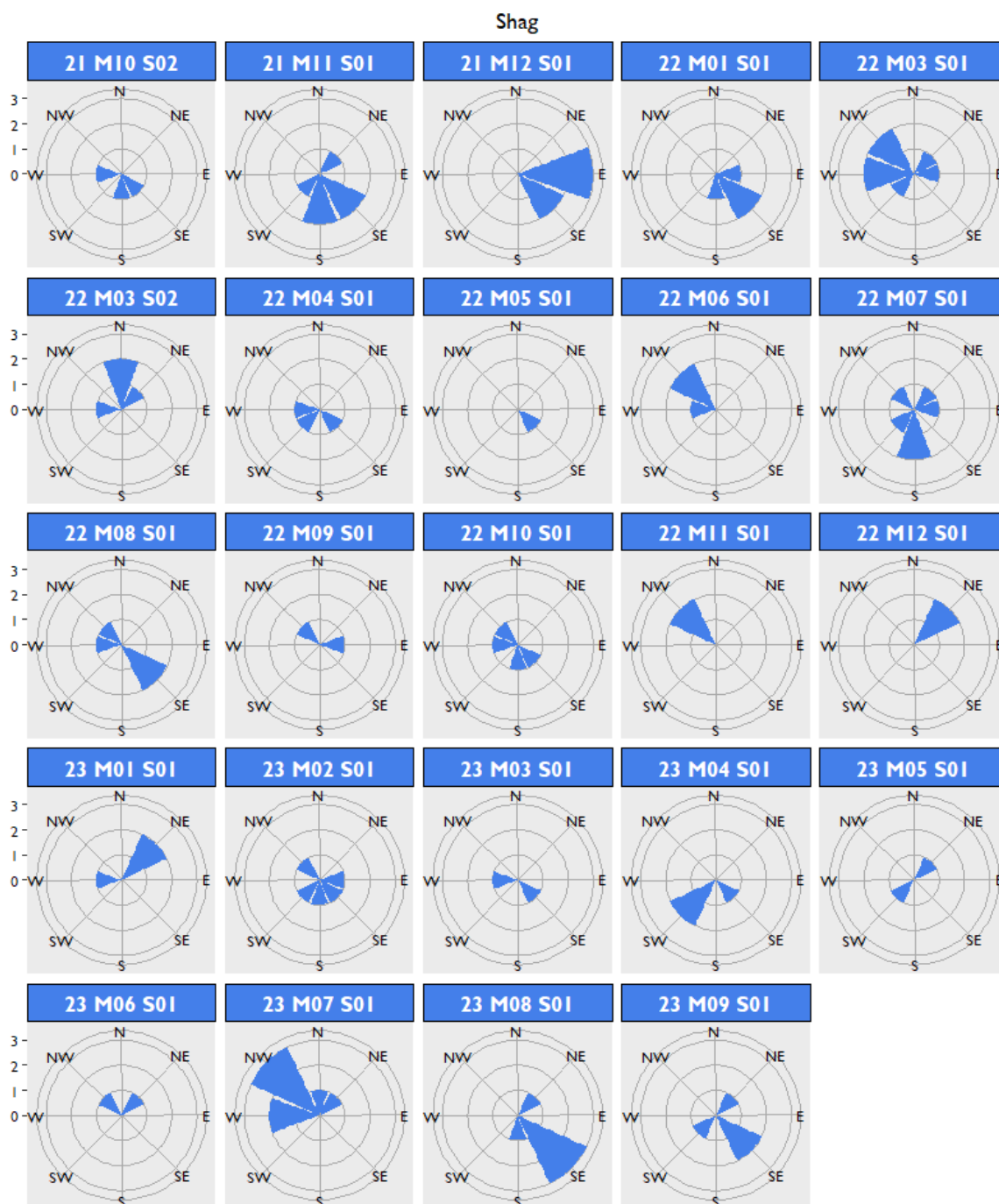


Figure 127 Summarised direction of movement of flying shags in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023



3.3.20 Less abundant bird species

- 170 Thirty less abundant bird species were recorded throughout the survey period. The first and third most numerous species were cory's shearwater (*Calonectris diomedea borealis*) and great shearwater (*Ardenna gravis*) with all cory's shearwater (777) and the majority of great shearwater (146, and two in July 2023) observed in August 2023. The most numerous less abundant species that were found across a range of months were oystercatcher and common eider (hereafter referred to as eider, *Somateria mollissima*), with 157 and 104 records respectively over the 24-month period (Figure 128 and Figure 129). In addition, sooty shearwater (*Ardenna grisea*) was recorded in August 2022 (three) and August 2023 (seven), respectively. Distributions are presented in Figure 130 to Figure 133, while population and density estimates for these species can be found in Appendix I: Density and population estimates.
- 171 Black-headed gulls were the most numerous gull or tern species of the less abundant species across the 24-month period with 93 records in total, peaking in October 2021 with 26 birds.
- 172 Sandwich terns and little terns were recorded in moderate numbers (74 and 20 respectively) across the survey period with most observations recorded between April 2022 and September 2022, and April 2022 and August 2023.
- 173 Over the 24-month period, 53 observations of European storm petrel (*Hydrobates pelagicus*) were recorded in the summer months of both 2022 and 2023. Cormorant (*Phalacrocorax carbo*) and grey heron (*Ardea cinerea*) were recorded intermittently across the survey period, with a total of 30 and 31 observations respectively. 16 little egrets (*Egretta garzetta*) were also recorded across the survey period, with the majority (14) recorded in the second 12-month period.
- 174 Five additional duck species were recorded intermittently over the survey period including shelduck, mallard, teal, red-breasted merganser (*Mergus serrator*) and wigeon. A total of 45 mallard were recorded, with 27 observed in December 2021 alongside 17 teal. Only 41 red-breasted merganser and four wigeon were recorded across the whole survey period.
- 175 Wader species recorded to species level also included 36 individuals whimbrel (*Numenius phaeopus*) observed in April and May 2023 only. Curlew were recorded in low numbers in most months with 50 recorded across the survey period, whilst a flock of 13 knot (*Calidris canutus*) were recorded in September 2023. Ten bar-tailed godwits were also recorded in low numbers across four months of the 24-month period.
- 176 Other species were recorded in single digit numbers across the survey period with total numbers lower than ten individuals including brent goose (*Branta bernicla*), golden plover, turnstone, little gull (*Hydrocoloeus minutus*), great skua (*Stercorarius skua*) and hooded crow (*Corvus cornix*). One record of mute swan (*Cygnus olor*), feral pigeon (*Columba livia domestica*) and black-throated diver (*Gavia arctica*) were recorded in the March 2023, September 2022 and January 2022 surveys respectively.

Figure 128 Numbers of less abundant bird species recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2022

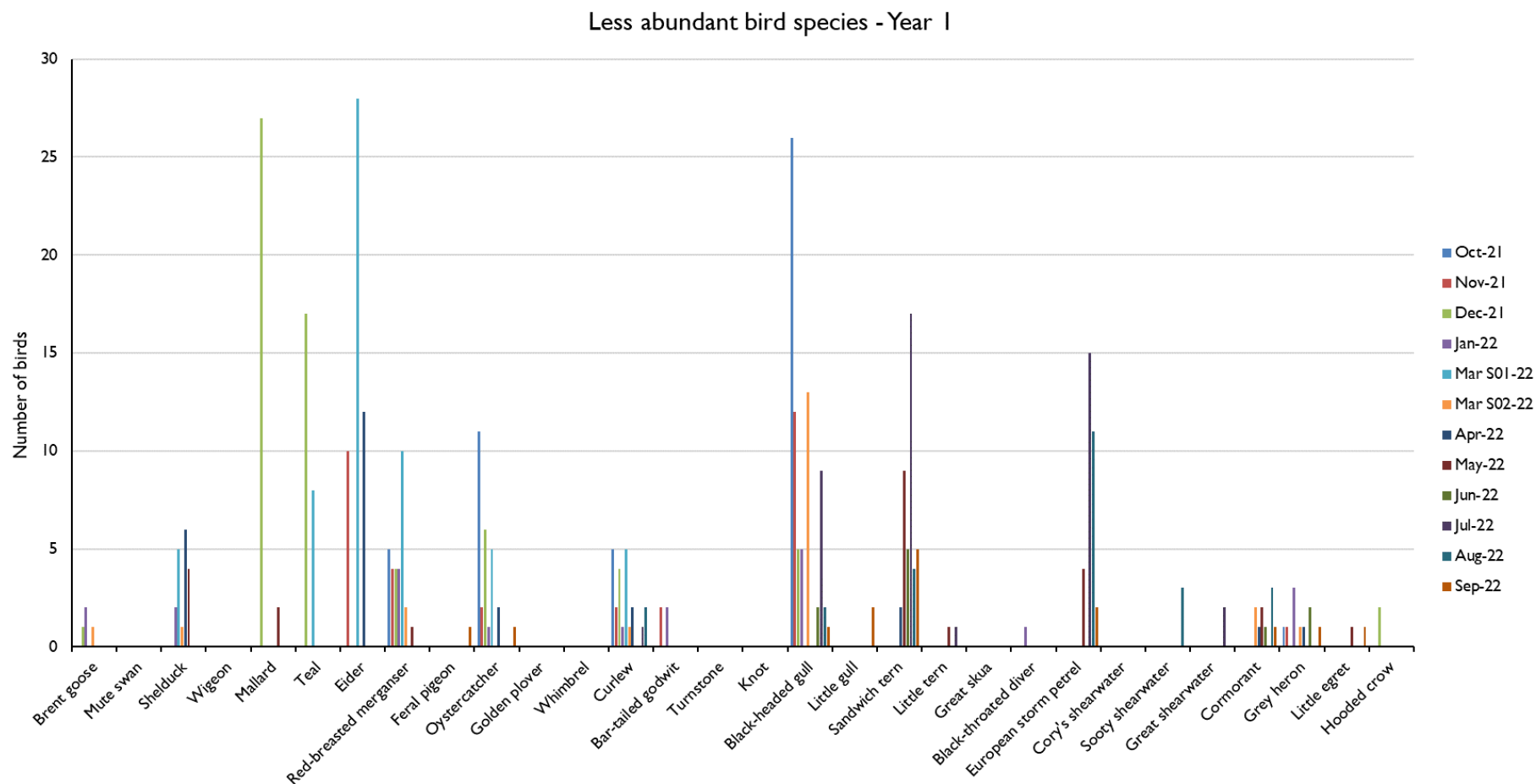
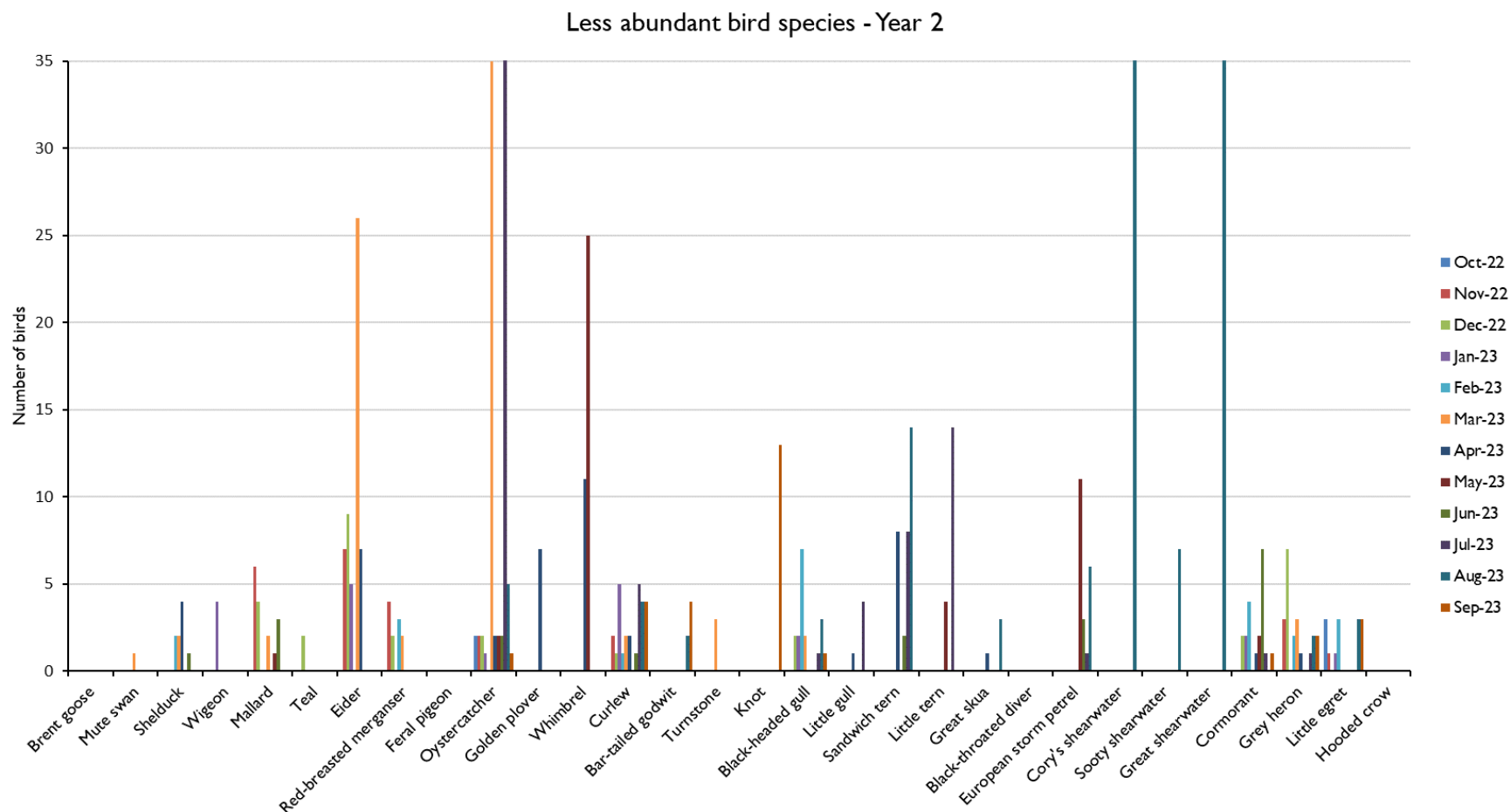


Figure 129 Numbers of less abundant bird species recorded within the Fuinneamh Sceirde Teoranta survey area between October 2022 and September 2023



*Oystercatcher records in March 2023 = 35, and July 2023 = 75 records. In August 2023, Cory's shearwater records = 777 and great shearwater = 146 records

Figure 130 Detections of less abundant bird species in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

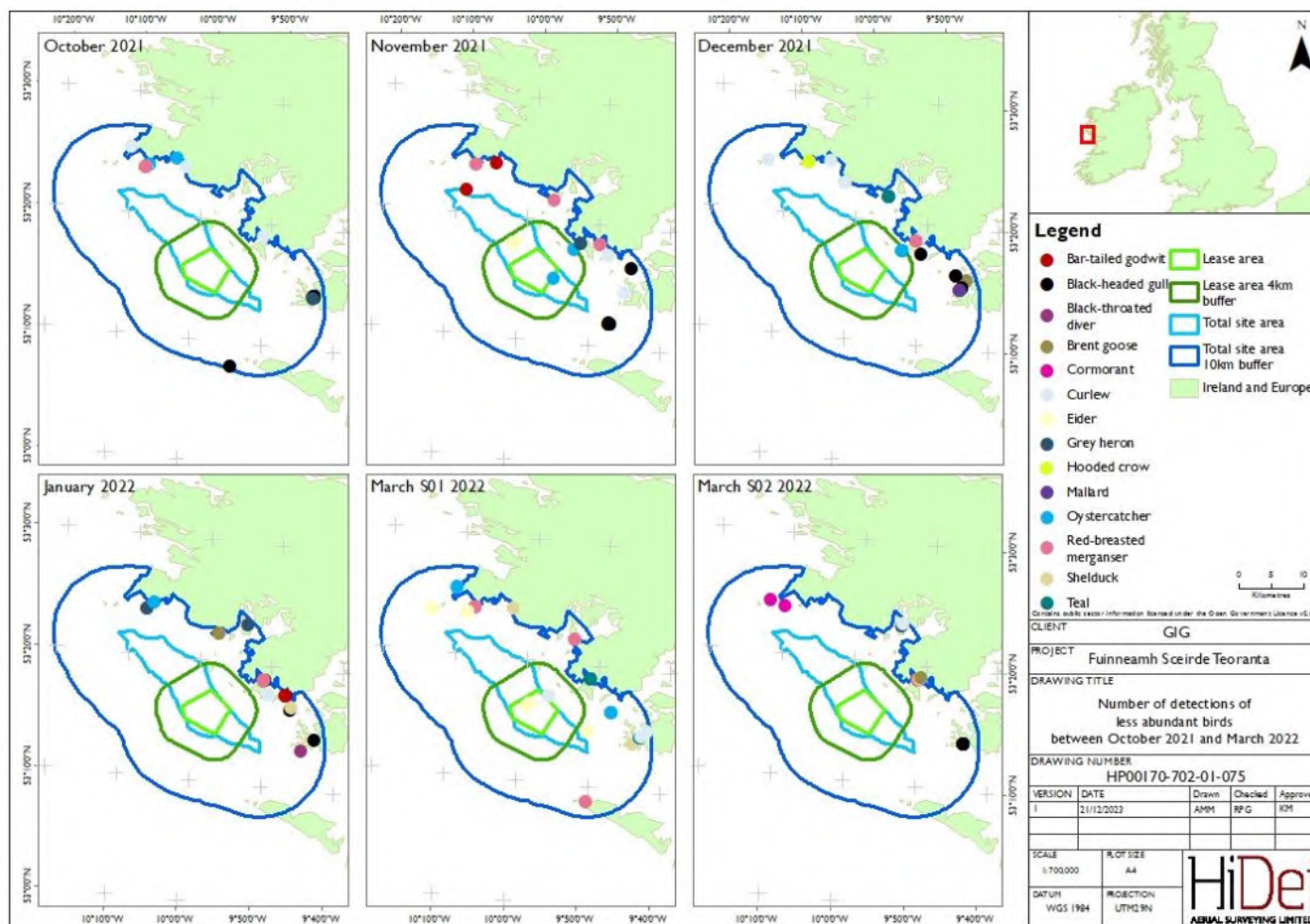


Figure 131 Detections of less abundant bird species in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

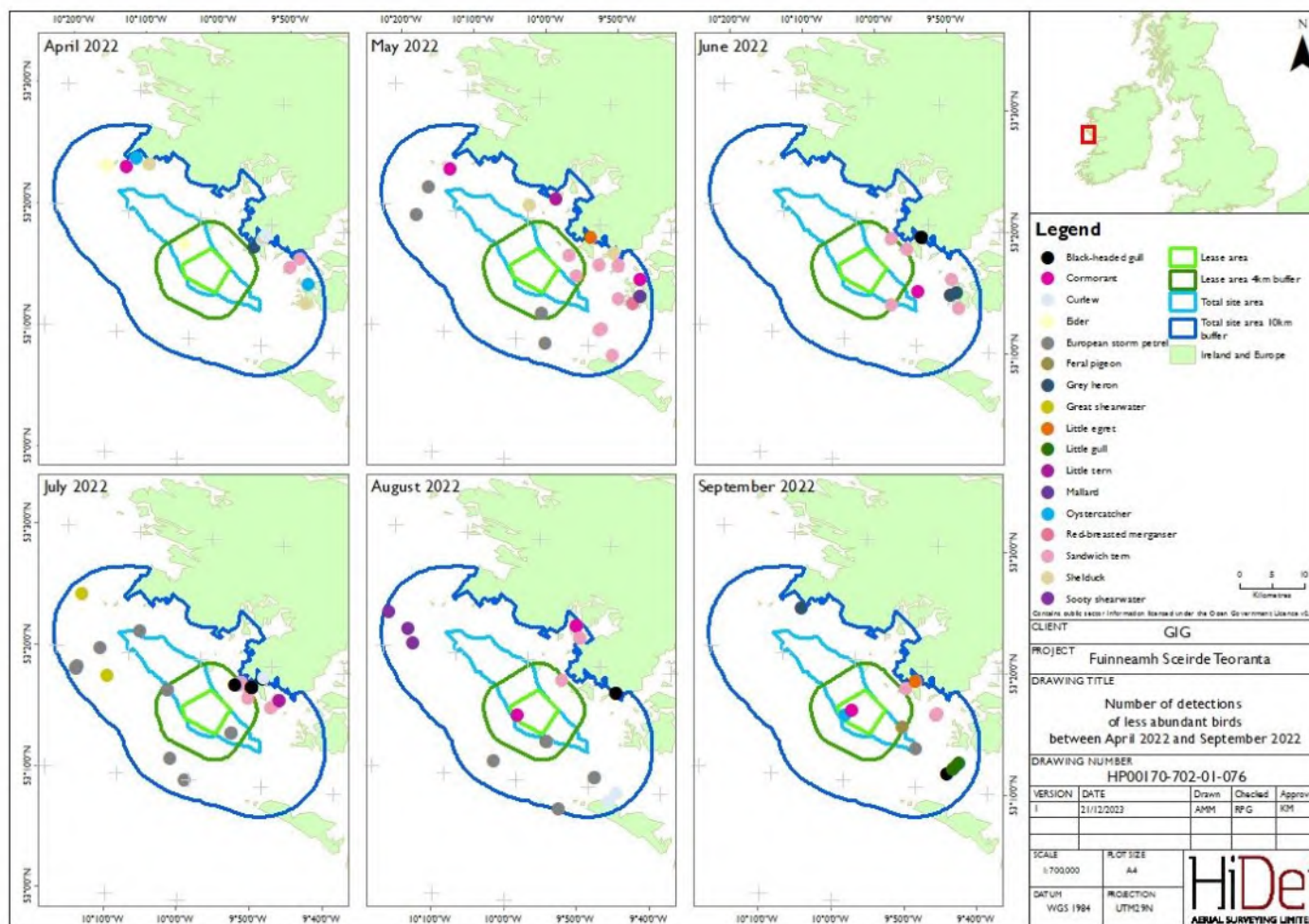


Figure 132 Detections of less abundant bird species in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

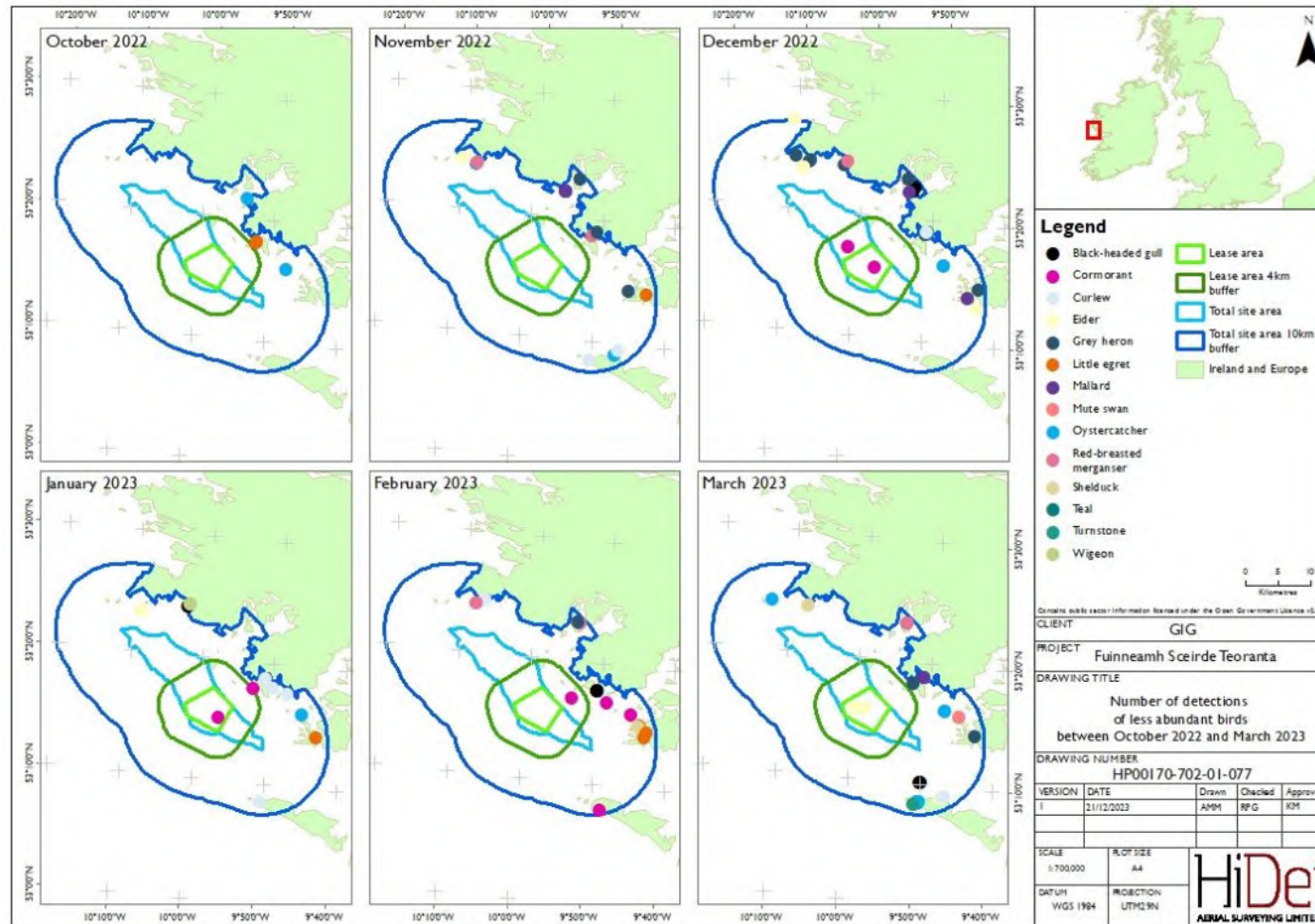
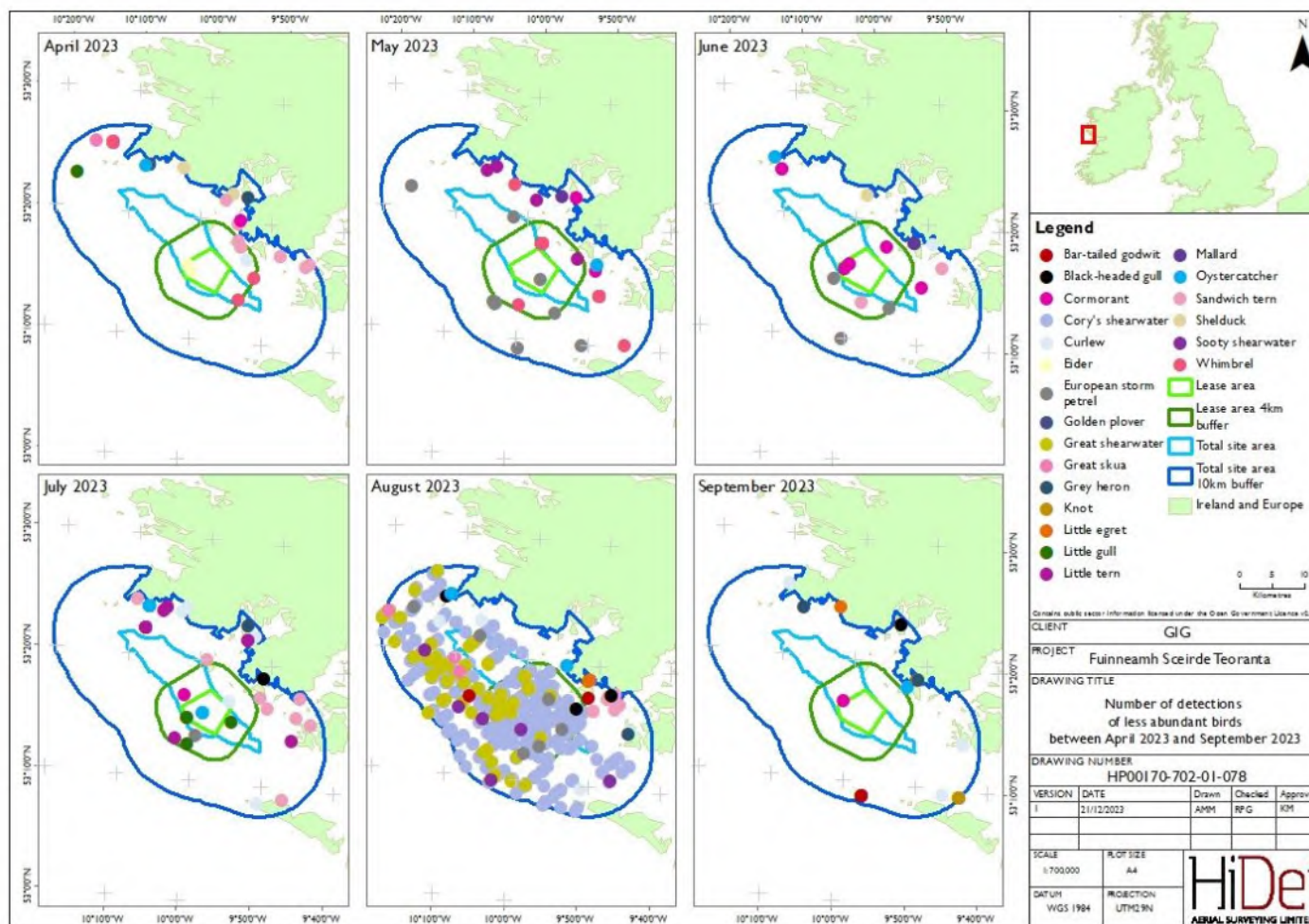


Figure 133 Detections of less abundant bird species in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.2I Unidentified bird species

- 177 Unidentified birds were recorded throughout the survey period with greater numbers recorded between May and August 2022 and 2023 (Figure 134 to Figure 137). The summer peaks of unidentified birds primarily relate to difficulties separating razorbill and guillemot and reflects the large number of birds present at that time. These species can be particularly hard to distinguish when adults undergo the autumn moult and are accompanied by fully grown juveniles.
- 178 In addition, a total of four dead birds were observed over three months and not assigned to species. In June 2023, one large auk species was recorded dead and in July and August 2023 one gull species and two small gull species were recorded as dead respectively.
- 179 Distributions of unidentified birds are displayed in Figure 138 to Figure 141.

Figure 134 Number of unidentified birds, assigned to species group (excluding auks), recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2022

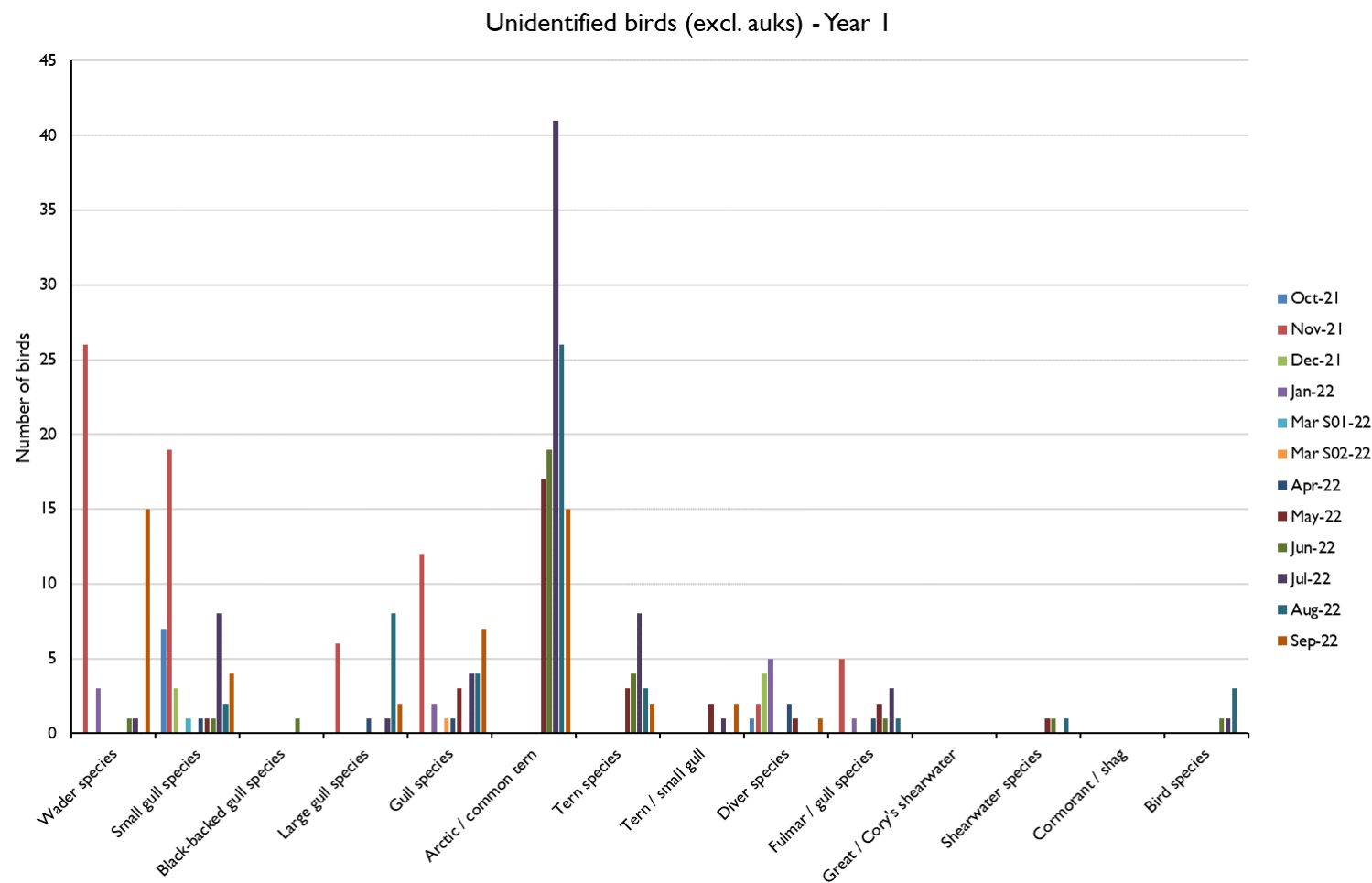


Figure I35 Number of unidentified auk species, recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2022

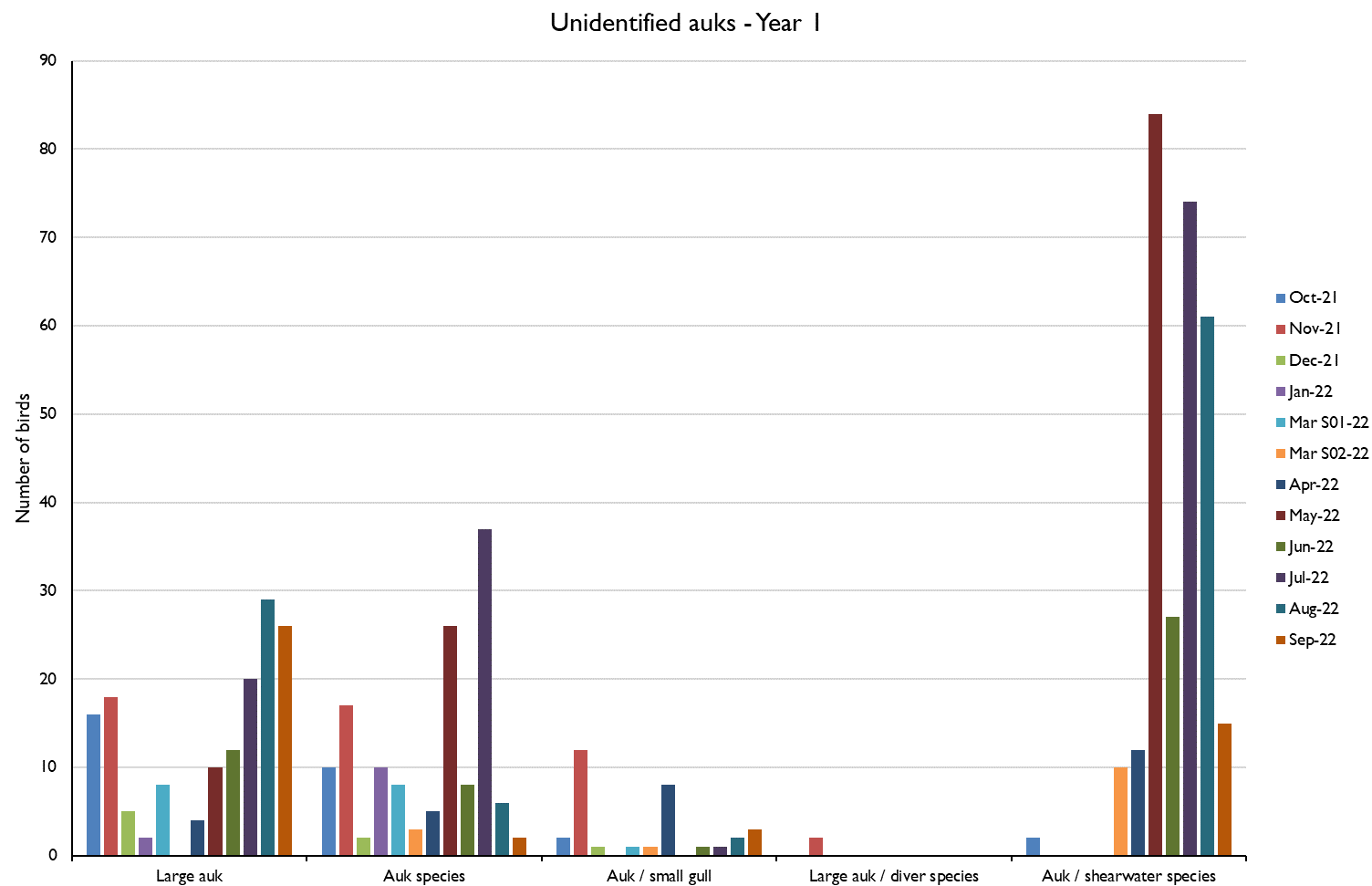


Figure 136 Number of unidentified birds, assigned to species group (excluding auks), recorded within the Fuinneamh Sceirde Teoranta survey area between October 2022 and September 2023

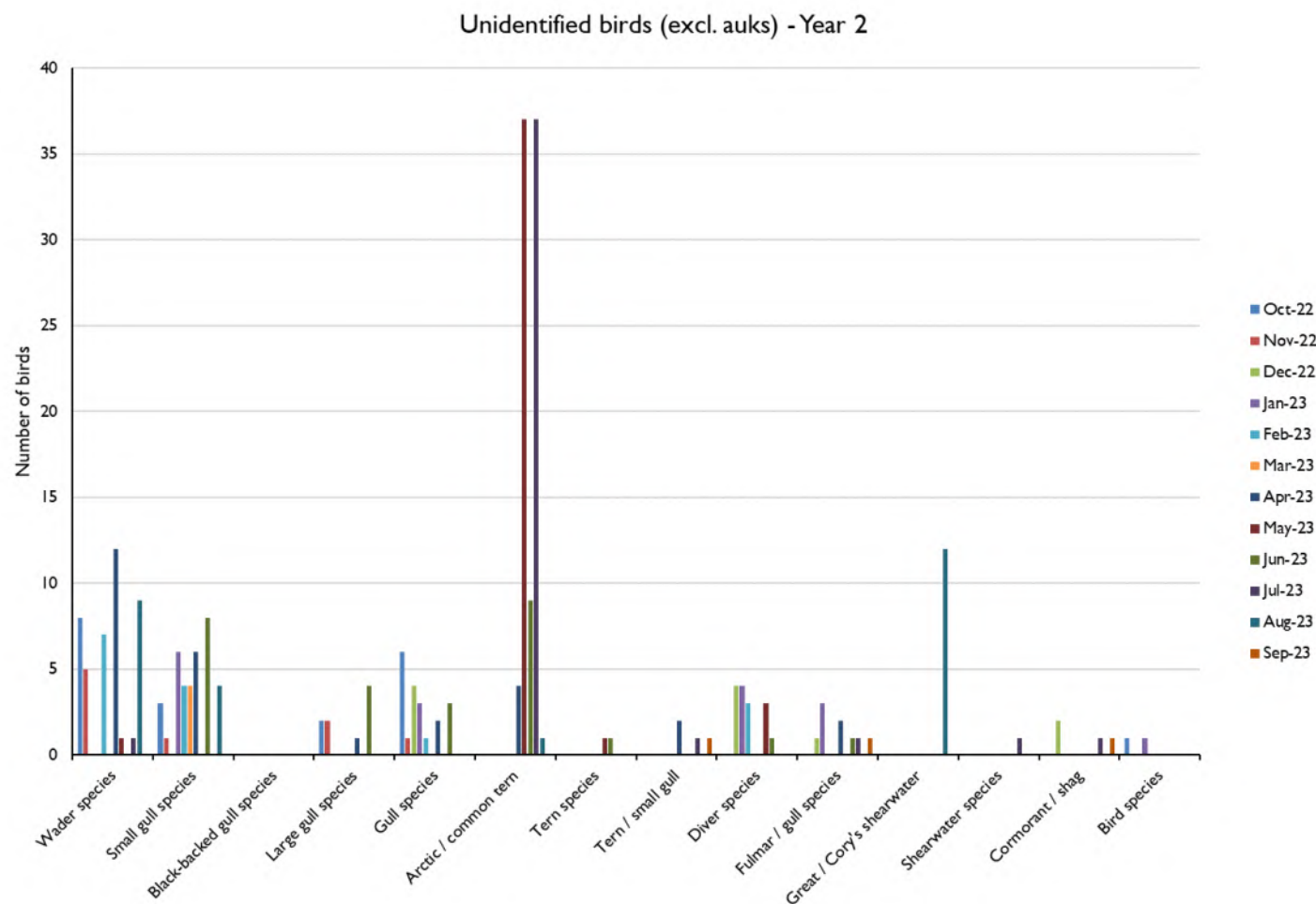


Figure 137 Number of unidentified auk species, recorded within the Fuinneamh Sceirde Teoranta survey area between October 2022 and September 2023

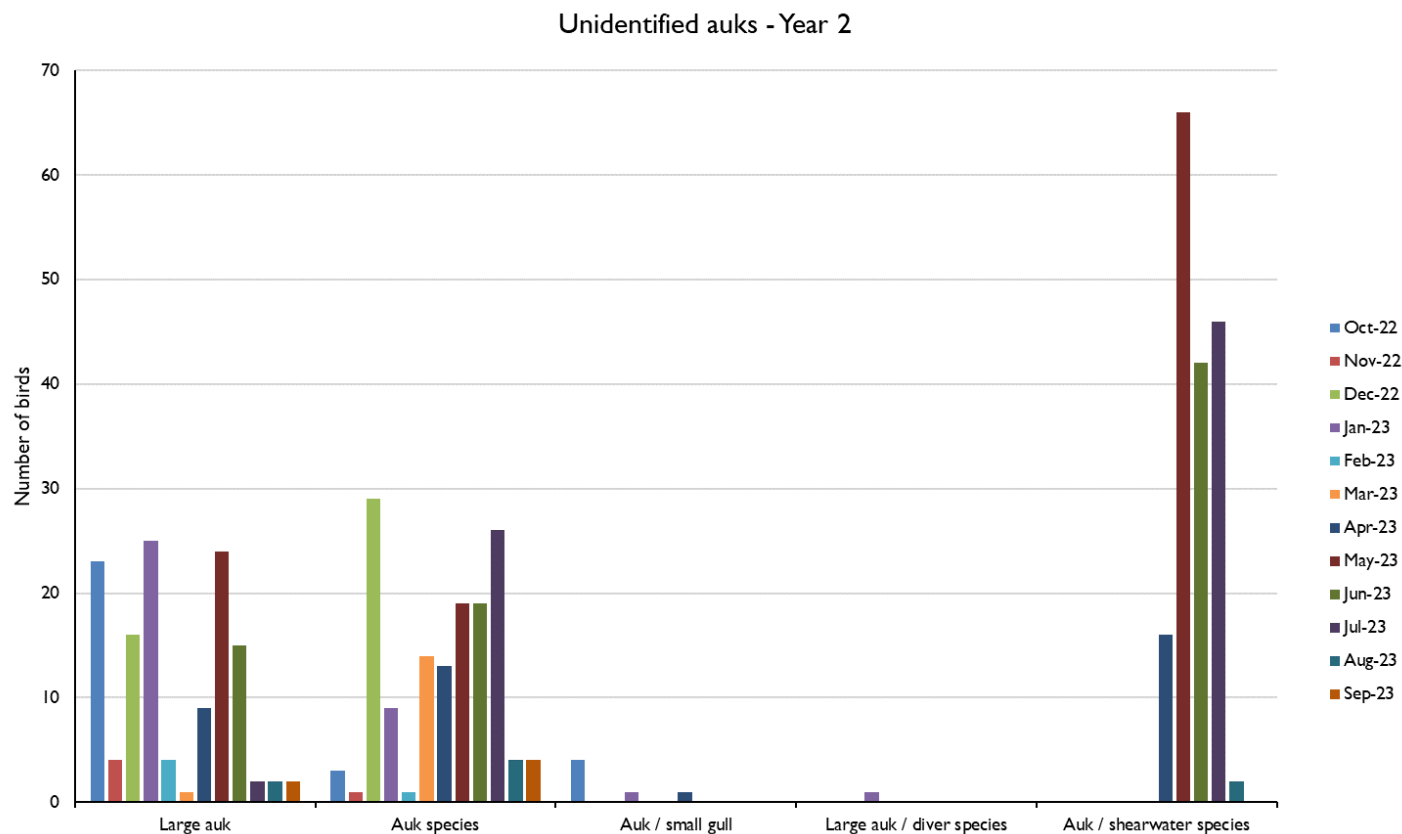


Figure 138 Detections of unidentified birds, assigned to species group in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

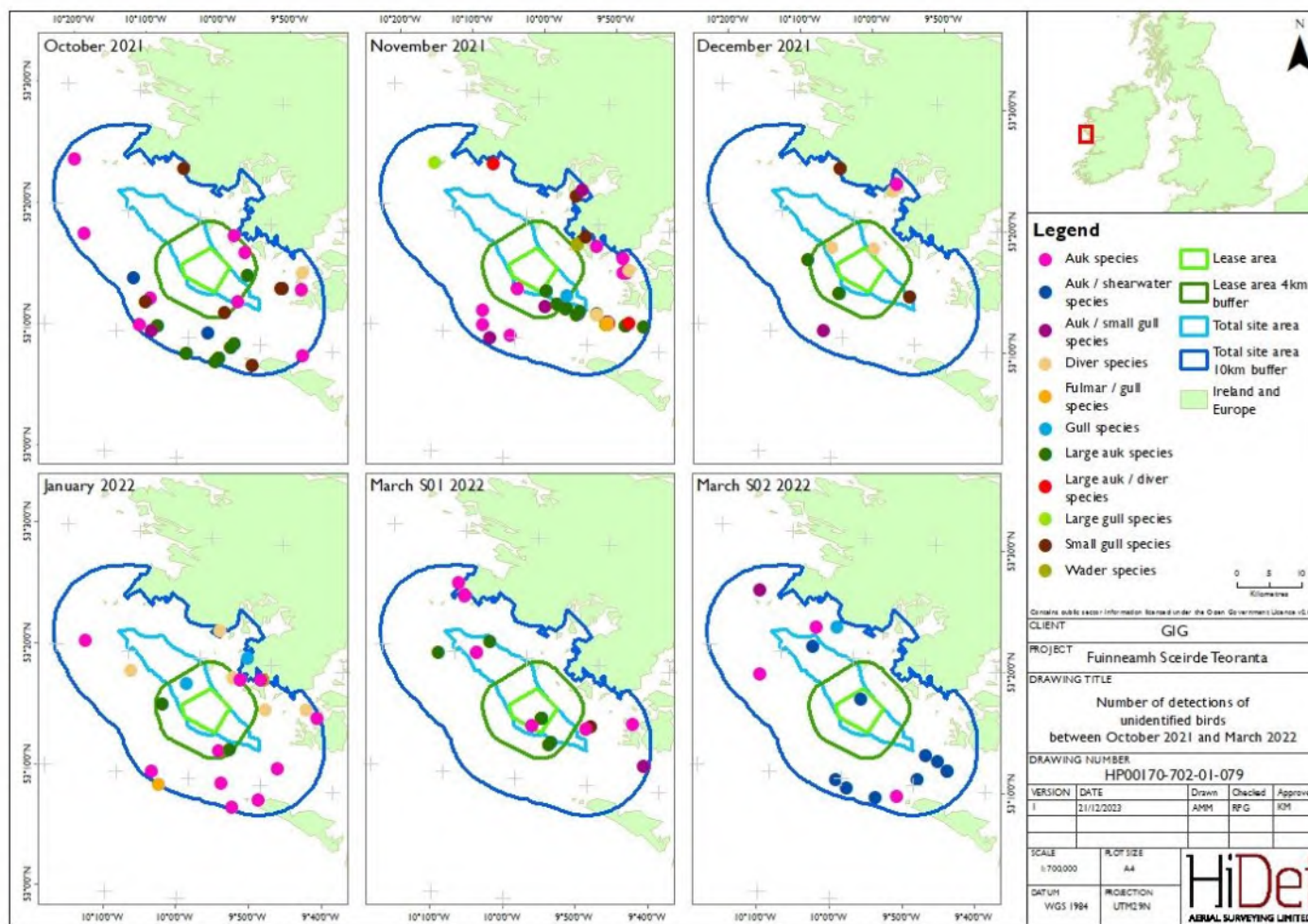


Figure 139 Detections of unidentified birds, assigned to species group in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

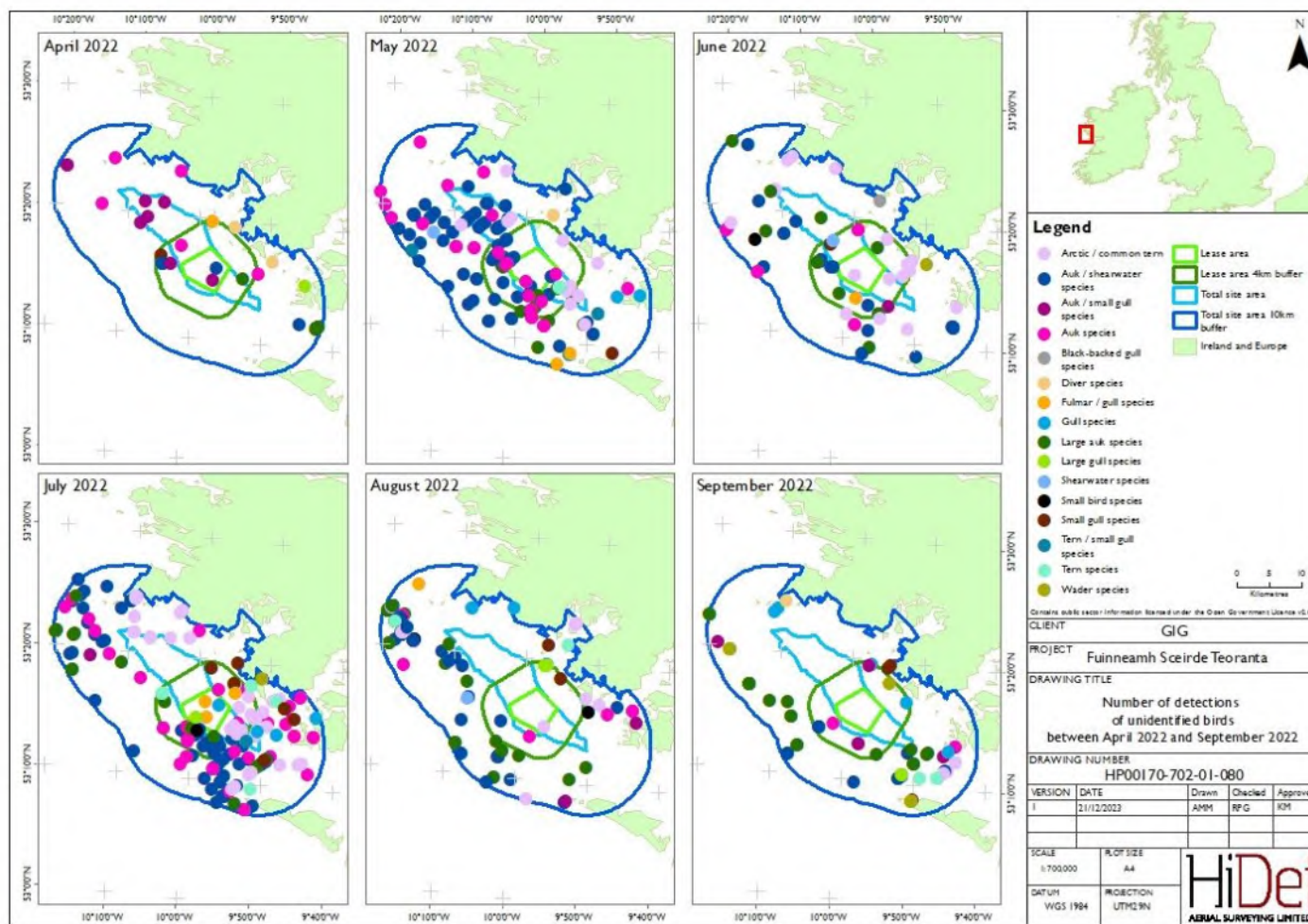


Figure 140 Detections of unidentified birds, assigned to species group in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

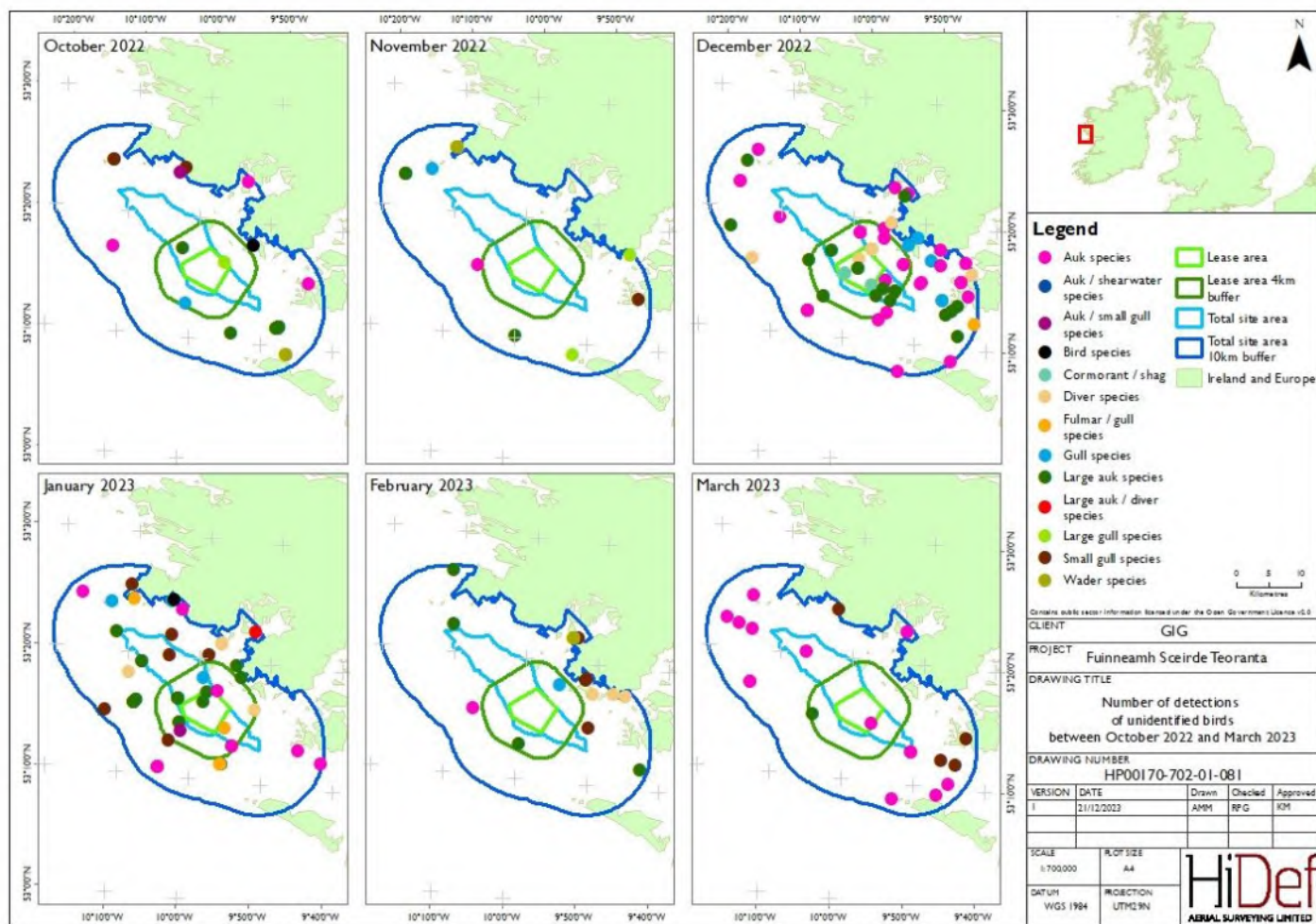
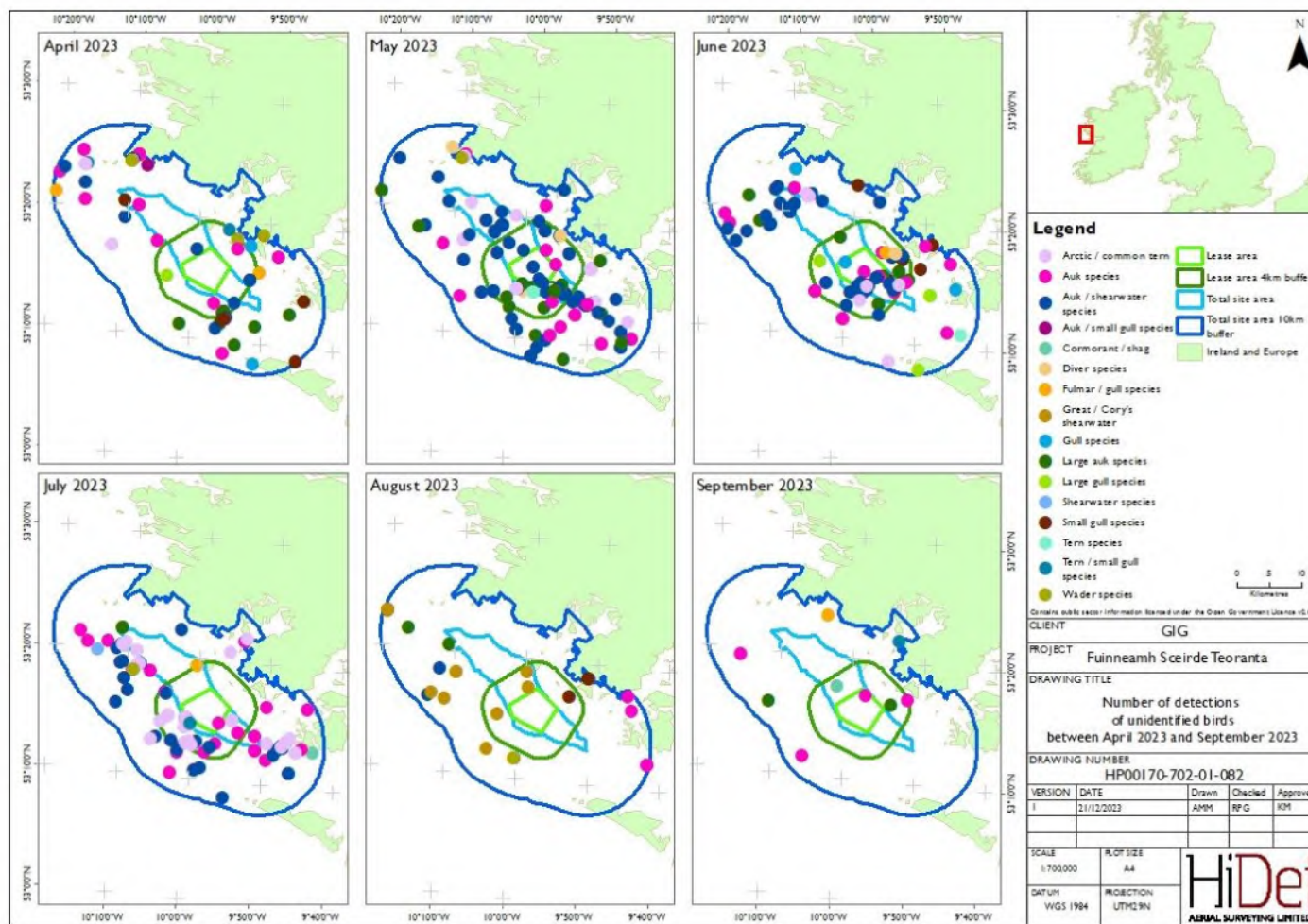


Figure 141 Detections of unidentified birds, assigned to species group in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.22 All non-avian animals

- 180 Non-avian animals were recorded in all surveys, with the highest numbers recorded in November 2022 (Figure 142).
- 181 Surfacing rates of species and unidentified animals can be found in Table 52.
- 182 The densities of all non-avian animals are presented in Figure 143 to Figure 146.

Figure 142 Total number of non-avian animals recorded in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

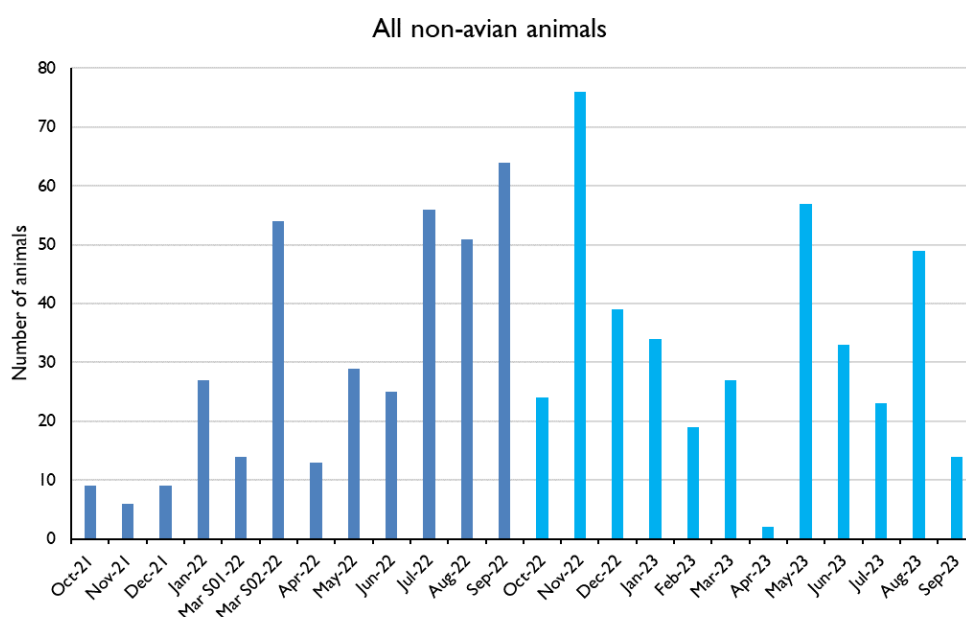


Table 52 Summary of surfacing behaviour for all non-avian animals in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

Species	Submerged	Surfacing	Surfacing at red line	% Surfacing at red line	Unknown if surfacing	Total
Lion's mane jellyfish	1	0	0	0	0	1
Basking shark	2	0	0	0	0	2
Blue shark	7	0	0	0	0	7
Bluefin tuna	16	0	0	0	0	16
Ocean sunfish	25	0	0	0	0	25
Grey seal	15	1	63	43	67	146
Harbour seal	4	1	7	8	81	93
Common dolphin	219	19	42	14	12	292
Bottlenose dolphin	9	0	1	10	0	10
Harbour porpoise	16	2	4	17	0	22
No ID						
Jellyfish	1	0	0	0	0	1
Fish species	1	0	0	0	0	1
Seal species	31	13	54	40	37	135
Cetacean species	1	1	0	0	0	2
Seal / small cetacean species	0	1	0	0	0	1
Total	348	38	171	23	197	754

Figure 143 Density (number/km²) and number of detections per segment of all non-avian animals in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

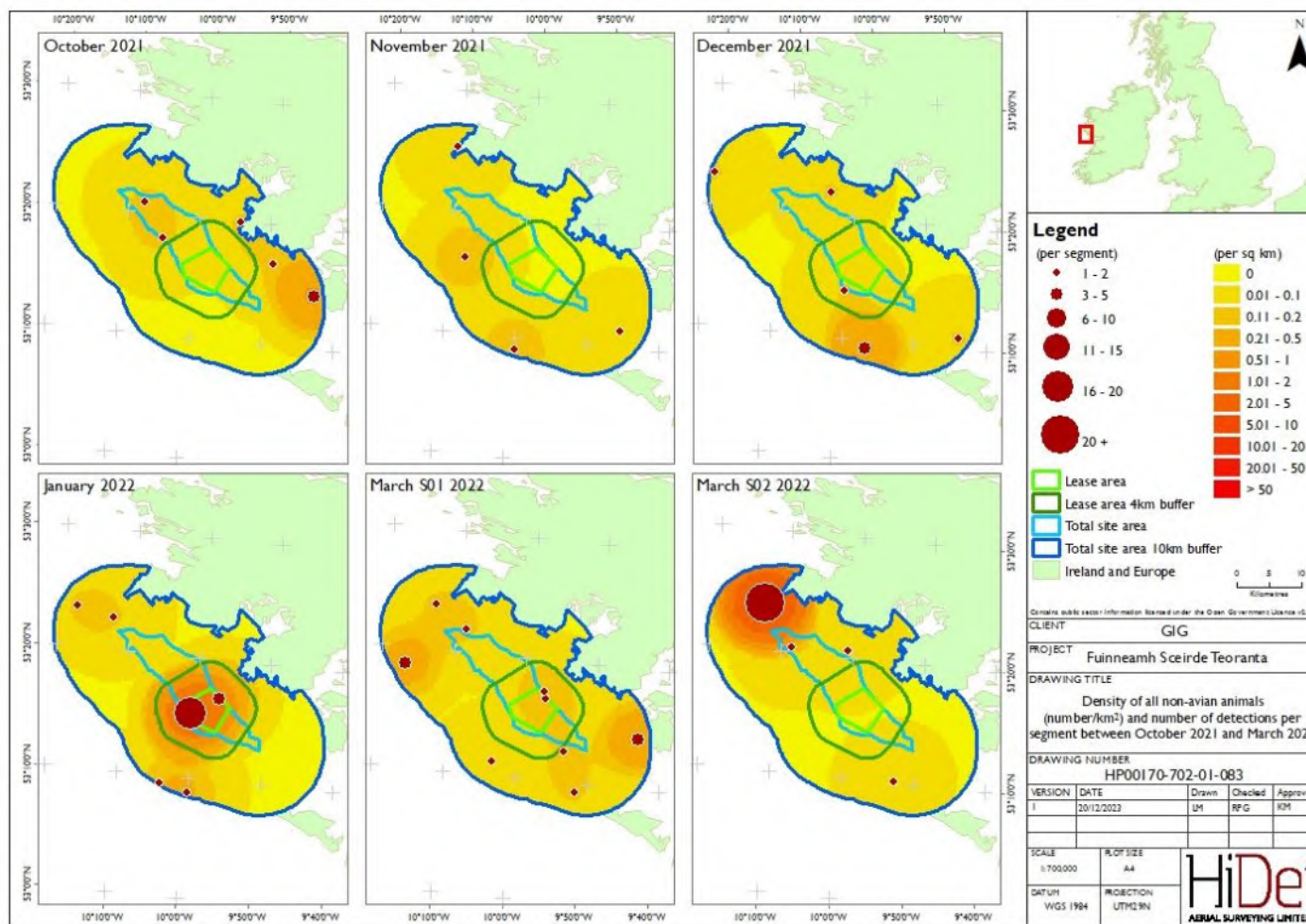


Figure I44 Density (number/km²) and number of detections per segment of all non-avian animals in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

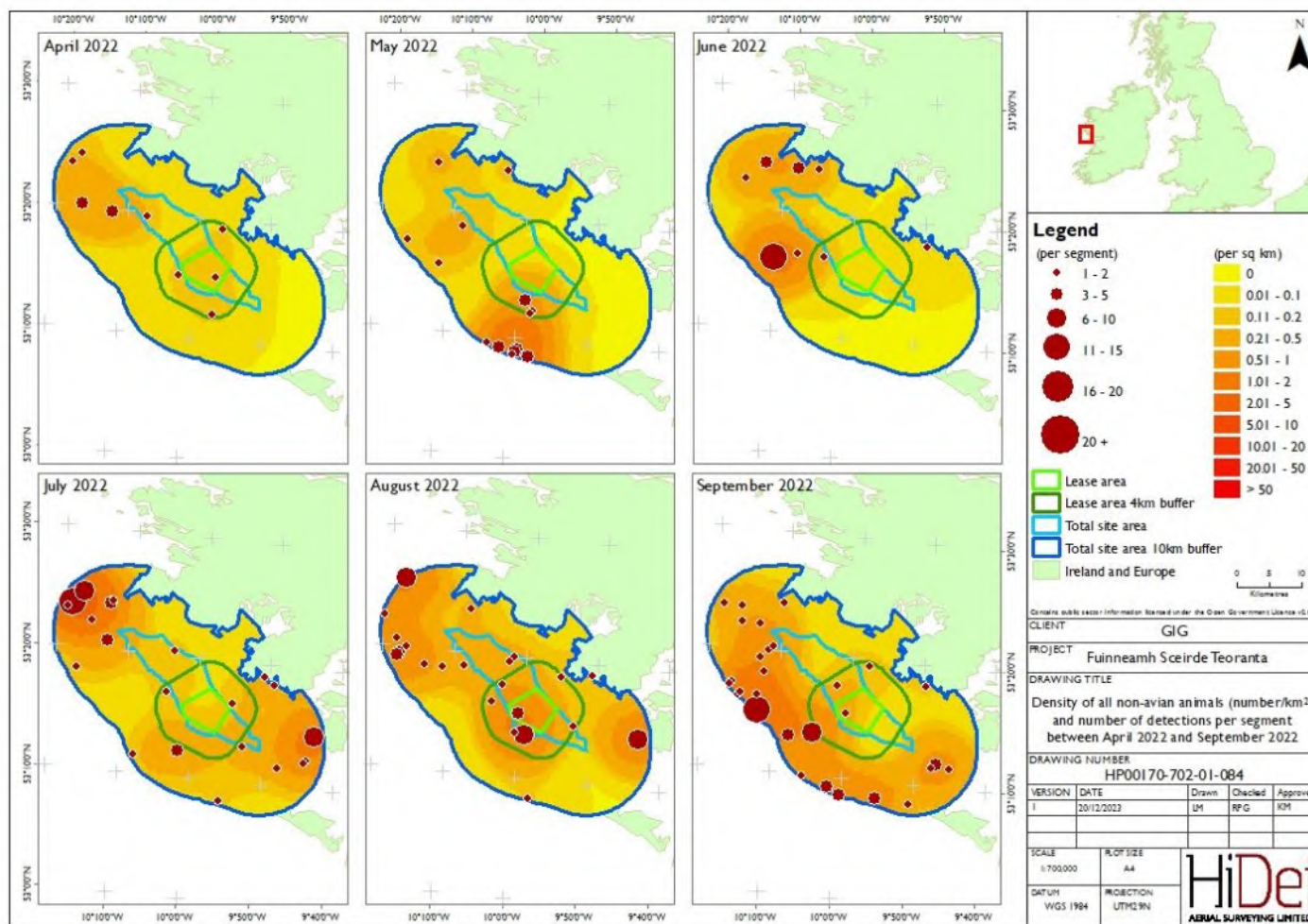


Figure 145 Density (number/km²) and number of detections per segment of all non-avian animals in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

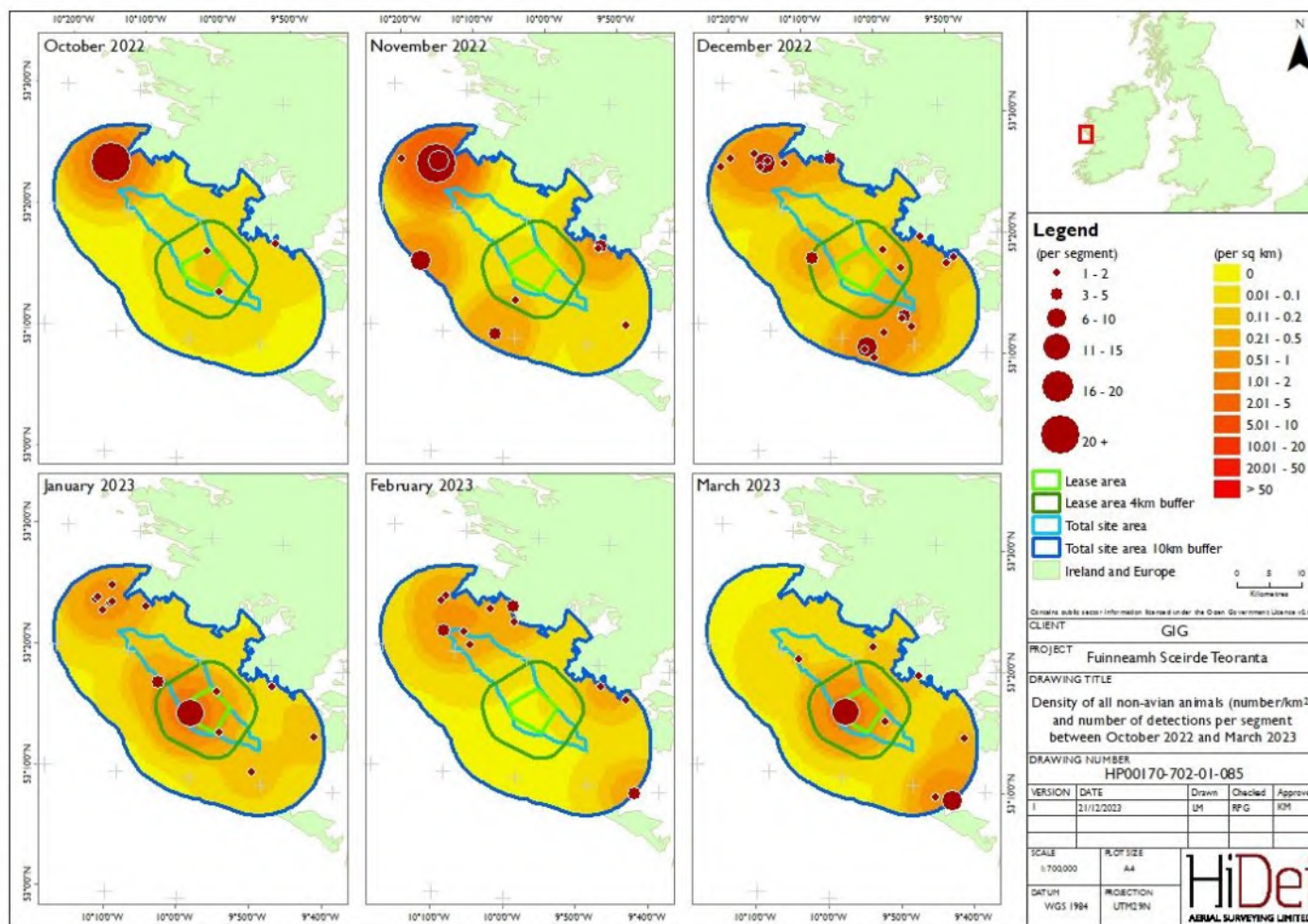
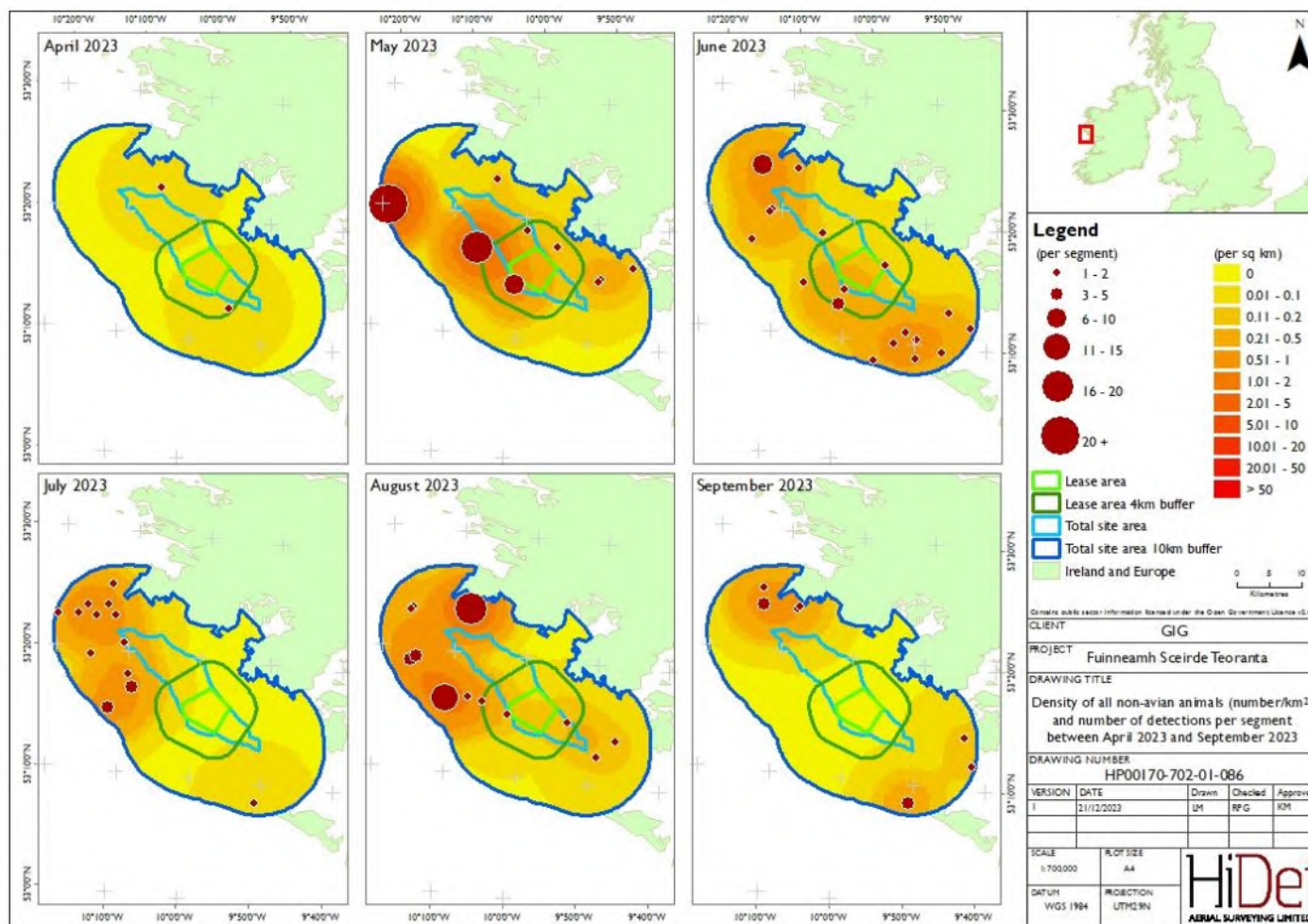


Figure I46 Density (number/km²) and number of detections per segment of all non-avian animals in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.23 Common dolphin

- 183 Common dolphin was the most abundant marine mammal recorded throughout the survey period, with numbers peaking in May 2023 (Figure 147).
- 184 Density estimates for the species ranged between 0.01 animals/km² (95% CI 0.00 – 0.03) in March 2023 and 0.41 animals/km² (95% CI 0.00 – 1.07) in May 2023 (Figure 148 and Table 53) equating to nine animals (95% CI 0 – 25) and 391 animals (95% CI 0 – 1,008) respectively.
- 185 Common dolphins were widespread across the survey area, with higher densities recorded both in the buffer and lease area at certain times of year (Figure 149 to Figure 152).
- 186 Proportions of surfacing animals can be found in Table 52; 75% of individuals were recorded as submerged.
- 187 Since juveniles are almost always accompanied by adults, and this is the easiest way of aging adult cetaceans, the proportion of adults and juveniles in aged animals appears to be similar, a total of 14 pairs of adult/juvenile recorded across the period in July, August and December 2022, and January, February, May, June and August 2023.

Figure 147 Number of common dolphin recorded between October 2021 and September 2023 in the Fuinneamh Sceirde Teoranta survey area

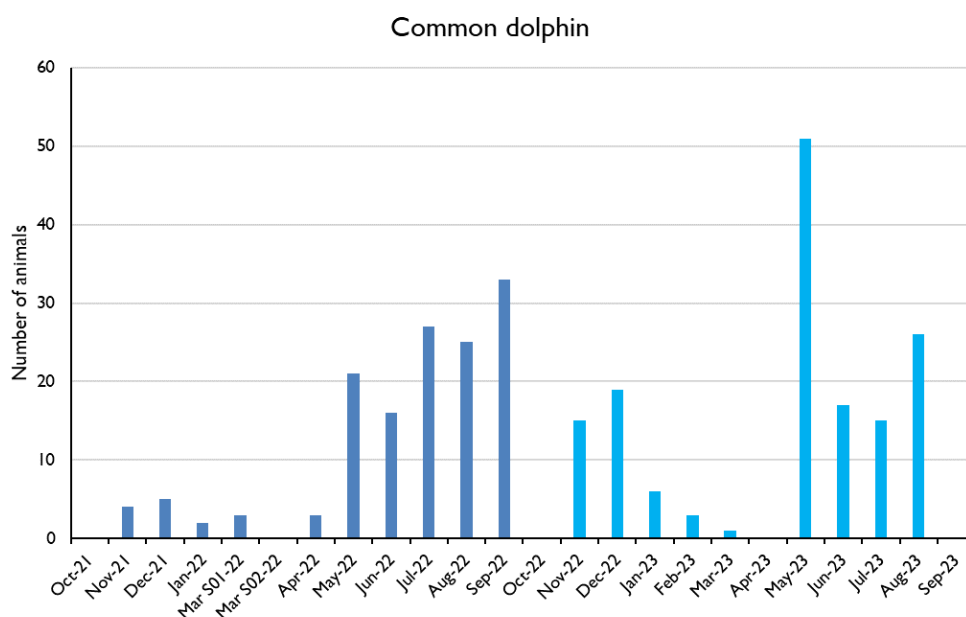


Figure I48 Common dolphin density estimates, with 95% lower and upper confidence limits, in the Fuinneamh Sceirde Teoranta survey area, between October 2021 and September 2023

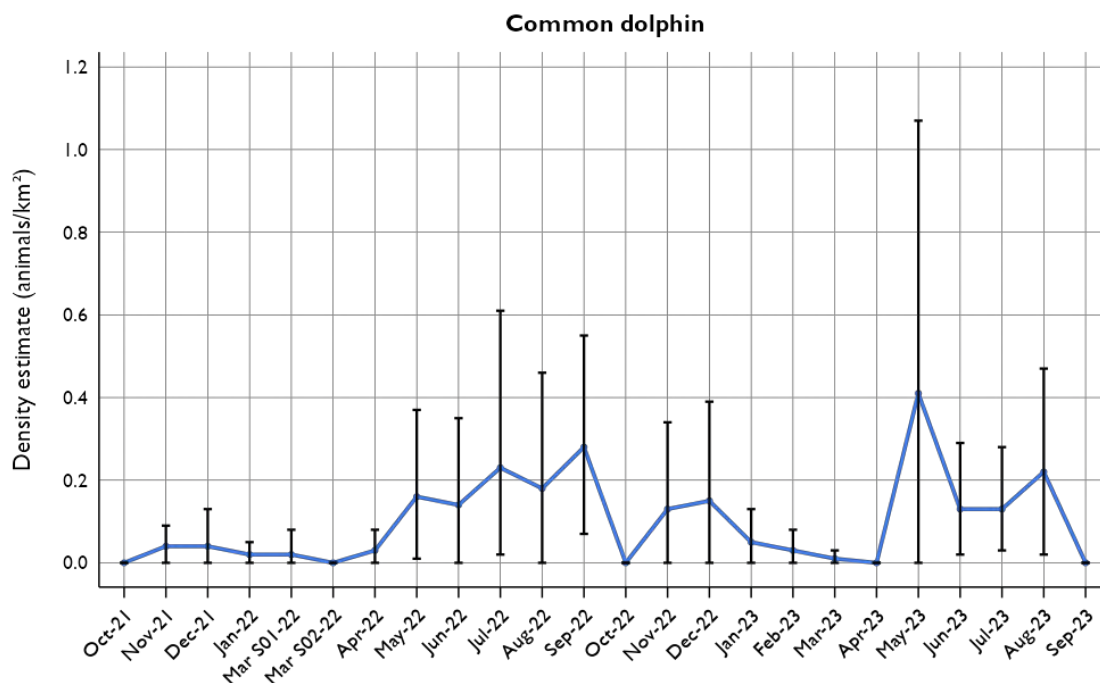


Table 53 **Density and population estimates of common dolphins in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023**

Survey date	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
28 October 2021	0.00	0	0	0	0	0.00
27 November 2021	0.04	34	0	81	21	61.76
10 December 2021	0.04	38	0	122	38	100.00
21 January 2022	0.02	16	0	47	15	93.75
01 March 2022	0.02	23	0	73	24	104.35
19 March 2022	0.00	0	0	0	0	0.00
01 April 2022	0.03	25	0	73	23	92.00
27 May 2022	0.16	151	9	349	76	49.88
18 June 2022	0.14	133	0	328	93	69.92
11 July 2022	0.23	214	16	580	167	78.04
06 August 2022	0.18	172	0	435	101	58.52
01 September 2022	0.28	262	65	523	116	44.27
17 October 2022	0.00	0	0	0	0	0.00
29 November 2022	0.13	127	0	320	87	68.50
22 December 2022	0.15	145	0	370	96	66.04
19 January 2023	0.05	48	0	126	33	68.75
09 February 2023	0.03	26	0	73	24	92.31
04 March 2023	0.01	9	0	25	8	88.89
18 April 2023	0.00	0	0	0	0	0.00
02 May 2023	0.41	391	0	1008	261	66.52
03 June 2023	0.13	126	17	275	56	44.17
19 July 2023	0.13	124	25	265	64	51.61
17 August 2023	0.22	207	17	448	109	52.66
16 September 2023	0.00	0	0	0	0	0.00

Figure I49 Detections of common dolphins in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

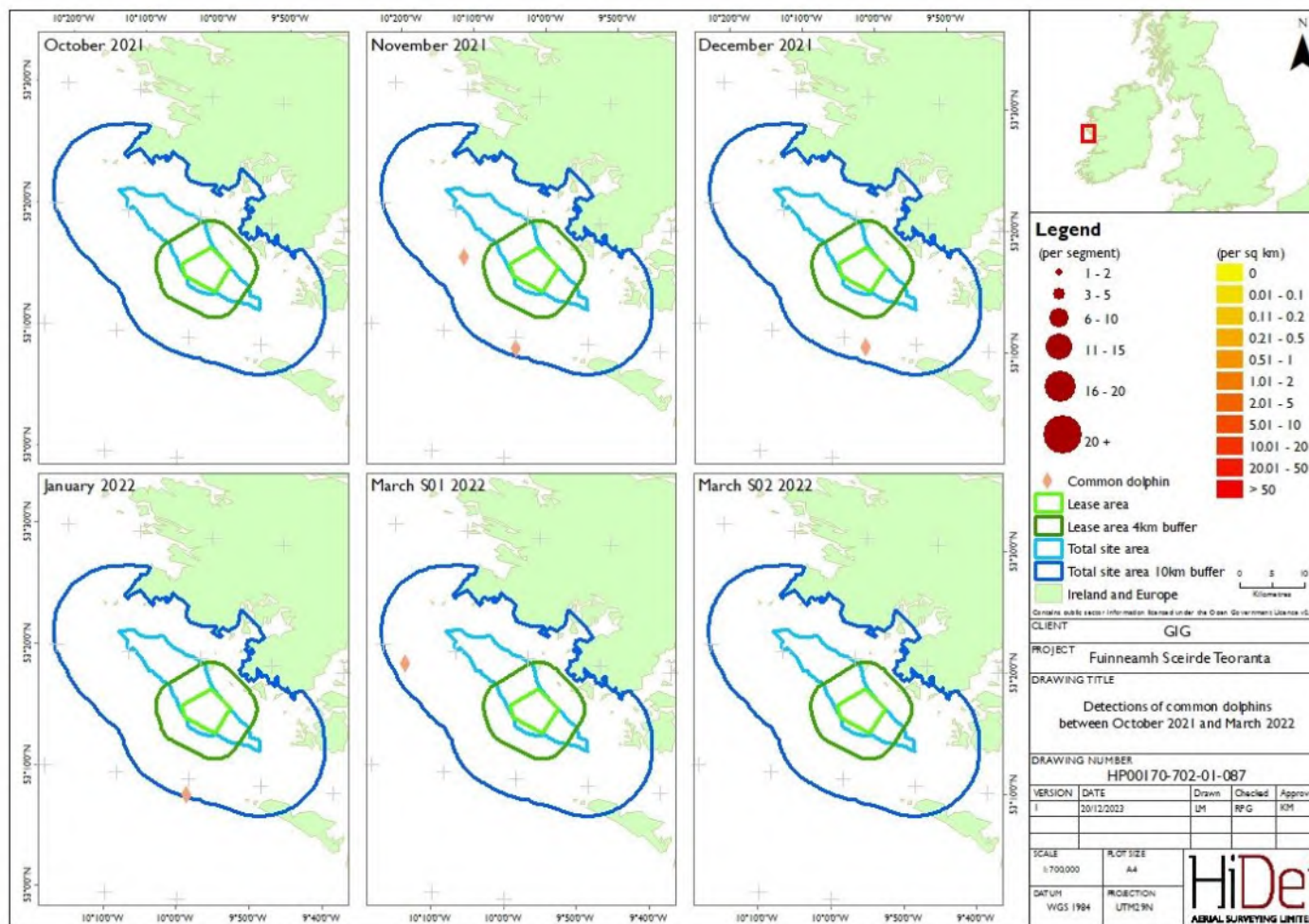


Figure 150 Detections, density (number/km²) and number of detections per segment of common dolphins in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

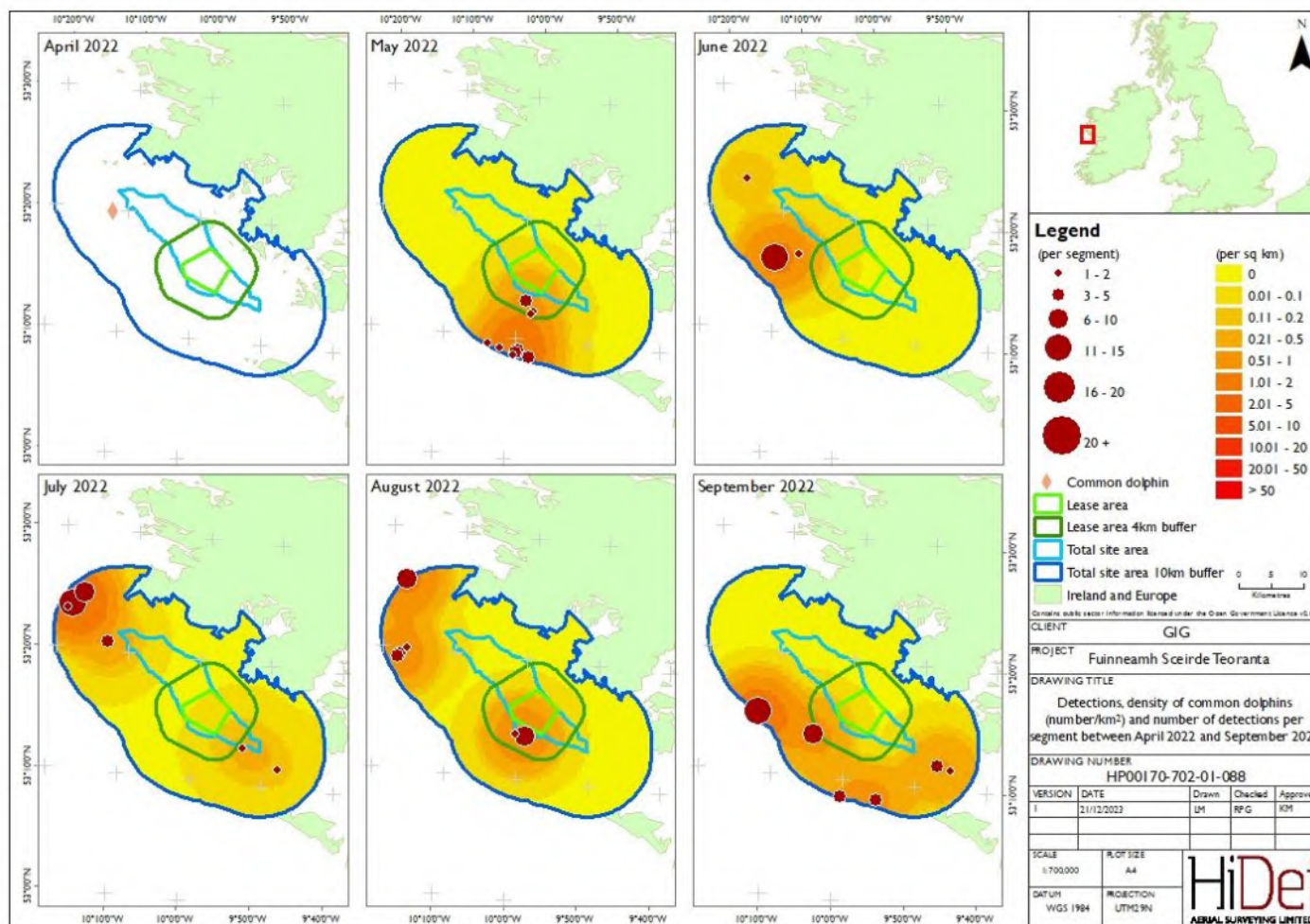


Figure 151 Detections, density (number/km²) and number of detections per segment of common dolphins in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

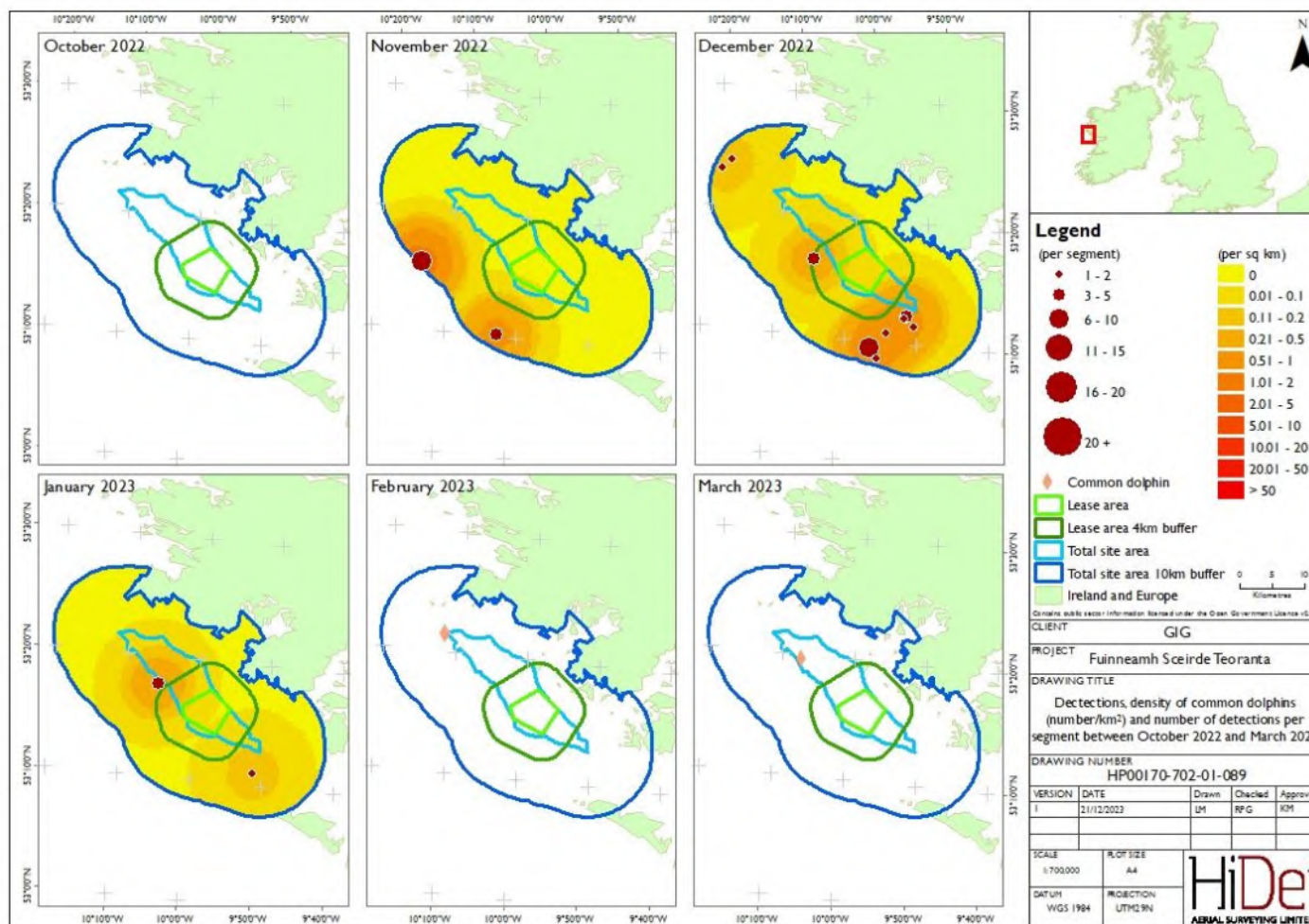
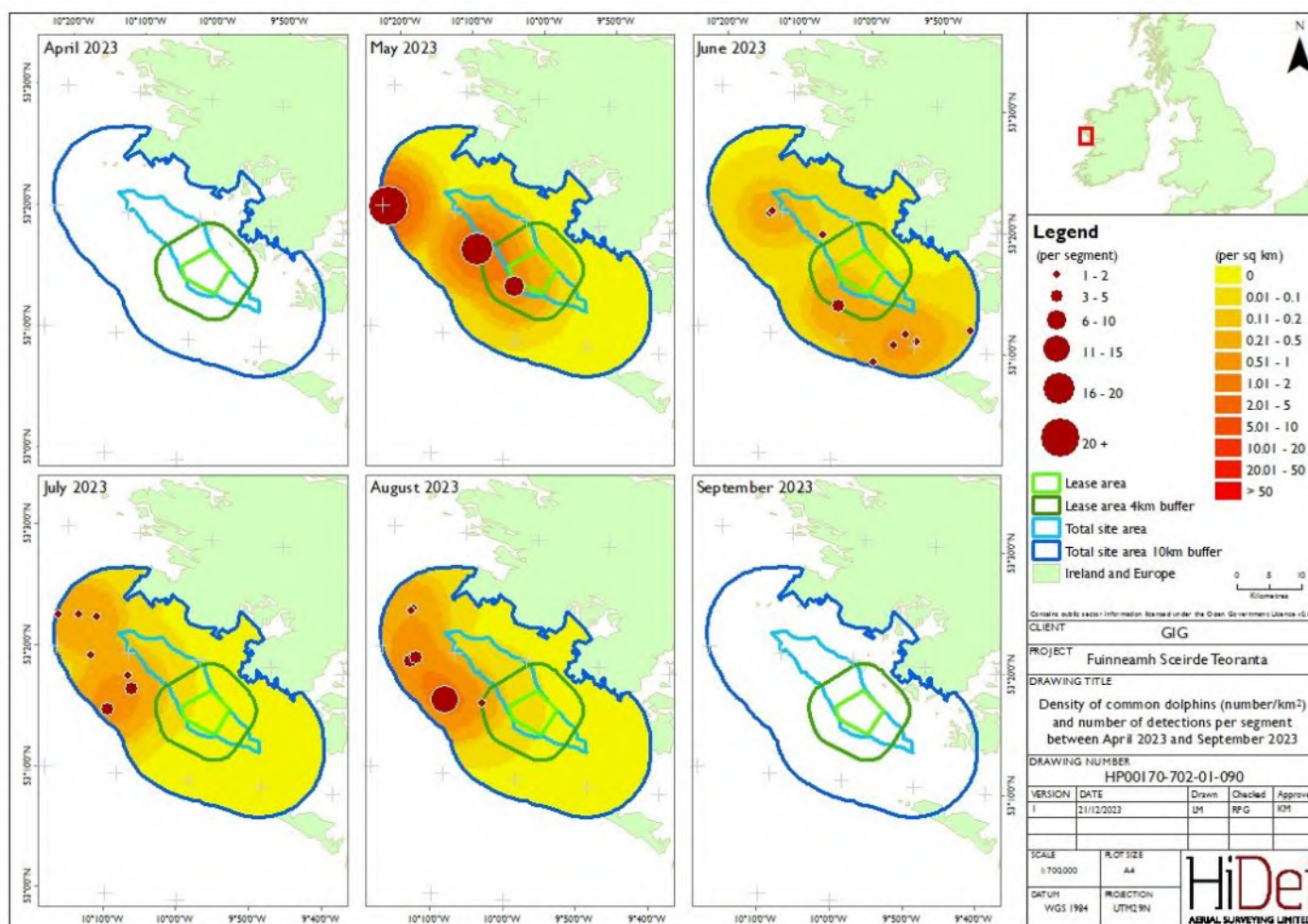


Figure I52 Detections, density (number/km²) and number of detections per segment of common dolphins in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.24 Less abundant non-avian animal species

- 188 A variety of other non-avian animal species were recorded in the survey area throughout the survey period. A total of two basking sharks (*Cetorhinus maximus*) were individually recorded in April and August 2022 and seven blue sharks (*Prionace glauca*) in September 2022 (Figure 153).
- 189 Grey seals were the second most numerous non-avian animal species with a total of 146 individuals recorded across the survey period and 93 observations of harbour seals were recorded as the third most numerous.
- 190 Harbour porpoises were recorded in relatively low numbers with only 22 observations across the survey period. A total of ten bottlenose dolphins were observed, with nine individuals recorded in March 2023.
- 191 Two identified fish species were recorded across the survey period with 25 observations of ocean sunfish (*Mola mola*) and 16 records of bluefin tuna (*Thunnus thynnus*). One lion's mane jellyfish (*Cyanea capillata*) was also recorded in June 2022.
- 192 The distribution of less abundant non-avian animal species are presented in Figure 154 to Figure 157.

Figure 153 Number of less abundant non-avian animals recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

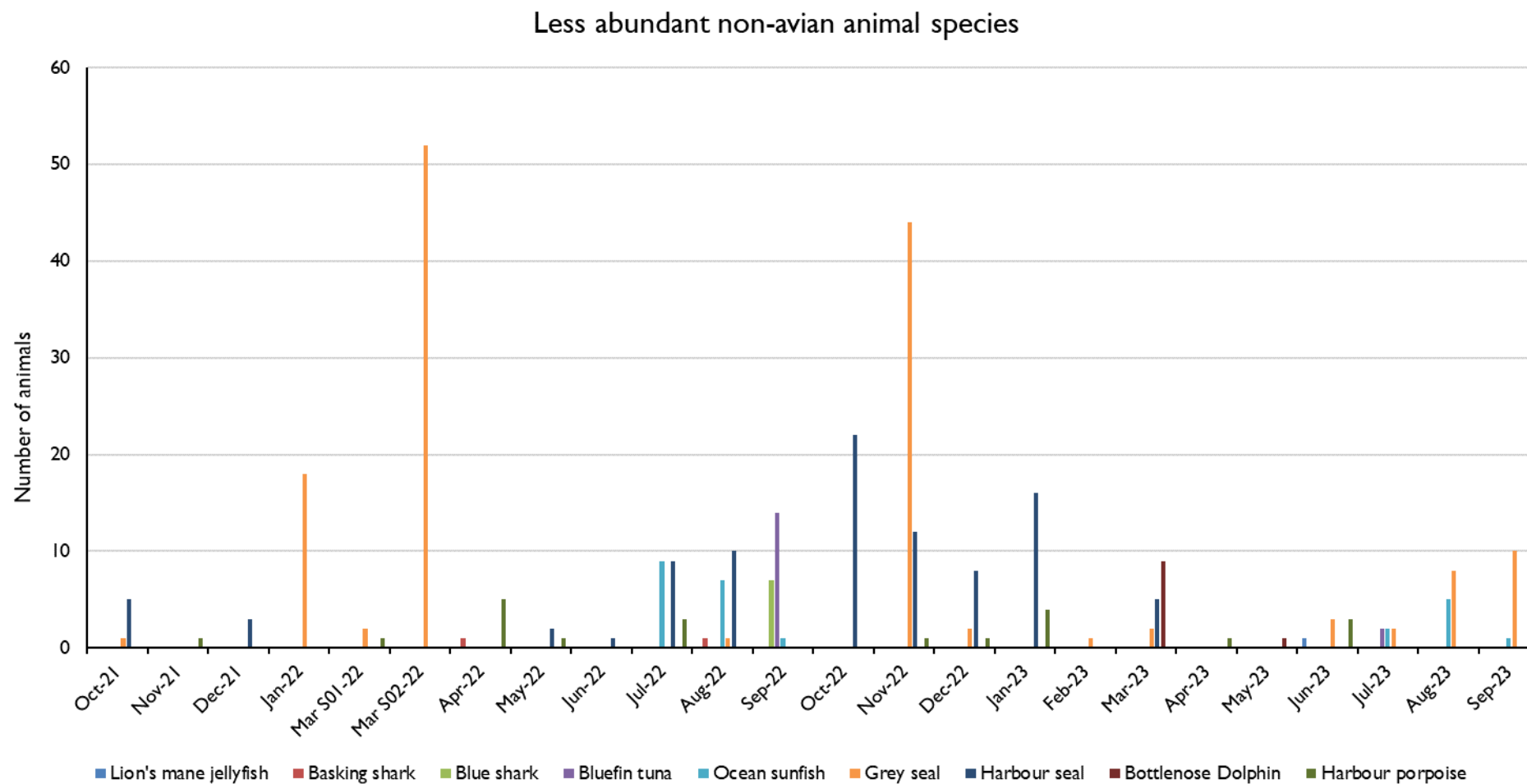


Figure 154 Detections of less abundant non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

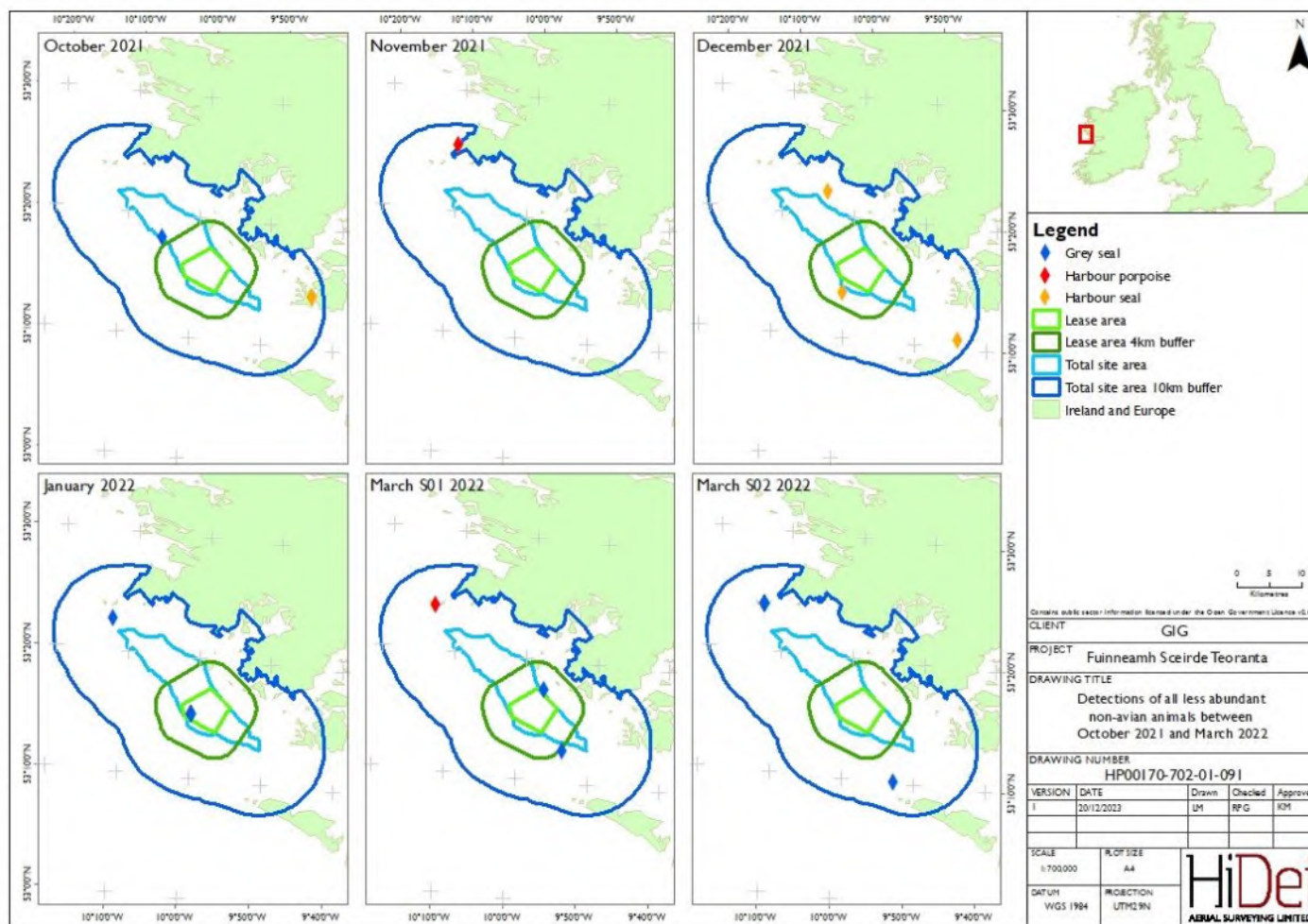


Figure 155 Detections of less abundant non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

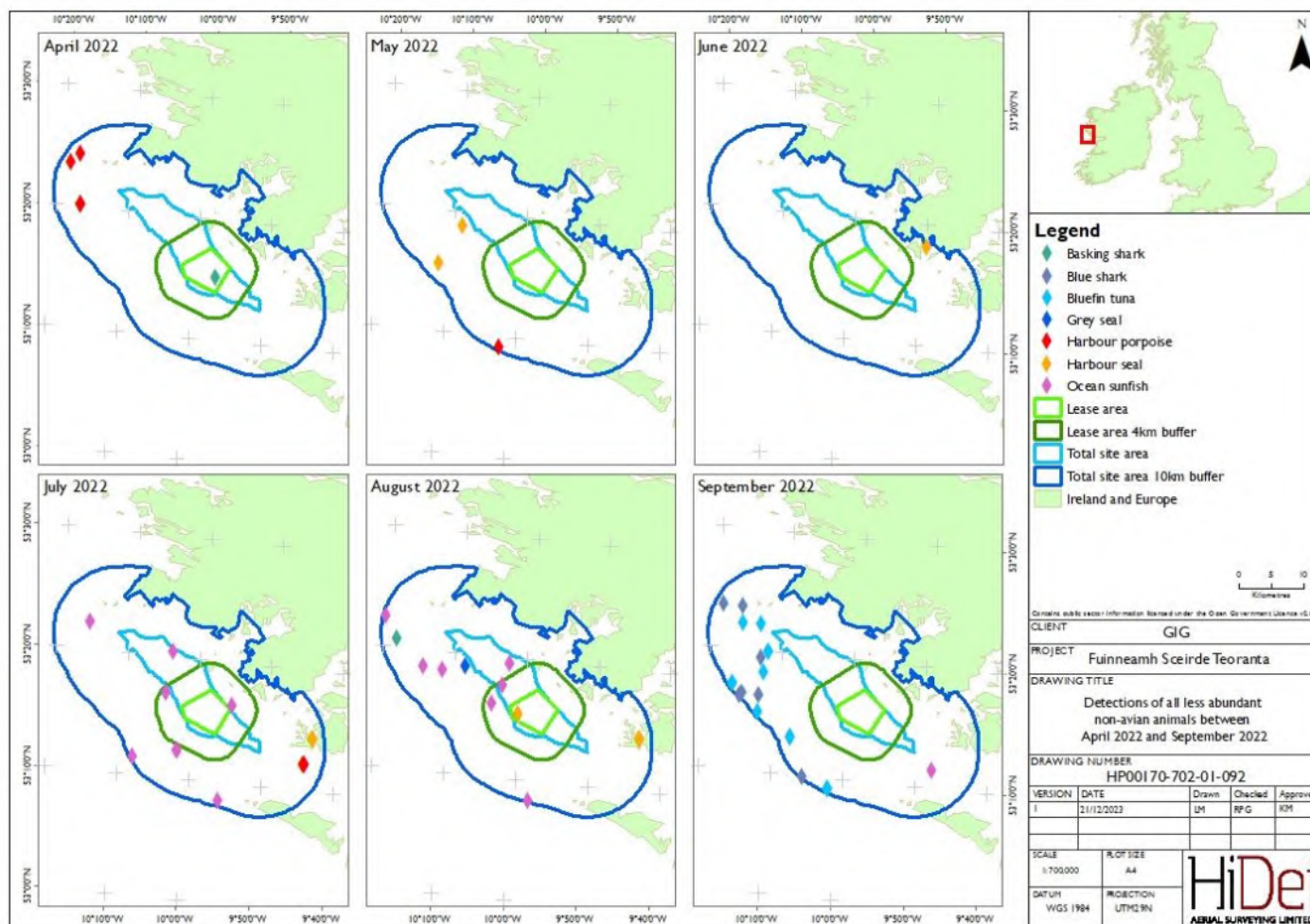


Figure 156 Detections of less abundant non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

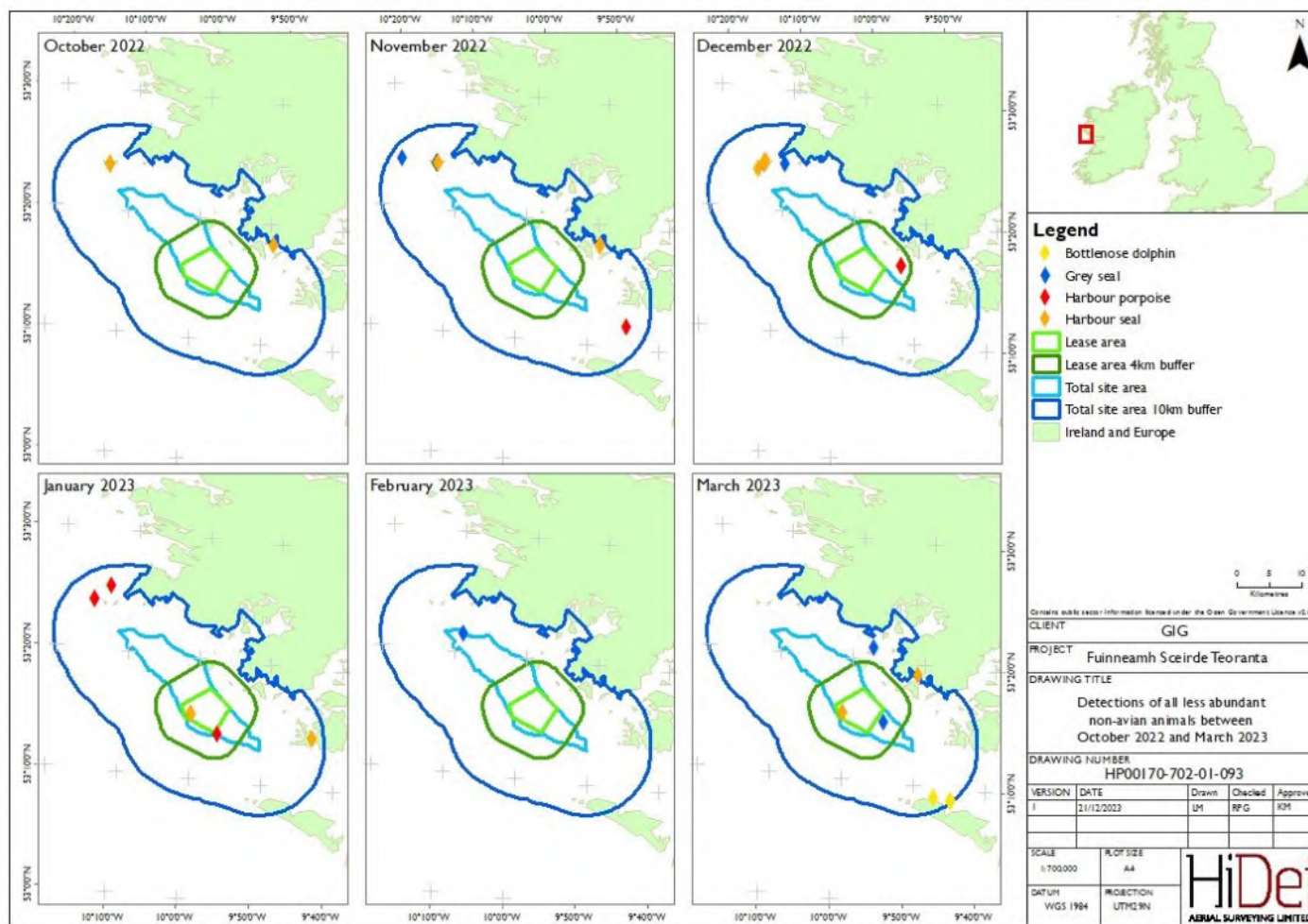
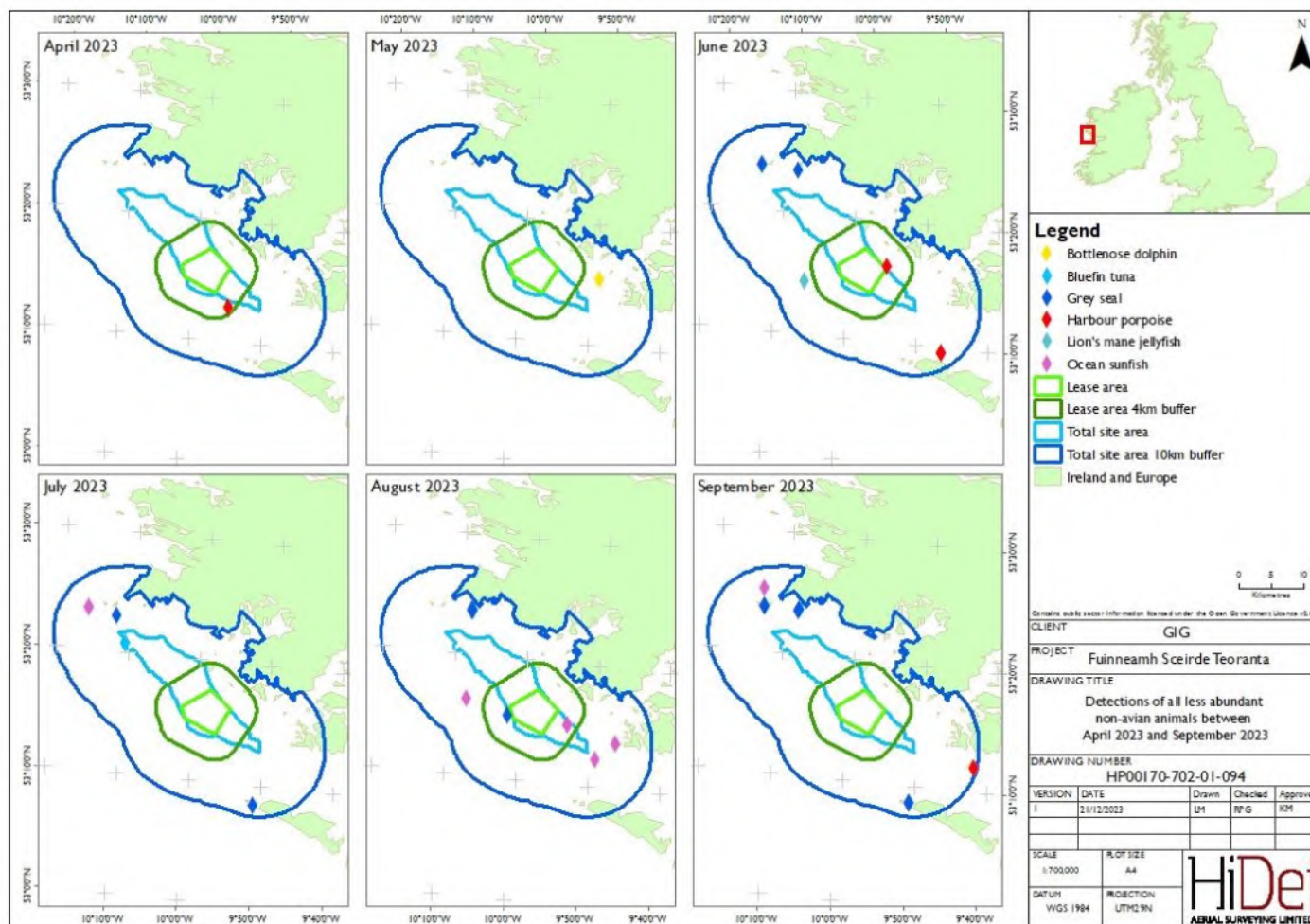


Figure 157 Detections of less abundant non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.25 Unidentified non-avian animals

- 193 Several unidentified non-avian animals were recorded through the survey period, with peaks in non-identification related to seal species (Figure 158). This is primarily related to difficulties differentiating between harbour and grey seals, which can be problematic as females and juveniles of each species overlap in size. Two unidentified cetacean species were recorded in July and October 2022 and one seal / small cetacean species in December 2022. One record of a fish and jellyfish species was recorded in February 2023 and May 2023 respectively.
- 194 Animals were dispersed throughout the survey area with no obvious distribution for the unidentified species groups (Figure 159 to Figure 162).

Figure 158 Number of unidentified non-avian animals recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

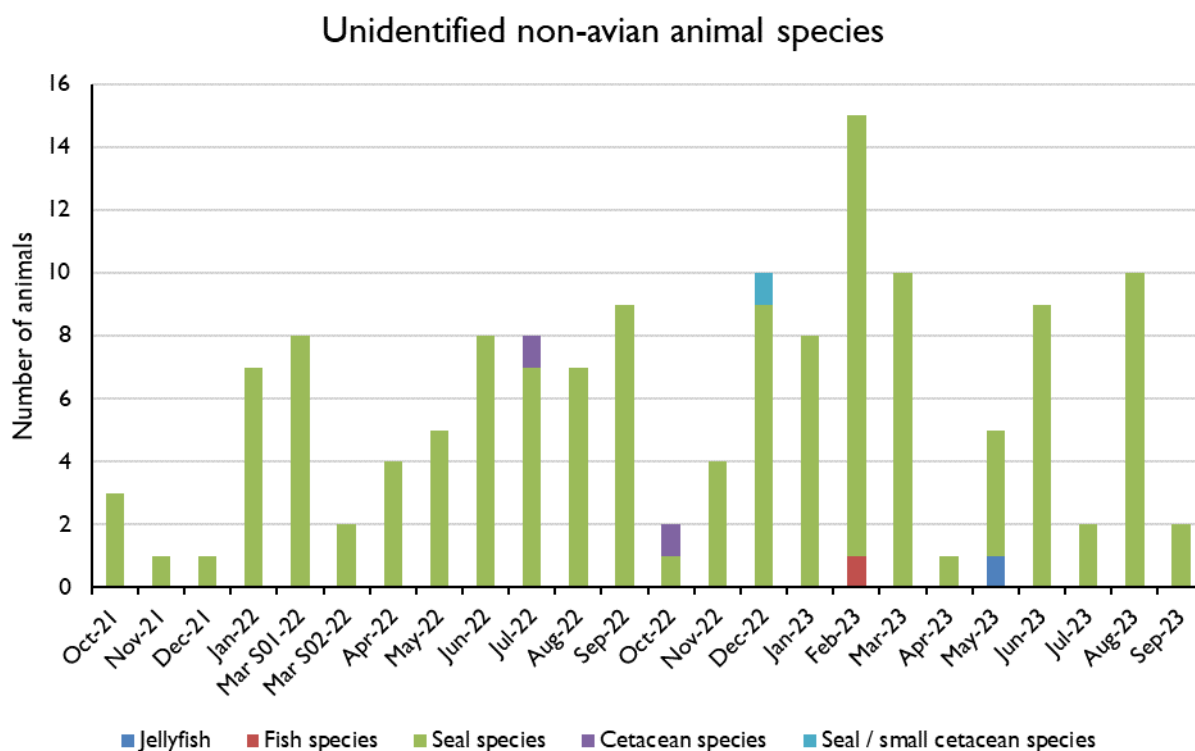


Figure 159 Detections of unidentified non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

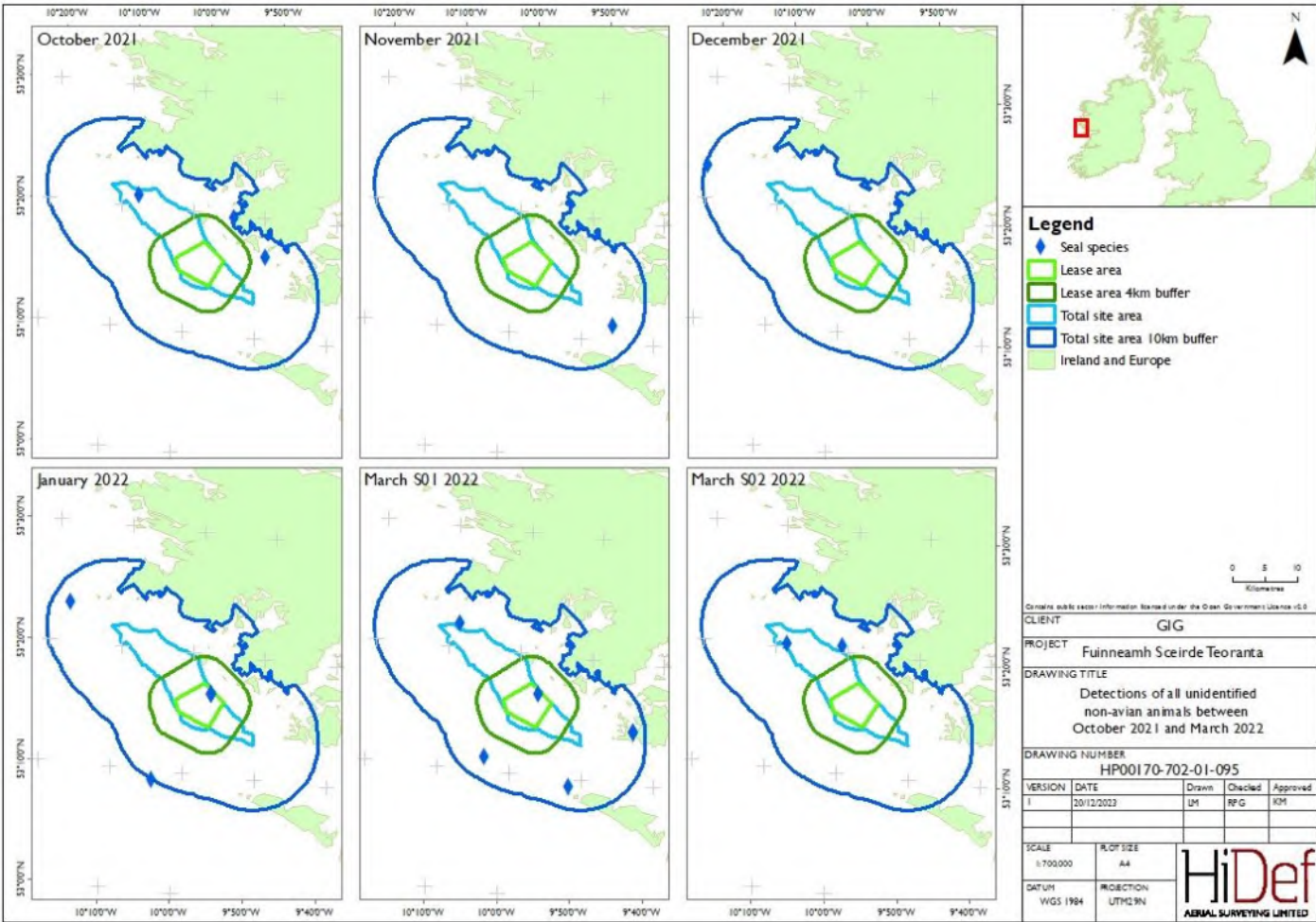


Figure 160 Detections of unidentified non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

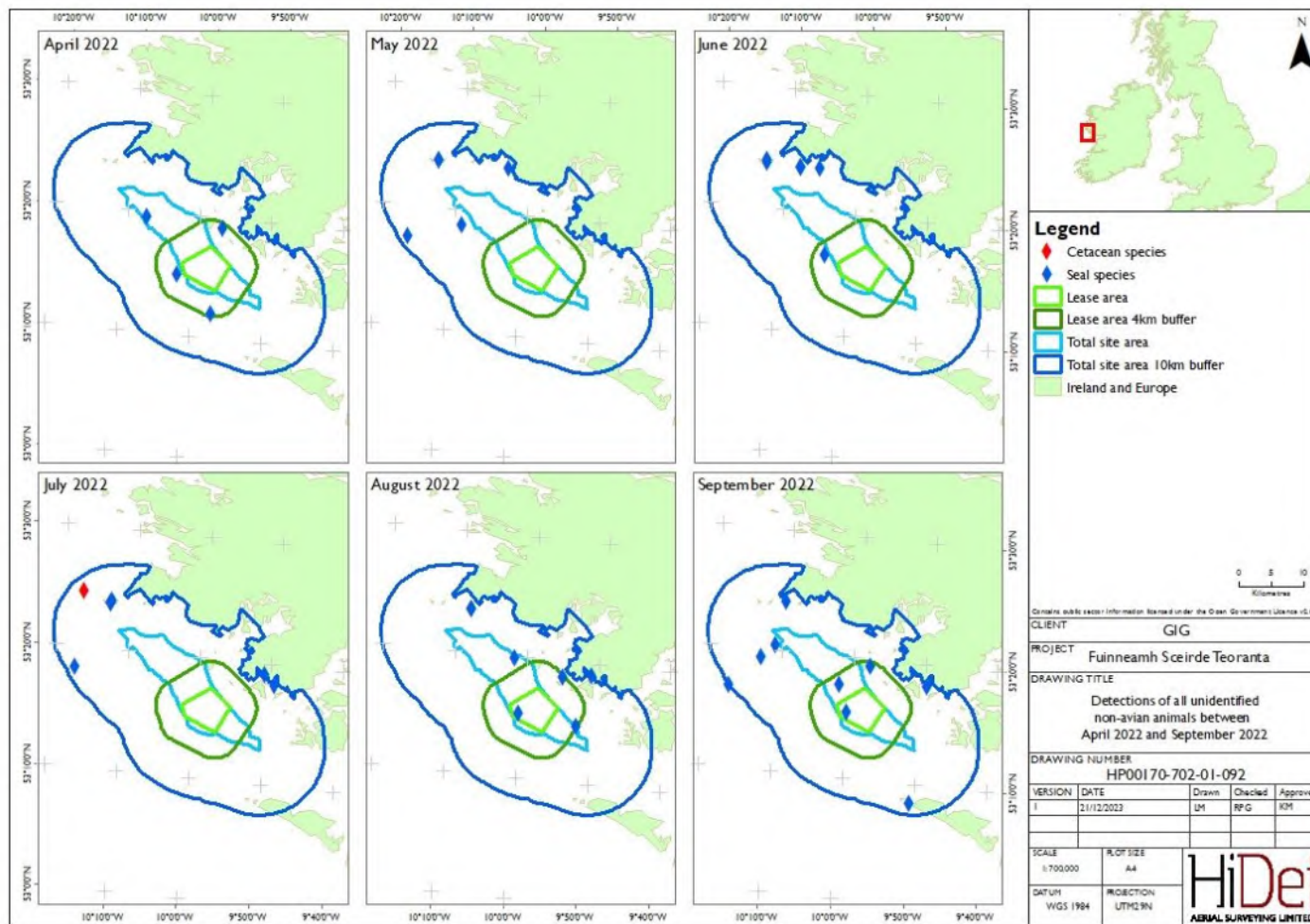


Figure 161 Detections of unidentified non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

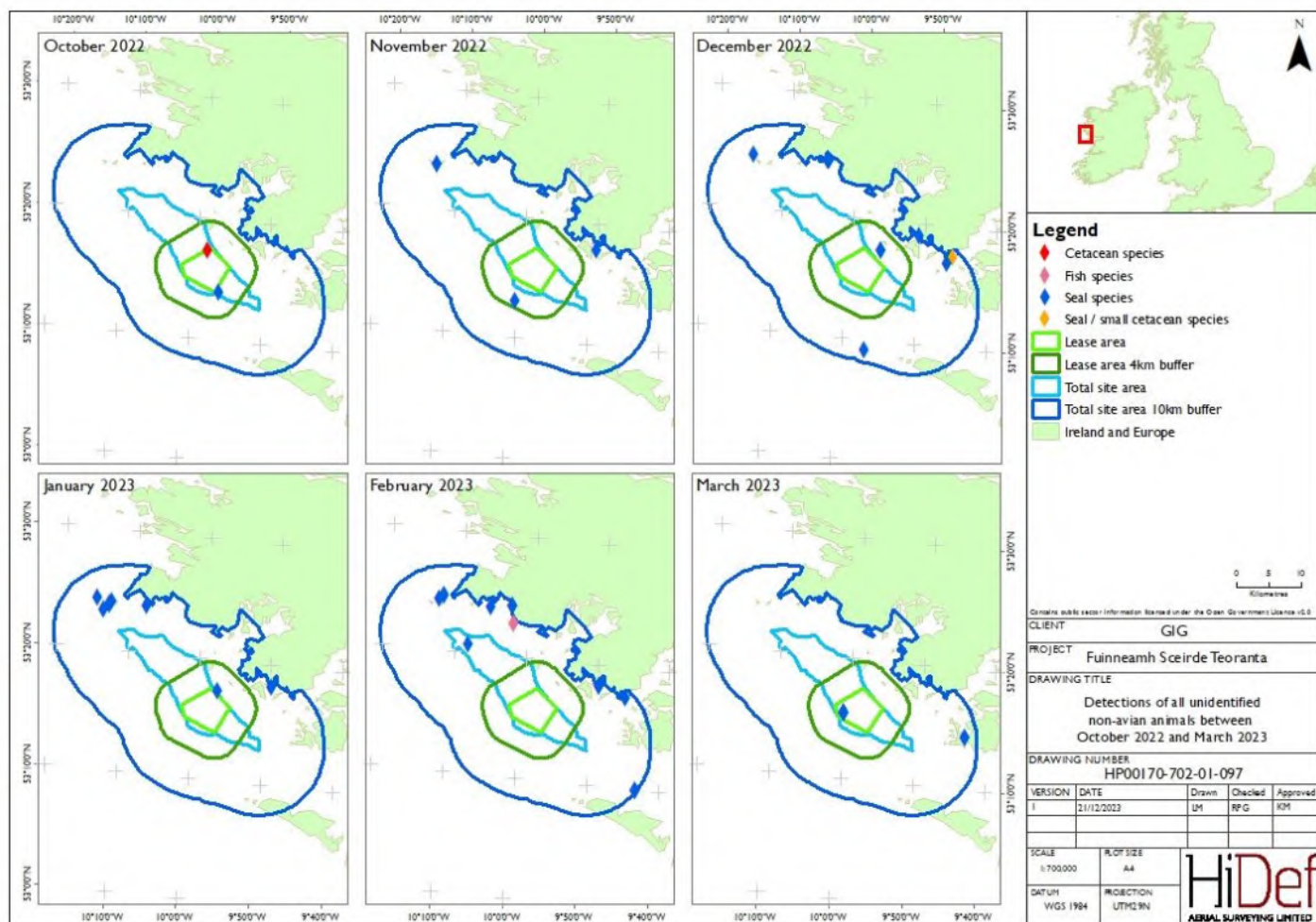
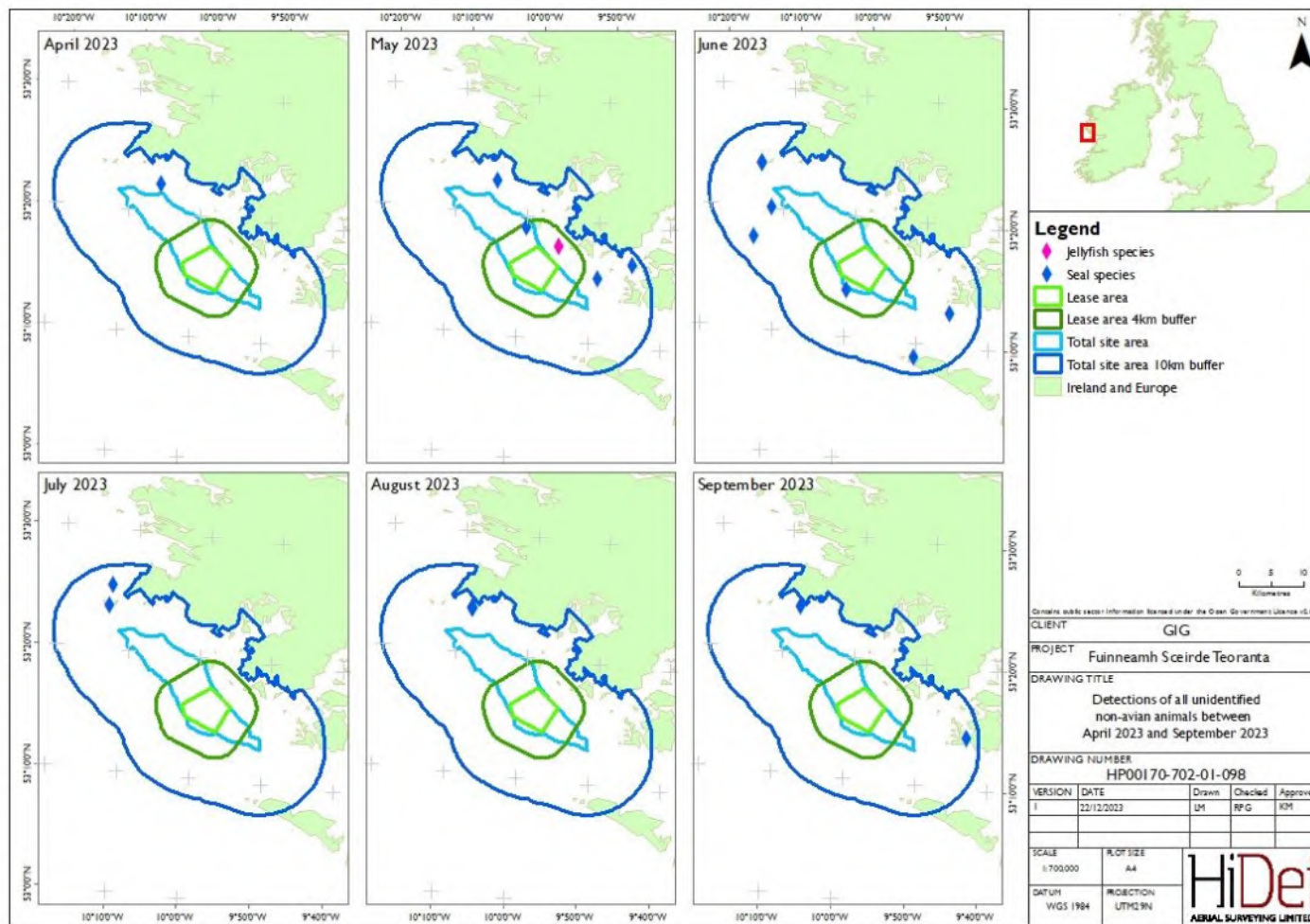


Figure 162 Detections of unidentified non-avian animal species in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



3.3.26 Anthropogenic activity

- 195 Anthropogenic activity was recorded throughout the survey period (Figure 163). Fishing boats and other boats were observed in all months apart from November 2021. 150 fishing boats were recorded across the survey period with the most observed in July 2023 with 20 records. Of the other boats recorded, this included leisure and pleasure boats, yachts and motorboats.
- 196 A total of 8,655 man-made objects were recorded throughout the survey period, with fishing buoys being the most numerous. Other objects, such as marker posts, navigation buoys, potting buoys, fishing nets or fishing gear were observed within the survey area. Most of these objects were located close to the coast (Figure 164 to Figure 167).

Figure 163 Number of vessels and anthropogenic objects recorded within the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023

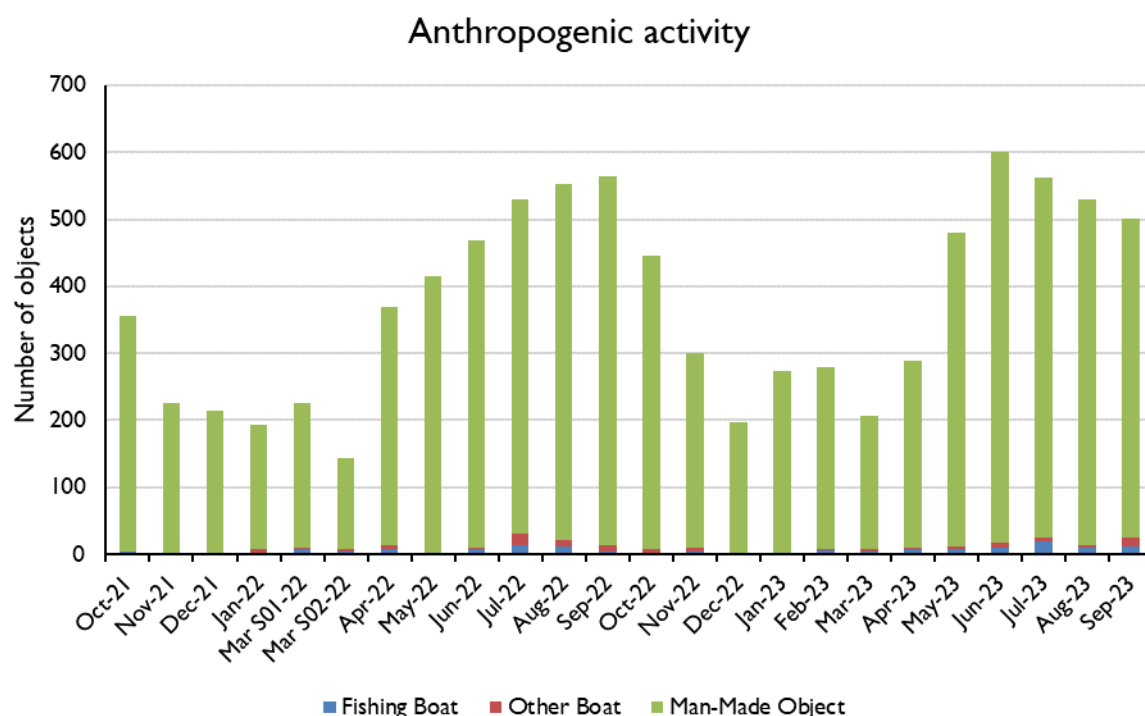


Figure 164 Detections of anthropogenic objects species in the Fuinneamh Sceirde Teoranta survey area between October 2021 and March 2022

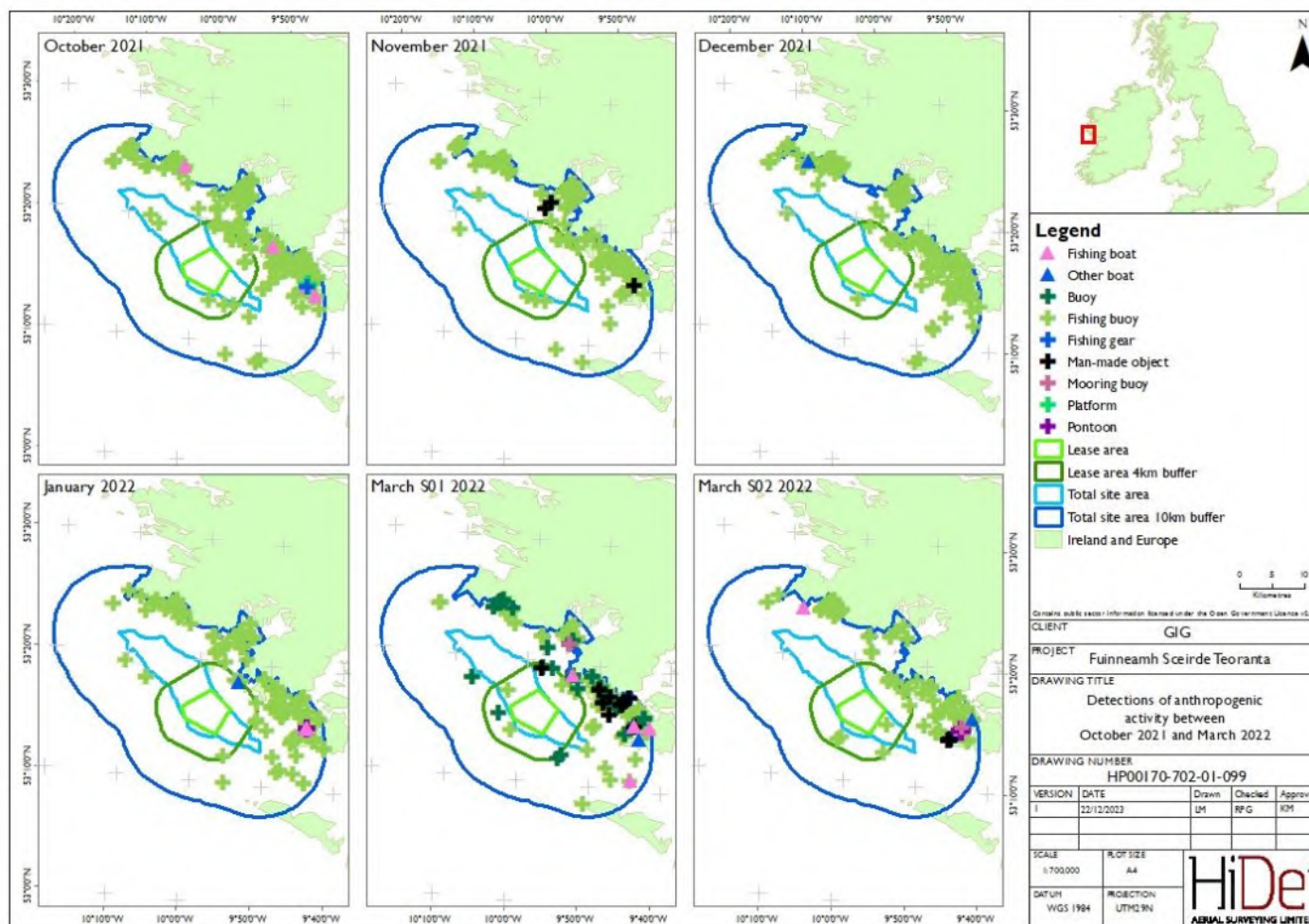


Figure 165 Detections of anthropogenic objects in the Fuinneamh Sceirde Teoranta survey area between April and September 2022

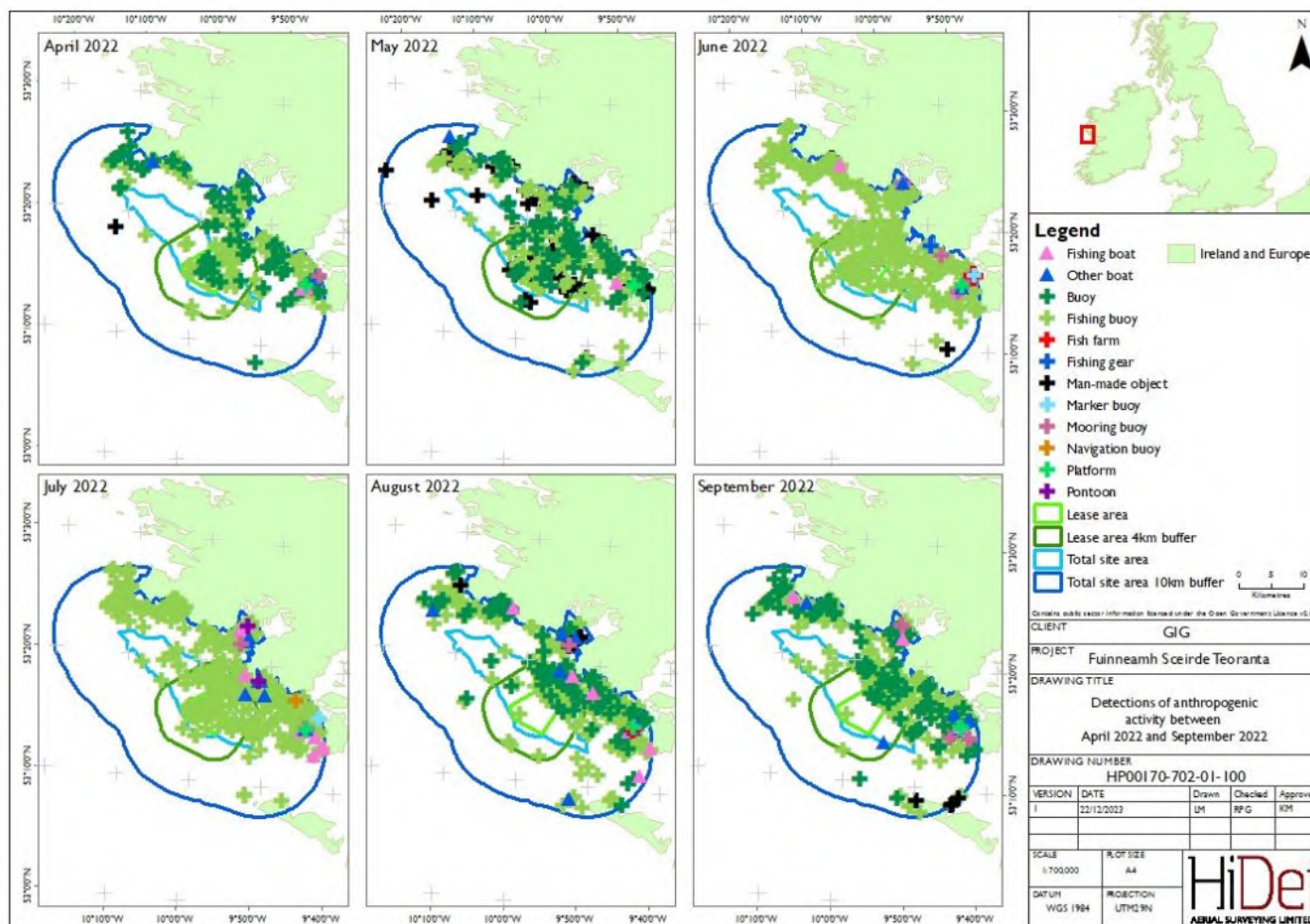


Figure 166 Detections of anthropogenic objects in the Fuinneamh Sceirde Teoranta survey area between October 2022 and March 2023

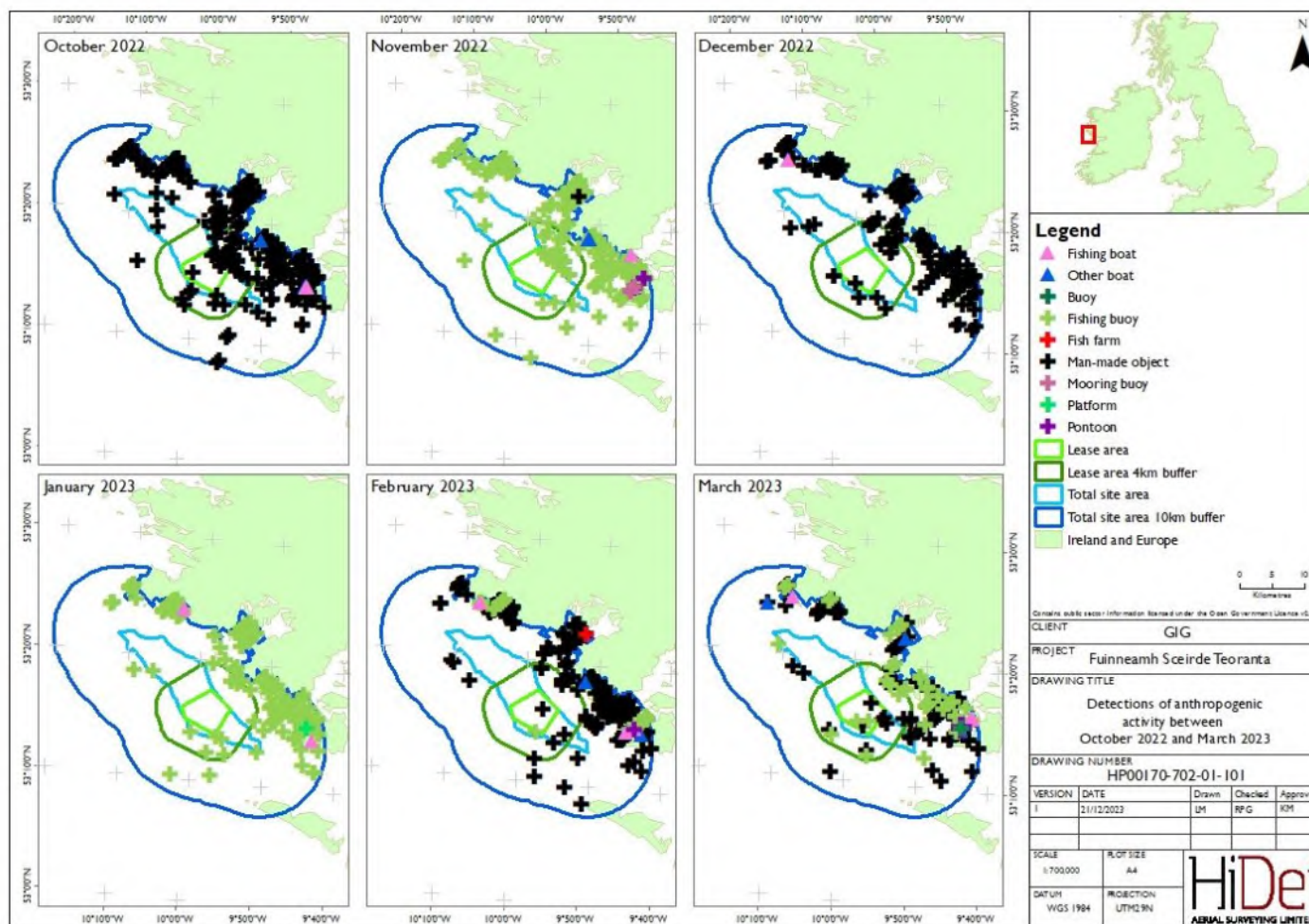
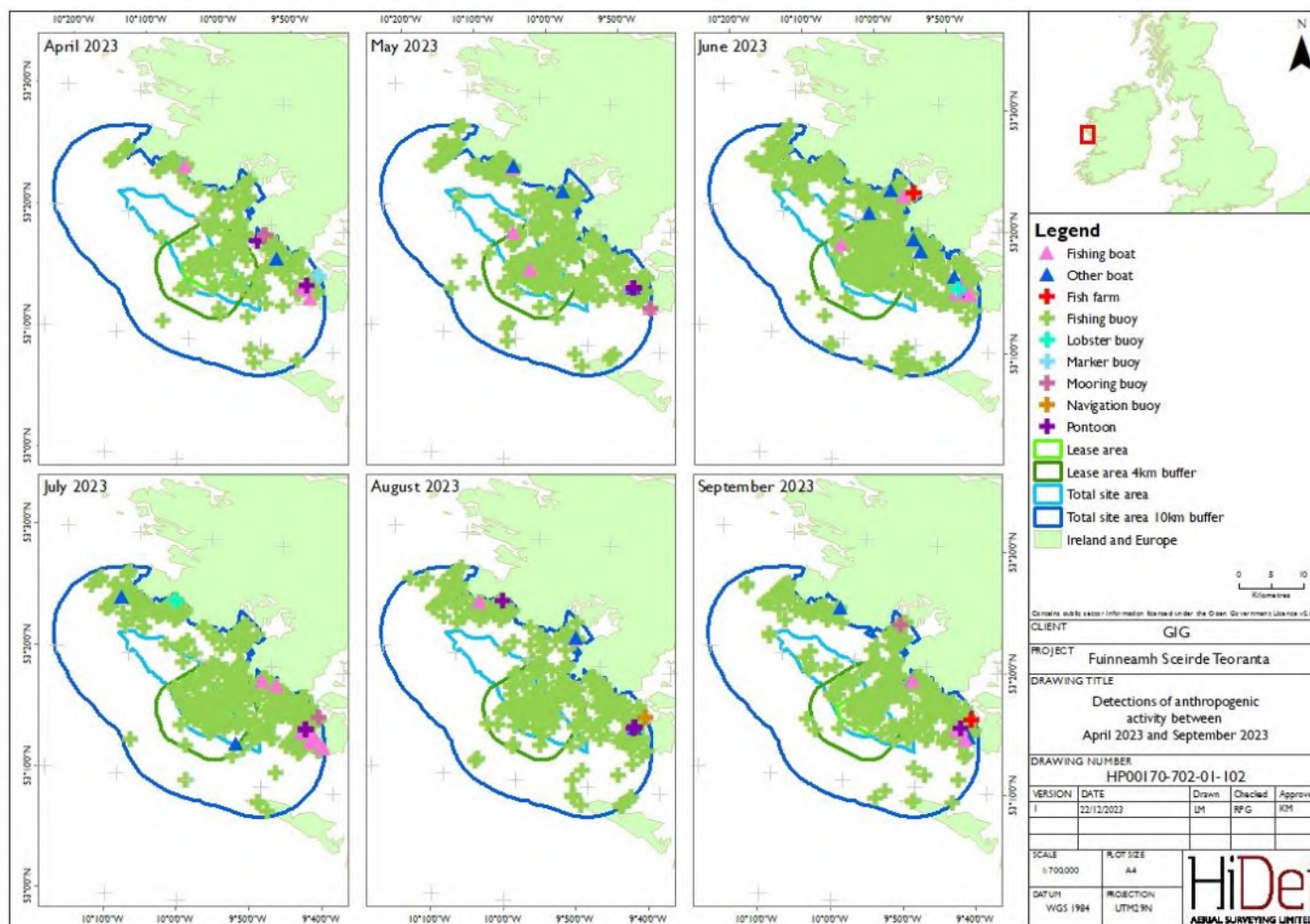


Figure 167 Detections of anthropogenic objects in the Fuinneamh Sceirde Teoranta survey area between April and September 2023



4 Discussion

- 197 The surveys recorded a total of 46,973 birds of 48 species and 614 non-avian animals of 10 species. A further 1,621 birds and 140 marine mammals were recorded which were not assigned to a species. An identification rate to species level of 96.43% was achieved throughout the 24-month period.
- 198 Barnacle goose were recorded in six surveys across the 24-month survey period. All observations were recorded during the winter months when barnacle goose migrate south from Greenland and Svalbard. There was a marked peak in November 2022 when 624 birds were recorded. The barnacle geese could have come from a range of SPAs nearby such as the Slyne Head to Ardmore Point SPA, which the site partly overlaps with, and the Cruagh Island SPA. Both sites are noted as internationally important wintering grounds for barnacle goose. Although it is noted that the survey area did not cover most of the main winter habitat for barnacle goose.
- 199 Kittiwake were the third most abundant species recorded over the survey period, with lower numbers observed in August and September in both years. Records peaked in April 2023. A similar number of birds were recorded as either flying or sitting on the water, indicating the importance of the area for both foraging and passage. Kittiwake have a foraging range of 156.1km \pm 144.5 SD (Woodward *et al.*, 2019), therefore the birds observed on site could have come from a number of nearby SPAs, such as Inishmore, and Cliffs of Moher. According to the Seabirds Count 2015-21, the Cliffs of Moher host the largest breeding numbers of kittiwake in the country (Burnell *et al.*, 2023).
- 200 Common gull were observed in all surveys undertaken during the 24-month survey period, with a marked peak in November 2021. During the second year of surveys numbers peaked in January 2023. A similar number of birds recorded as sitting on the water and flying suggests the area may be used for both foraging and passage. Common gull have a smaller foraging range when compared to other species (mean max 50km; Woodward *et al.*, 2019) with some birds in the survey area likely to be associated with the nearby Tralee Bay Complex SPA.
- 201 Great black-backed gull were recorded in varying numbers across the survey period but in all months, peaking in July 2022. Higher numbers were also observed in March S01 2022, May 2023 and June 2023. Great black-backed gull have a foraging range of 73km (Woodward *et al.*, 2019) therefore the birds observed on site could have come from a range of areas nearby.
- 202 Herring gull were observed in all surveys across the 24-month period, with a marked peak in November 2021. Lower numbers were observed in March S02 2022 to April 2022 and January 2023 to March 2023. The majority of birds were observed sitting on the water suggesting the area may be used for foraging. Herring gull have a mean maximum foraging range of 58.8km \pm 26.8 SD (Woodward *et al.*, 2019).
- 203 Lesser black-backed gull records peaked in June 2023, with a secondary peak in July 2022 during the first year of surveys. No birds recorded between December 2021 to March S01 2022 and October 2022 to March 2023. High numbers of birds were recorded as flying in both August 2022 and 2023. Lesser black-backed gull have a larger foraging range when compared to other species with a mean max of 127km \pm 109 SD (Woodward *et al.*, 2019).
- 204 Common tern were only recorded over the spring and summer months, with no observations from October 2021 to April 2022, October 2022 to March 2023 and September 2023. Records peaked in July 2023. The majority of common tern were recorded as flying suggesting the area may be used as passage. Common tern have a smaller foraging range compared to other species (mean max 18.0km \pm 8.9 SD (Woodward *et al.*, 2019)).

- 205 Arctic tern were only recorded across eight of the 24 surveys, between May 2022 to August 2022, October 2022 and May 2023 to July 2023, in accordance with the migration pattern of this species. Records peaked in July 2023, with high numbers also observed in May 2023. In the first year of surveys, records peaked in July 2022 Arctic tern have a mean max foraging range of 25.7km \pm 14.8 SD (Woodward *et al.*, 2019) therefore the birds observed on site could have come from the Slyne Head to Ardmore Point SPA, Inishmore SPA and the High Island, Inishark and Davillaun SPA.
- 206 Guillemot were the second most abundant species recorded during the 24-month survey period, and were observed in all surveys, with higher numbers between July 2022 and September 2022 as well as May 2023 and June 2023. Guillemot have a mean max foraging range of 73.2km \pm 80.5 SD (Woodward *et al.*, 2019), indicating birds observed within the survey area may originate from a range of SPAs such as Inishmore SPA, Cliffs of Moher SPA and the Claire Island SPA. According to the Seabirds Count 2015-21, the Cliffs of Moher SPA host the second largest breeding numbers of guillemot in the country (Burnell *et al.*, 2023).
- 207 Razorbill were the fourth most abundant species recorded over the survey period. Numbers varied but were recorded in every month with a marked peak in July 2022. During the second year of surveys numbers peaked in December 2022. Low numbers were observed from April 2022 to June 2022, October 2022 and July 2023. Razorbill recorded on the site could have come from a variety of SPAs located within the razorbill' foraging range (mean max 88.7km \pm 75.9 SD; Woodward *et al.*, 2019) such as the Cliffs of Moher SPA and the Claire Island SPA. According to the Seabirds Count 2015-21, the Cliffs of Moher SPA host the fourth largest breeding numbers for razorbill in the country (Burnell *et al.*, 2023).
- 208 Black guillemot were recorded in 21 of the 24 surveys, peaking in February 2023. During the first year of surveys, numbers peaked in January 2022. No birds were recorded in May 2022, July 2023 and August 2023. The majority of birds were recorded as sitting on the water and birds were typically recorded closer to the coastline. It is likely that some of the birds recorded during surveys originate from the nearby Inishmore SPA.
- 209 Puffin was recorded in higher numbers during the summer months between May and August. There was a marked peak in May 2022 and July 2023. There were no observations between December 2021 to March 2022 and October 2022 to March 2023. Over the survey period the majority of birds were recorded as sitting suggesting the area may be used as foraging grounds for puffin. It is likely that some of the birds recorded on site are part of the nearby Cliffs of Moher SPA which is within puffin' foraging range (mean max 137.1km \pm 128.3 SD; Woodward *et al.*, 2019).
- 210 Red-throated diver were recorded in lower numbers compared to other species, with higher numbers observed between October 2021 and April 2022. There were only four observations in the second year of surveys compared to 91 observations in the previous 12 months. All the birds were recorded as sitting on the water except one diving bird in November 2021. Red-throated diver' have a relatively small foraging range compared to other species with a mean max of 9km.
- 211 Great northern diver were observed in larger numbers in the winter and spring months, with records peaking between January 2022 to April 2022 and December 2022 to May 2023. This indicates that the survey area is a relatively important wintering area with increased numbers in the spring likely relating to birds on passage to breeding ground elsewhere. There were no observations between June 2022 to September 2022 and July 2023 to September 2023. With the exception of one flying bird, all birds were recorded as sitting on the water.

- 212 Fulmar were recorded in 21 out of the 24 surveys across the period, with a marked peak in December 2021. Observations varied across the survey period with no birds recorded in March 2022, November 2022 and January 2023. Most of the birds were recorded flying over the survey area suggesting the site may be used for passage or may be making foraging trips, especially in the summer months. Fulmar have a relatively large foraging range compared to the other species ($542.3\text{km} \pm 657.9\text{SD}$, Woodward *et al.*, 2019), therefore the birds recorded could have come from a range of areas such as the Inishark and Davillaun SPA, Cliffs of Moher SPA or the Claire Island SPA.
- 213 Manx shearwater was the most abundant species recorded over the 24-month survey period, with greater numbers observed over the summer periods from May to August in both years. There were no birds recorded between November 2021 to January 2022, November 2022 to December 2022 and February 2023. A similar number of Manx shearwater were recorded as flying and sitting on the water suggesting the area may be used for both foraging and passage. Manx shearwater have a large foraging range when compared to other species with a mean max foraging range of $1346.8\text{km} \pm 1018.7\text{SD}$ (Woodward *et al.*, 2019). The Cruagh Island SPA is one of the sites located within the birds foraging range which supports breeding Manx shearwater and is an important national and international colony.
- 214 Gannet were recorded in varying numbers across the survey period with higher numbers in October 2021 and August 2023, peaking in November 2021. Birds were recorded as both flying and sitting on the water suggesting the area may be used for both passage and foraging. Gannet have a foraging range mean max of $315.2\text{km} \pm 194.2\text{SD}$ (Woodward *et al.*, 2019), therefore the birds on site could have come from a wide range of areas. One dead gannet was recorded in September 2022.
- 215 Shag were present in all the surveys across the 24-month period, with higher numbers observed in March 2022, January 2023 and February 2023. The majority of birds were recorded as sitting on the water, suggesting the area may be used for foraging. Shag have a relatively small foraging range when compared to other species with a mean max of $13.2\text{km} \pm 10.5\text{SD}$ (Woodward *et al.*, 2019).
- 216 Common dolphin were the most abundant non-avian animal recorded over the survey period, peaking in May 2023 with a density of 0.41 animals/km^2 (95% CI 0.00 – 1.07). Higher numbers were also recorded between May 2022 to September 2022, November and December 2022 and May 2023 to August 2023. The survey area overlaps with Stratum 7 of the ObSERVE survey (Rogan *et al.*, 2018) and was surveyed with visual aerial surveys; common dolphin was only recorded in this stratum during winter 2016/2017 and density, corrected for visibility bias, was estimated to be 0.576 (%CV 99.5).

5 Conclusions

- 217 The provision of high-resolution digital aerial video surveys provided spatial distributions of birds, mammals and other megafauna in the Fuinneamh Sceirde Teoranta project area, located off the coast of County Galway, Ireland. The survey design allowed repeatable estimates of species abundance, and the digital aerial platform provides a unique, auditable record of species identification.
- 218 The surveys recorded a total of 46,973 birds of 48 species and 614 non-avian animals of 10 species. A further 1,621 birds and 140 marine mammals were recorded which were not assigned to a species. An identification rate to species level of 96.43% was achieved throughout the 24-month period.
- 219 The seasonal changes in the numbers of seabirds recorded is consistent with the survey area's proximity to seabird colonies along the west coast of Ireland. Several seabird species appear to use the area during the summer months (e.g., Arctic tern and common tern), others use it for wintering (e.g., barnacle goose) and other species are recorded all year round (e.g., kittiwake).
- 220 The abundance of cetaceans was variable from month to month with no strong seasonal pattern. Common dolphin was more abundant than harbour porpoise.
- 221 The study provided robust distribution and density data for multiple seabird and marine mammal species off the County Galway, Ireland. Regular data collection is essential to begin to determine trends in distributions and abundance of marine species and will be important in informing further assessments and decisions on the development of the area.

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Appendix I: Density and population estimates

- 222 The density, total estimated population, upper and lower 95% CLs, standard deviation and CV for each species and species group have been calculated using strip transect analysis and are presented here for each of the surveys undertaken.

Table 54 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey I on 28 October 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	9.12	8606	5375	12993	1894	22.00
All non-avian animals	0.08	74	16	163	42	56.76
Species group						
Duck species	0.04	42	0	122	40	95.24
Wader species	0.14	131	24	298	77	58.78
Small gull species	0.92	868	317	1535	273	31.41
Black-backed gull species	0.02	17	0	40	12	70.59
Large gull species	0.23	219	57	453	97	44.03
Gull species	0.01	14	0	37	9	63.89
Large auk	6.60	6230	3725	9517	1394	22.37
Auk species	0.32	302	175	445	61	20.04
Auk / small gull	0.04	38	0	85	21	53.67
Auk / shearwater species	0.02	17	0	40	11	64.71
Diver species	0.22	206	78	365	71	34.11
Fulmar / gull species	0.05	49	16	94	20	40.82
Shearwater species	0.02	17	0	41	11	64.71
Gannet species	0.47	445	103	978	250	56.18

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cormorant / shag	0.07	67	25	116	19	28.32
Heron species	0.01	9	0	25	8	88.89
Seal species	0.08	75	16	163	41	54.67

Table 55 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey I on 28 October 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Red-breasted merganser	0.04	41	0	122	39	95.12
Oystercatcher	0.10	91	0	252	80	87.91
Curlew	0.04	41	8	86	21	51.22
Kittiwake	0.57	538	174	991	167	30.87
Black-headed gull	0.21	201	0	628	194	96.52
Common gull	0.08	79	25	142	28	34.55
Great black-backed gull	0.09	88	9	193	41	46.59
Herring gull	0.16	153	49	298	64	41.26
Lesser black-backed gull	0.01	9	0	25	8	88.89
Guillemot	6.26	5905	3536	8960	1324	22.41
Razorbill	0.24	226	17	536	130	57.33
Black guillemot	0.07	66	17	118	26	39.39
Puffin	0.16	147	57	248	46	30.88
Red-throated diver	0.09	85	17	166	37	42.61
Great northern diver	0.12	111	33	219	46	40.70

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.04	41	8	86	20	48.78
Manx shearwater	0.02	17	0	40	11	64.71
Gannet	0.48	451	108	1027	246	54.55
Shag	0.07	65	24	116	20	30.65
Grey heron	0.01	8	0	25	8	100.00
Grey seal	0.01	9	0	25	9	100.00
Harbour seal	0.04	42	0	122	40	95.24

Table 56 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey I on 28 October 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Red-breasted merganser	0.04	42	0	122	39	92.86
Oystercatcher	0.10	92	0	255	77	83.70
Curlew	0.04	41	8	86	21	51.22
Kittiwake	0.63	592	214	1045	170	28.58
Black-headed gull	0.23	214	0	632	213	99.53
Common gull	0.09	83	29	145	29	34.08
Great black-backed gull	0.09	88	8	188	41	45.48
Herring gull	0.16	151	48	295	64	41.81
Lesser black-backed gull	0.01	9	0	25	8	88.89
Guillemot	6.47	6111	3716	9413	1413	23.12
Razorbill	0.25	234	26	548	131	55.79
Black guillemot	0.09	83	36	143	28	33.73
Puffin	0.21	194	89	309	52	26.54
Red-throated diver	0.09	88	24	172	36	40.03
Great northern diver	0.12	115	37	220	47	40.15

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.04	41	8	82	20	48.78
Manx shearwater	0.02	16	0	41	11	68.75
Gannet	0.50	468	111	1028	257	54.91
Shag	0.07	67	25	115	19	28.32
Grey heron	0.01	9	0	25	9	100.00
Grey seal	0.01	13	2	30	8	61.54
Harbour seal	0.07	62	7	149	40	64.52

Table 57 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 2 on 27 November 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	13.84	13067	3726	25722	5522	42.25
All non-avian animals	0.05	50	9	95	23	46.00
Species group						
Goose species	5.42	5114	0	14932	4845	94.74
Duck species	0.08	73	0	192	43	57.62
Wader species	0.27	251	9	701	210	83.3
Small gull species	1.20	1132	328	2475	599	52.86
Black-backed gull species	0.10	90	0	222	56	61.47
Large gull species	1.08	1024	82	2641	687	66.99
Gull species	0.46	434	0	1267	385	88.48
Large auk	4.07	3843	1208	7094	1366	35.54
Auk species	0.22	210	80	382	71	33.61
Auk / small gull	0.10	94	0	253	71	74.59
Large auk / diver species	0.03	25	0	63	18	72.00
Diver species	0.21	198	94	329	59	29.36
Fulmar / gull species	0.15	142	25	311	73	50.78
Gannet species	0.48	450	47	943	179	39.76

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cormorant / shag	0.20	186	25	462	123	66.13
Heron species	0.01	8	0	25	9	112.50
Seal species	0.01	9	0	25	8	88.89
Dolphin species	0.04	35	0	81	22	62.86
Cetacean species	0.01	8	0	25	9	112.50

Table 58 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 2 on 27 November 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	5.35	5050	0	14871	4562	90.34
Eider	0.04	42	0	119	39	92.86
Red-breasted merganser	0.04	34	0	73	20	58.82
Oystercatcher	0.01	8	0	20	6	75.00
Curlew	0.02	17	0	41	12	70.59
Bar-tailed godwit	0.02	16	0	49	15	93.75
Kittiwake	0.53	498	227	805	119	23.81
Black-headed gull	0.11	103	0	281	87	84.47
Common gull	0.57	536	41	1427	413	76.90
Great black-backed gull	0.06	58	0	162	42	71.44
Herring gull	1.25	1180	73	3508	871	73.73
Lesser black-backed gull	0.04	41	8	95	24	58.54
Guillemot	2.69	2537	611	4839	978	38.55
Razorbill	1.14	1078	199	2119	387	35.83
Black guillemot	0.07	63	17	117	23	35.49

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Puffin	0.01	8	0	25	8	100.00
Red-throated diver	0.17	162	64	299	61	37.65
Great northern diver	0.03	30	0	61	14	45.34
Fulmar	0.07	70	17	135	29	40.41
Gannet	0.47	445	62	963	178	39.80
Shag	0.20	185	24	458	124	67.03
Grey heron	0.01	9	0	31	9	100.00
Common dolphin	0.04	34	0	81	22	64.71
Harbour porpoise	0.01	9	0	32	9	100.00

Table 59 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 2 on 27 November 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	5.47	5161	0	14950	4704	91.15
Red-breasted merganser	0.03	33	0	78	20	60.61
Eider	0.04	38	0	119	39	102.63
Curlew	0.02	17	0	41	12	70.59
Oystercatcher	0.01	8	0	20	6	75.00
Bar-tailed godwit	0.02	17	0	49	16	94.12
Kittiwake	0.56	526	244	892	136	25.75
Black-headed gull	0.14	130	2	358	110	84.62
Common gull	0.73	686	41	1895	546	79.47
Great black-backed gull	0.06	60	0	158	41	67.41
Herring gull	1.34	1269	74	3373	971	76.44
Lesser black-backed gull	0.05	44	0	105	28	63.64
Guillemot	2.85	2688	641	5211	1029	38.25
Razorbill	1.19	1126	320	2170	396	35.15
Black guillemot	0.17	162	69	280	53	32.25

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Puffin	0.02	22	6	43	10	45.45
Red-throated diver	0.21	194	80	352	70	36.08
Great northern diver	0.03	31	3	68	15	46.97
Fulmar	0.07	69	16	134	29	40.99
Gannet	0.50	473	64	1034	189	39.91
Shag	0.20	192	24	488	129	67.19
Grey heron	0.01	9	0	25	9	100.00
Common dolphin	0.04	34	0	81	21	61.76
Harbour porpoise	0.01	8	0	25	8	100.00

Table 60 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 3 on 10 December 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.03	2857	2088	3806	384	13.43
All non-avian animals	0.08	71	8	171	41	56.62
Species group						
Goose species	0.12	114	0	329	102	89.47
Duck species	0.42	392	0	1053	303	77.30
Wader species	0.06	61	8	141	28	45.22
Small gull species	0.88	834	558	1146	123	14.63
Black-backed gull species	0.02	17	0	41	12	70.59
Large gull species	0.35	334	183	533	84	25.00
Large auk	0.33	314	175	469	60	18.82
Auk species	0.04	41	0	93	25	60.98
Auk / small gull	0.01	9	0	31	9	100.00
Large auk / diver species	0.01	9	0	25	8	88.89
Diver species	0.14	131	39	242	46	35.03
Fulmar / gull species	0.58	549	314	802	112	20.22
Gannet species	0.00	4	0	12	4	100.00
Cormorant / shag	0.06	53	16	110	20	37.74

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Crow species	0.02	17	0	49	17	100.00
Seal species	0.03	29	0	61	14	46.90
Dolphin species	0.04	39	0	121	37	94.87

Table 61 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 3 on 10 December 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.01	9	0	25	9	100.00
Barnacle goose	0.11	106	0	317	102	96.23
Mallard	0.24	223	0	650	174	78.03
Teal	0.15	138	0	418	137	99.28
Red-breasted merganser	0.03	32	0	98	32	100.00
Oystercatcher	0.03	29	0	85	22	74.28
Curlew	0.04	34	8	65	15	44.12
Kittiwake	0.56	532	358	730	73	13.54
Black-headed gull	0.04	42	0	89	23	54.76
Common gull	0.25	236	86	448	94	39.83
Great black-backed gull	0.11	104	49	164	26	24.34
Herring gull	0.26	250	113	446	80	31.80
Guillemot	0.24	231	121	353	48	20.58
Razorbill	0.06	60	0	173	38	62.03
Black guillemot	0.03	24	0	65	19	79.17

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Red-throated diver	0.10	99	32	195	39	39.23
Great northern diver	0.02	16	0	41	11	68.75
Fulmar	0.57	540	308	781	110	20.19
Gannet	0.01	5	0	12	5	100.00
Shag	0.06	53	9	109	20	36.63
Hooded crow	0.02	17	0	49	17	100.00
Harbour seal	0.02	22	0	53	13	57.50
Common dolphin	0.04	42	0	122	39	92.86

Table 62 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 3 on 10 December 2021

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.01	9	0	25	8	88.89
Barnacle goose	0.11	105	0	317	100	95.24
Mallard	0.24	228	0	648	178	78.07
Teal	0.16	147	0	414	138	93.88
Red-breasted merganser	0.03	33	0	98	32	96.97
Oystercatcher	0.03	30	0	85	21	68.72
Curlew	0.03	33	8	64	16	48.48
Kittiwake	0.58	552	388	738	70	12.56
Black-headed gull	0.04	41	0	88	22	53.66
Common gull	0.26	245	75	452	95	38.78
Great black-backed gull	0.11	102	49	161	27	25.79
Herring gull	0.27	251	106	441	78	30.89
Guillemot	0.26	245	129	366	48	19.40
Razorbill	0.07	69	0	180	39	55.92
Black guillemot	0.04	42	0	97	25	59.52

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Red-throated diver	0.13	118	32	233	44	37.23
Great northern diver	0.02	19	0	45	12	63.16
Fulmar	0.57	541	312	787	114	20.91
Gannet	0.01	5	0	12	4	80.00
Shag	0.06	53	9	108	20	36.63
Hooded crow	0.02	17	0	49	17	100.00
Harbour seal	0.03	31	0	68	15	46.97
Common dolphin	0.04	38	0	122	38	100.00
Brent goose	0.01	9	0	25	8	88.89

Table 63 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 4 on 21 January 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.46	3270	2375	4238	450	13.75
All non-avian animals	0.14	128	8	306	67	52.16
Species group						
Goose species	0.20	190	0	523	163	85.79
Duck species	0.05	46	0	137	41	89.13
Wader species	0.06	55	8	122	32	58.18
Small gull species	0.68	643	347	978	157	24.29
Black-backed gull species	0.02	16	0	39	11	68.75
Large gull species	0.60	566	285	892	149	26.21
Gull species	0.16	147	8	337	86	57.89
Large auk	0.78	738	404	1133	166	22.40
Auk species	0.39	368	212	535	77	20.8
Diver species	0.47	448	259	675	94	20.9
Fulmar / gull species	0.02	16	0	40	11	68.75
Gannet species	0.01	8	0	24	8	100.00
Cormorant / shag	0.05	45	16	83	17	36.65
Passerine species	0.02	23	0	63	18	78.26

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Seal species	0.12	109	0	276	64	58.31
Dolphin species	0.02	16	0	47	15	93.75

Table 64 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 4 on 21 January 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.02	16	0	61	17	106.25
Barnacle goose	0.18	168	0	495	159	94.64
Shelduck	0.02	16	0	39	11	68.75
Red-breasted merganser	0.03	31	0	94	31	100.00
Oystercatcher	0.01	9	0	24	9	100.00
Curlew	0.01	9	0	31	9	100.00
Bar-tailed godwit	0.02	16	0	47	16	100.00
Kittiwake	0.43	405	243	580	83	20.32
Black-headed gull	0.04	40	8	84	20	50.00
Common gull	0.33	309	32	710	178	57.61
Great black-backed gull	0.10	93	31	186	35	37.56
Herring gull	0.54	514	226	863	153	29.62
Guillemot	0.64	607	350	901	125	20.46
Razorbill	0.16	150	46	298	61	40.45
Black guillemot	0.30	280	165	408	61	21.48

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Red-throated diver	0.05	48	16	92	22	45.83
Black-throated diver	0.01	8	0	24	8	100.00
Great northern diver	0.37	347	191	538	78	22.34
Fulmar	0.01	8	0	24	8	100.00
Gannet	0.01	9	0	24	8	88.89
Shag	0.05	44	15	87	17	37.48
Grey heron	0.03	25	0	63	18	72.00
Grey seal	0.08	77	0	226	65	83.76
Common dolphin	0.02	16	0	47	15	93.75

Table 65 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 4 on 21 January 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.02	17	0	61	17	100.00
Barnacle goose	0.18	166	0	493	158	95.18
Shelduck	0.02	16	0	39	11	68.75
Red-breasted merganser	0.03	33	0	94	32	96.97
Oystercatcher	0.01	8	0	24	8	100.00
Curlew	0.01	9	0	24	8	88.89
Bar-tailed godwit	0.02	17	0	60	16	94.12
Kittiwake	0.43	404	232	586	87	21.36
Black-headed gull	0.04	39	8	85	21	53.85
Common gull	0.33	314	39	693	177	56.37
Great black-backed gull	0.10	95	30	186	36	37.79
Herring gull	0.55	516	237	861	154	29.7
Guillemot	0.65	614	355	903	123	20.00
Razorbill	0.16	149	42	296	58	38.73
Black guillemot	0.37	350	211	505	72	20.32

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Red-throated diver	0.06	52	14	103	23	44.23
Black-throated diver	0.01	9	1	25	8	88.89
Great northern diver	0.40	382	217	570	81	21.14
Fulmar	0.01	9	0	24	8	88.89
Gannet	0.01	9	0	24	8	88.89
Shag	0.05	43	16	83	17	38.35
Grey heron	0.03	24	0	63	18	75.00
Grey seal	0.12	111	0	284	67	59.90
Common dolphin	0.02	16	0	47	15	93.75

Table 66 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 5 on 01 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	6.11	5766	4194	7622	675	11.70
All non-avian animals	0.11	104	24	211	45	42.58
Species group						
Goose species	0.28	260	0	769	249	95.77
Duck species	0.40	381	126	723	138	36.13
Wader species	0.08	76	16	157	35	45.05
Small gull species	1.21	1140	832	1467	126	11.05
Black-backed gull species	0.23	219	56	433	87	39.41
Large gull species	0.37	346	56	736	168	48.28
Gull species	0.03	33	8	63	14	42.42
Large auk	2.51	2369	1538	3282	388	16.37
Auk species	0.13	124	57	202	35	27.61
Auk / small gull	0.01	8	0	25	8	100.00
Diver species	0.44	417	204	703	116	27.75
Shearwater species	0.03	33	0	88	20	59.69
Gannet species	0.07	66	0	177	48	72.73
Cormorant / shag	0.33	308	137	510	82	26.31

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Seal species	0.08	74	8	175	43	57.16
Dolphin species	0.03	25	0	73	24	96.00
Cetacean species	0.01	8	0	25	8	100.00

Table 67 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 5 on 01 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	0.27	257	0	775	258	100.39
Shelduck	0.04	41	0	89	22	53.66
Teal	0.07	63	0	169	46	73.02
Eider	0.21	201	0	461	102	50.57
Red-breasted merganser	0.09	81	0	189	48	59.26
Oystercatcher	0.04	40	0	101	27	67.50
Curlew	0.04	38	0	84	20	51.10
Kittiwake	1.04	985	689	1289	119	11.99
Common gull	0.17	161	81	253	41	25.04
Great black-backed gull	0.24	225	63	439	87	38.44
Herring gull	0.38	359	65	756	174	48.20
Guillemot	1.73	1630	989	2299	280	17.15
Razorbill	0.71	674	388	994	136	20.10
Black guillemot	0.07	64	17	113	25	39.06
Red-throated diver	0.17	164	24	403	108	65.85

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.27	257	132	393	58	22.37
Manx shearwater	0.03	33	0	89	20	59.69
Gannet	0.07	65	0	189	49	75.38
Shag	0.32	306	130	510	82	26.71
Grey seal	0.01	12	0	36	9	74.54
Common dolphin	0.03	25	0	73	24	96.00
Harbour porpoise	0.01	8	0	25	8	100.00

Table 68 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 5 on 01 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	0.27	258	0	762	243	94.19
Shelduck	0.04	40	0	88	23	57.50
Teal	0.07	65	0	176	47	72.31
Eider	0.22	204	0	476	104	50.77
Red-breasted merganser	0.09	82	0	192	52	63.41
Oystercatcher	0.04	40	0	96	27	67.50
Curlew	0.04	36	0	85	20	53.93
Kittiwake	1.05	987	685	1314	121	12.23
Common gull	0.17	164	80	254	41	24.66
Great black-backed gull	0.24	228	63	454	90	39.23
Herring gull	0.39	366	80	767	175	47.55
Guillemot	1.75	1656	1020	2349	282	17.02
Razorbill	0.72	681	388	994	139	20.35
Black guillemot	0.13	121	61	195	36	29.75
Red-throated diver	0.17	160	24	382	103	64.38
Great northern diver	0.27	254	128	390	57	22.25

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Manx shearwater	0.04	35	0	86	19	53.68
Gannet	0.07	63	0	167	47	74.6
Shag	0.32	304	130	513	82	26.81
Grey seal	0.08	72	8	167	41	56.18
Common dolphin	0.02	23	0	73	24	104.35
Harbour porpoise	0.01	8	0	25	8	100.00

Table 69 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 6 on 19 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	7.54	7114	4530	10349	1385	19.46
All non-avian animals	0.47	445	8	1258	398	89.44
Species group						
Goose species	0.01	8	0	25	8	100.00
Duck species	0.03	24	0	73	25	104.17
Wader species	0.01	9	0	25	8	88.89
Small gull species	0.71	669	235	1350	268	40.03
Black-backed gull species	0.08	79	25	137	27	33.30
Large gull species	0.11	101	40	177	32	30.74
Gull species	0.02	17	0	40	11	64.71
Large auk	3.25	3069	2029	4289	519	16.90
Auk species	0.24	228	96	385	66	28.63
Auk / small gull	0.01	9	0	25	8	88.89
Auk / shearwater species	0.22	206	77	370	60	28.87
Diver species	0.36	337	173	550	91	26.79
Fulmar / gull species	0.26	241	41	534	121	50.13
Shearwater species	2.04	1922	416	3840	849	44.13

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.03	30	0	61	14	45.34
Cormorant / shag	0.14	128	33	258	55	42.30
Heron species	0.01	9	0	25	8	88.89
Seal species	0.48	455	8	1263	410	90.11

Table 70 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 6 on 19 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.01	9	0	25	9	100.00
Shelduck	0.01	9	0	25	9	100.00
Red-breasted merganser	0.02	17	0	63	17	100.00
Curlew	0.01	9	0	25	9	100.00
Kittiwake	0.46	436	194	706	117	26.81
Black-headed gull	0.11	104	0	314	99	95.19
Common gull	0.12	112	8	296	82	73.21
Great black-backed gull	0.07	70	24	124	24	33.35
Herring gull	0.05	51	8	112	23	44.06
Lesser black-backed gull	0.08	71	16	137	29	39.84
Guillemot	3.16	2980	1883	4231	550	18.44
Razorbill	0.29	270	119	446	72	26.59
Black guillemot	0.08	75	16	149	33	43.18
Puffin	0.00	4	0	12	4	100.00
Red-throated diver	0.08	78	24	145	30	37.53

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.27	258	114	439	81	31.13
Fulmar	0.25	236	47	511	116	49.09
Manx shearwater	2.15	2032	595	3865	823	40.46
Gannet	0.03	29	0	61	14	46.90
Shag	0.12	112	39	217	46	40.34
Cormorant	0.02	17	0	41	12	70.59
Grey heron	0.01	9	0	25	9	100.00
Grey seal	0.43	409	0	1241	412	100.73

Table 71 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 6 on 19 March 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Brent goose	0.01	9	0	25	9	100.00
Shelduck	0.01	9	0	25	9	100.00
Red-breasted merganser	0.02	17	0	62	17	100.00
Curlew	0.01	8	0	25	9	112.50
Kittiwake	0.46	434	200	721	115	26.48
Black-headed gull	0.11	102	0	313	98	96.08
Common gull	0.12	117	8	288	78	66.67
Great black-backed gull	0.07	69	24	124	24	33.83
Herring gull	0.05	50	8	111	23	44.94
Lesser black-backed gull	0.07	68	16	132	28	40.14
Guillemot	3.19	3015	1941	4355	568	18.81
Razorbill	0.31	291	130	465	74	25.35
Black guillemot	0.09	83	19	160	34	40.41
Puffin	0.01	5	0	13	4	80.00
Red-throated diver	0.08	78	24	147	30	37.53
Great northern diver	0.27	258	115	443	79	30.35

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.26	243	46	546	124	50.94
Manx shearwater	2.22	2099	709	3926	827	39.36
Gannet	0.03	30	0	61	14	45.34
Shag	0.12	111	40	213	44	38.91
Cormorant	0.02	16	0	40	11	68.75
Grey heron	0.01	8	0	25	8	100.00
Grey seal	0.46	436	8	1265	411	94.27

Table 72 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 7 on 01 April 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	9.71	9168	5004	14489	2227	24.29
All non-avian animals	0.09	88	13	177	35	39.45
Species group						
Duck species	0.15	138	16	340	81	58.26
Wader species	0.03	32	0	77	20	62.50
Small gull species	0.24	228	120	368	56	24.36
Black-backed gull species	0.01	9	0	25	8	88.89
Large gull species	0.10	93	32	164	34	35.74
Gull species	0.00	4	0	12	4	100.00
Tern species	0.02	17	0	49	16	94.12
Large auk	4.90	4626	2850	6659	915	19.77
Auk species	0.11	105	32	182	31	28.92
Auk / small gull	0.13	123	29	241	50	40.13
Auk / shearwater species	0.53	504	24	1324	335	66.41
Diver species	0.43	410	218	640	94	22.90
Fulmar / gull species	0.03	33	0	75	16	46.16
Shearwater species	2.64	2495	251	6035	1550	62.09

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.10	98	48	155	24	24.25
Cormorant / shag	0.06	53	8	115	26	47.77
Heron species	0.01	8	0	25	9	112.50
Seal species	0.02	21	0	49	11	50.62
Dolphin species	0.03	24	0	73	24	100.00
Cetacean species	0.04	41	0	104	28	68.29
Shark species	0.00	4	0	12	4	100.00

Table 73 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 7 on 01 April 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.05	50	0	97	27	54.00
Eider	0.10	92	0	266	83	89.55
Oystercatcher	0.02	17	0	40	11	64.71
Curlew	0.02	16	0	49	17	106.25
Kittiwake	0.12	116	33	223	40	34.35
Common gull	0.12	113	32	220	44	38.31
Great black-backed gull	0.03	29	0	85	24	80.50
Herring gull	0.06	58	16	118	28	48.28
Lesser black-backed gull	0.01	8	0	25	8	100.00
Sandwich tern	0.02	16	0	49	16	100.00
Guillemot	5.05	4767	2961	6864	926	19.42
Razorbill	0.04	41	0	121	39	95.12
Black guillemot	0.01	9	0	31	9	100.00
Puffin	0.03	29	0	71	15	51.72
Red-throated diver	0.03	33	0	80	23	69.70

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.39	365	207	546	79	21.39
Fulmar	0.03	30	8	68	14	45.34
Manx shearwater	3.07	2895	284	6759	1691	58.38
Gannet	0.11	100	48	153	23	22.80
Shag	0.05	45	8	99	21	45.32
Cormorant	0.01	8	0	25	8	100.00
Grey heron	0.01	9	0	25	8	88.89
Common dolphin	0.03	25	0	73	24	96.00
Harbour porpoise	0.04	42	0	105	28	66.67
Basking shark	0.01	5	0	12	4	80.00

Table 74 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 7 on 01 April 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.05	49	0	97	27	55.10
Eider	0.10	91	0	266	78	85.07
Oystercatcher	0.02	16	0	40	11	68.75
Curlew	0.02	17	0	49	17	100.00
Kittiwake	0.12	115	32	222	40	34.10
Common gull	0.12	114	33	221	44	37.97
Great black-backed gull	0.04	37	0	92	25	65.76
Herring gull	0.06	58	16	119	28	48.28
Lesser black-backed gull	0.01	8	0	25	8	100.00
Sandwich tern	0.02	17	0	49	16	94.12
Guillemot	5.14	4848	3038	7073	927	19.10
Razorbill	0.04	40	0	120	39	97.50
Black guillemot	0.01	14	3	33	9	64.29
Puffin	0.05	45	7	99	19	40.79
Red-throated diver	0.04	35	1	81	22	62.86
Great northern diver	0.40	381	211	589	85	22.31

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.03	33	0	68	14	42.21
Manx shearwater	3.15	2975	286	6896	1695	56.94
Gannet	0.10	96	47	154	24	24.52
Shag	0.05	46	8	100	22	46.47
Cormorant	0.01	9	0	25	8	88.89
Grey heron	0.01	9	0	31	9	100.00
Basking shark	0.01	5	0	12	4	80.00
Common dolphin	0.03	25	0	73	23	92.00
Harbour porpoise	0.04	40	0	104	29	72.50

Table 75 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 8 on 27 May 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	47.00	44367	18878	76122	10467	23.59
All non-avian animals	0.23	218	70	399	76	34.55
Species group						
Duck species	0.06	58	0	121	31	53.45
Small gull species	0.42	393	222	606	92	23.32
Black-backed gull species	0.03	33	0	82	18	53.70
Large gull species	0.35	333	150	588	110	32.84
Gull species	0.10	97	0	226	51	52.01
Arctic / common tern	0.27	252	120	421	60	23.63
Tern species	0.11	108	44	188	29	26.71
Tern / small gull species	0.02	17	0	41	11	64.71
Large auk	5.28	4980	3534	6620	707	14.19
Auk species	1.00	940	556	1421	182	19.27
Auk / shearwater species	1.16	1093	661	1594	188	17.16
Diver species	0.10	99	41	158	26	25.97
Storm petrel species	0.03	29	0	68	15	50.21
Fulmar / gull species	0.29	270	133	449	74	27.24

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Shearwater species	37.64	35527	11060	65660	10212	28.74
Gannet species	0.08	79	28	137	22	26.91
Cormorant / shag	0.05	49	8	98	17	33.97
Heron species	0.01	9	0	25	9	100.00
Seal species	0.06	57	16	105	24	42.11
Dolphin species	0.16	151	9	357	78	51.18
Cetacean species	0.01	9	0	25	9	100.00

Table 76 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 8 on 27 May 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.03	33	0	81	23	69.70
Mallard	0.02	17	0	49	17	100.00
Red-breasted merganser	0.01	8	0	25	8	100.00
Kittiwake	0.36	339	164	536	89	26.16
Common gull	0.09	88	8	243	67	76.14
Great black-backed gull	0.08	76	17	150	31	40.26
Herring gull	0.27	254	87	495	98	38.48
Lesser black-backed gull	0.07	62	8	125	23	36.25
Sandwich tern	0.07	65	17	126	25	38.06
Little tern	0.01	8	0	25	9	112.50
Common tern	0.11	102	41	178	34	32.59
Arctic tern	0.07	65	8	144	31	46.28
Guillemot	5.20	4907	3540	6519	673	13.71
Razorbill	0.03	29	0	65	13	43.21
Puffin	0.81	766	449	1164	157	20.46

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Red-throated diver	0.01	9	0	25	8	88.89
Great northern diver	0.09	82	32	142	26	31.35
European storm petrel	0.03	29	0	61	14	46.90
Fulmar	0.27	253	132	398	62	24.37
Manx shearwater	38.40	36249	11697	66980	10502	28.97
Gannet	0.08	78	28	138	23	28.23
Shag	0.04	34	8	74	13	37.44
Cormorant	0.02	17	0	41	11	64.71
Little egret	0.01	8	0	25	8	100.00
Harbour seal	0.02	17	0	41	11	64.71
Common dolphin	0.16	152	16	350	77	50.08
Harbour porpoise	0.01	9	0	25	8	88.89

Table 77 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 8 on 27 May 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.03	33	0	81	22	66.67
Mallard	0.02	16	0	49	16	100.00
Red-breasted merganser	0.01	9	0	25	8	88.89
Kittiwake	0.38	354	189	551	87	24.49
Common gull	0.12	111	13	258	67	60.36
Great black-backed gull	0.08	74	16	146	31	41.34
Herring gull	0.27	258	80	513	103	39.81
Lesser black-backed gull	0.06	60	8	127	23	37.01
Sandwich tern	0.08	74	16	153	28	36.88
Little tern	0.01	9	0	25	8	88.89
Common tern	0.16	154	75	251	42	26.91
Arctic tern	0.13	123	36	246	40	32.21
Guillemot	5.34	5044	3607	6669	686	13.59
Razorbill	0.03	31	2	65	14	43.28
Puffin	1.03	968	585	1407	180	18.57
Red-throated diver	0.01	10	0	26	8	80.00

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.10	90	39	155	26	28.57
European storm petrel	0.03	29	0	61	14	46.9
Fulmar	0.28	269	137	433	73	26.97
Manx shearwater	39.31	37103	12551	67989	10433	28.12
Gannet	0.08	76	28	135	22	27.97
Shag	0.03	33	8	68	13	38.57
Cormorant	0.02	17	0	40	11	64.71
Little egret	0.01	9	0	32	9	100.00
Harbour seal	0.06	57	16	109	23	40.35
Common dolphin	0.16	151	9	349	76	49.88
Harbour porpoise	0.01	8	0	25	8	100.00

Table 78 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 9 on 18 June 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	7.12	6723	4723	9974	1299	19.31
All non-avian animals	0.22	205	40	449	106	51.26
Species group						
Wader species	0.01	9	0	32	9	100.00
Small gull species	0.62	582	379	848	107	18.37
Black-backed gull species	0.10	91	25	166	33	35.78
Large gull species	0.24	223	65	403	88	39.05
Gull species	0.04	42	0	114	32	76.19
Arctic / common tern	0.39	368	188	562	80	21.69
Tern species	0.07	70	16	144	28	39.31
Large auk	1.97	1860	1284	2443	254	13.61
Auk species	0.26	247	114	396	58	23.31
Auk / small gull	0.01	14	0	40	11	73.54
Auk / shearwater species	0.57	539	241	896	143	26.42
Diver species	0.02	16	0	41	12	75.00
Fulmar / gull species	0.21	202	94	330	52	25.64
Shearwater species	2.44	2300	966	4495	955	41.51

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.13	120	49	202	33	27.13
Cormorant / shag	0.06	58	16	117	23	39.32
Heron species	0.02	16	0	49	15	93.75
Small bird species	0.01	9	0	25	8	88.89
Seal species	0.08	71	9	151	35	48.22
Dolphin species	0.14	130	0	337	96	73.85

Table 79 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 9 on 18 June 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.55	523	282	856	135	25.78
Black-headed gull	0.02	17	0	50	17	100.00
Common gull	0.09	81	24	163	38	46.91
Great black-backed gull	0.08	78	31	134	26	32.46
Herring gull	0.2	186	49	360	80	42.53
Lesser black-backed gull	0.06	54	0	142	37	67.08
Sandwich tern	0.03	33	0	75	16	46.16
Common tern	0.18	172	88	261	41	23.52
Arctic tern	0.08	77	17	156	31	39.07
Guillemot	1.95	1839	1298	2453	263	14.29
Razorbill	0.01	8	0	25	8	100.00
Black guillemot	0.01	8	0	25	8	100.00
Puffin	0.19	175	57	314	53	30.22
Red-throated diver	0.02	17	0	47	12	70.59
Fulmar	0.21	200	98	320	50	24.91

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Manx shearwater	2.78	2625	1149	4847	1017	38.73
Gannet	0.13	118	49	195	32	26.93
Shag	0.05	50	8	108	21	41.76
Cormorant	0.01	9	0	25	8	88.89
Grey heron	0.02	16	0	49	16	100.00
Harbour seal	0.01	9	0	32	9	100.00
Common dolphin	0.14	134	0	340	95	70.90

Table 80 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 9 on 18 June 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.56	525	287	826	126	23.98
Black-headed gull	0.02	17	0	49	17	100.00
Common gull	0.09	82	23	167	38	46.34
Great black-backed gull	0.09	85	31	152	30	34.44
Herring gull	0.19	181	41	361	81	44.25
Lesser black-backed gull	0.06	56	0	147	37	64.68
Sandwich tern	0.06	58	9	119	23	39.39
Common tern	0.27	259	148	386	57	21.79
Arctic tern	0.13	123	48	206	33	26.27
Guillemot	2.04	1924	1363	2537	261	13.52
Razorbill	0.01	9	1	25	8	88.89
Black guillemot	0.01	10	0	26	8	80.00
Puffin	0.22	210	86	351	54	25.60
Red-throated diver	0.02	17	0	41	11	64.71
Fulmar	0.22	204	107	329	51	24.90
Manx shearwater	2.96	2797	1210	5456	1051	37.56

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet	0.13	119	45	195	35	29.01
Shag	0.05	50	8	109	22	43.68
Cormorant	0.01	9	0	25	8	88.89
Grey heron	0.02	16	0	49	16	100.00
Harbour seal	0.07	66	9	140	35	53.03
Common dolphin	0.14	133	0	328	93	69.92

Table 81 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 10 on 11 July 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	43.10	40686	25668	60936	7922	19.47
All non-avian animals	0.48	451	149	909	193	42.59
Species group						
Wader species	0.02	16	0	49	16	100.00
Small gull species	1.08	1017	620	1499	206	20.21
Black-backed gull species	0.47	442	138	848	138	31.18
Large gull species	0.54	507	77	1240	254	49.93
Gull species	0.06	53	8	106	19	35.10
Arctic / common tern	0.73	693	339	1149	171	24.64
Tern species	0.29	275	95	519	89	32.01
Tern / small gull species	0.01	8	0	25	8	100.00
Large auk	21.04	19861	12428	29565	3958	19.93
Auk species	0.51	481	313	660	76	15.63
Auk / small gull	0.03	25	0	64	17	68.00
Auk / shearwater species	0.72	678	293	1150	202	29.75
Storm petrel species	0.11	105	8	261	59	55.90
Fulmar / gull species	0.20	187	79	317	51	27.11

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Shearwater species	16.78	15841	8383	24541	3482	21.98
Gannet species	0.06	58	8	121	29	50.00
Cormorant / shag	0.16	154	33	364	86	55.29
Bird species	0.00	4	0	12	4	100.00
Fish species	0.07	65	9	141	30	45.56
Seal species	0.14	128	16	294	74	57.81
Dolphin species	0.23	216	16	671	169	78.24
Cetacean species	0.03	33	0	88	25	75.76

Table 82 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 10 on 11 July 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Curlew	0.01	8	0	25	8	100.00
Kittiwake	0.90	848	495	1303	191	22.48
Black-headed gull	0.08	71	0	259	69	95.94
Common gull	0.09	86	24	161	29	32.83
Great black-backed gull	0.26	241	40	544	103	42.63
Herring gull	0.55	517	78	1213	253	48.74
Lesser black-backed gull	0.27	254	87	469	75	29.23
Sandwich tern	0.12	114	0	292	62	54.37
Little tern	0.01	8	0	32	9	112.50
Common tern	0.34	317	167	476	72	22.52
Arctic tern	0.17	165	62	306	52	31.07
Guillemot	19.32	18240	11239	27825	3845	21.08
Razorbill	1.75	1654	929	2514	342	20.63
Black guillemot	0.03	24	0	49	13	54.17
Puffin	0.05	47	0	112	24	50.57

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
European storm petrel	0.11	102	8	255	60	58.50
Fulmar	0.17	156	57	261	45	28.79
Great shearwater	0.02	17	0	40	11	64.71
Manx shearwater	17.02	16068	8670	25493	3609	22.45
Gannet	0.06	56	8	117	29	51.79
Shag	0.16	148	32	364	84	56.18
Ocean sunfish	0.07	66	16	141	30	44.87
Harbour seal	0.08	71	0	218	70	98.59
Common dolphin	0.23	219	16	560	160	73.06
Harbour porpoise	0.03	25	0	73	24	96.00

Table 83 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 10 on 11 July 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Curlew	0.02	17	0	49	17	100.00
Kittiwake	0.95	895	484	1367	203	22.65
Black-headed gull	0.08	73	2	216	66	89.3
Common gull	0.10	90	27	168	29	31.37
Great black-backed gull	0.25	239	41	560	104	43.49
Herring gull	0.57	536	109	1246	257	47.85
Lesser black-backed gull	0.27	254	84	455	73	28.53
Sandwich tern	0.15	139	12	324	68	48.25
Little tern	0.01	11	1	34	9	81.82
Common tern	0.55	515	274	816	123	23.73
Arctic tern	0.29	276	117	497	78	28.08
Guillemot	19.52	18423	11395	28157	3855	20.92
Razorbill	2.06	1941	1126	2857	376	19.36
Black guillemot	0.06	60	24	100	20	33.33
Puffin	0.11	103	52	167	25	23.98
European storm petrel	0.11	104	8	261	58	54.82

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.17	162	69	270	44	26.80
Great shearwater	0.02	16	0	41	11	68.75
Manx shearwater	17.33	16361	8911	26143	3726	22.77
Gannet	0.06	58	8	118	29	50.00
Shag	0.16	153	32	347	85	55.04
Ocean sunfish	0.07	66	16	139	29	43.39
Harbour seal	0.14	128	16	296	74	57.81
Common dolphin	0.23	214	16	580	167	78.04
Harbour porpoise	0.03	32	0	88	25	78.12

Table 84 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 11 on 06 August 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	33.87	31974	19883	46027	6770	21.17
All non-avian animals	0.37	347	121	620	110	31.45
Species group						
Wader species	0.02	17	0	49	16	94.12
Small gull species	0.24	229	85	401	71	30.74
Black-backed gull species	0.12	115	8	323	66	56.90
Large gull species	0.43	402	83	832	152	37.62
Gull species	0.06	54	8	114	26	46.89
Arctic / common tern	0.42	396	139	745	149	37.43
Tern species	0.07	62	8	145	36	56.82
Large auk	19.52	18428	11878	26256	3633	19.71
Auk species	0.21	198	94	325	52	25.80
Auk / small gull	0.03	24	0	49	13	54.17
Auk / shearwater species	1.19	1123	458	1949	392	34.82
Storm petrel species	0.06	59	0	171	37	62.37
Fulmar / gull species	0.23	217	120	312	43	19.79
Shearwater species	11.46	10814	5000	18243	3329	30.78

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.01	14	0	37	9	63.89
Cormorant / shag	0.06	58	12	122	23	39.39
Small bird species	0.03	25	0	64	17	68.00
Fish species	0.05	51	16	92	18	33.51
Shark species	0.01	9	0	25	8	88.89
Seal species	0.14	128	16	304	66	51.54
Dolphin species	0.18	167	0	433	98	58.09

Table 85 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 11 on 06 August 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Curlew	0.02	16	0	49	16	100.00
Kittiwake	0.12	114	52	193	28	24.37
Black-headed gull	0.02	17	0	49	16	94.12
Common gull	0.12	111	17	247	59	53.15
Great black-backed gull	0.11	101	17	225	42	41.36
Herring gull	0.32	300	62	594	115	38.16
Lesser black-backed gull	0.10	97	8	267	56	56.74
Sandwich tern	0.03	29	0	85	26	87.30
Common tern	0.07	63	8	148	35	54.80
Arctic tern	0.14	132	0	415	106	80.30
Guillemot	19.69	18583	11771	27438	3748	20.17
Razorbill	0.13	125	32	252	54	42.88
Black guillemot	0.01	9	0	25	9	100.0
Puffin	0.15	143	62	248	40	27.92
European storm petrel	0.06	60	0	172	37	61.33

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.22	206	120	299	41	19.63
Sooty shearwater	0.03	25	0	55	14	56.00
Manx shearwater	11.83	11168	5371	18018	3350	29.99
Gannet	0.01	13	0	36	9	68.80
Shag	0.04	38	4	80	15	37.68
Cormorant	0.02	21	0	61	17	78.54
Basking shark	0.01	9	0	25	8	88.89
Ocean sunfish	0.05	48	9	89	17	33.66
Grey seal	0.01	9	0	24	8	88.89
Harbour seal	0.08	75	0	217	65	86.00
Common dolphin	0.17	165	0	441	101	61.01

Table 86 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey II on 06 August 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Curlew	0.02	18	0	63	17	94.44
Kittiwake	0.13	121	52	200	30	24.02
Black-headed gull	0.02	16	0	49	17	106.25
Common gull	0.14	129	25	269	63	48.84
Great black-backed gull	0.12	112	16	250	50	43.83
Herring gull	0.34	321	75	664	119	36.79
Lesser black-backed gull	0.10	96	8	256	54	55.44
Sandwich tern	0.05	48	0	127	33	67.19
Common tern	0.18	168	49	325	63	37.29
Arctic tern	0.25	236	51	501	118	50.00
Guillemot	19.97	18851	11789	27391	3916	20.77
Razorbill	0.15	144	43	285	61	42.04
Black guillemot	0.01	11	1	28	8	72.73
Puffin	0.20	187	86	315	49	26.12
European storm petrel	0.07	62	0	171	37	58.18

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.23	214	128	305	42	19.44
Sooty shearwater	0.03	25	1	49	13	52.00
Manx shearwater	11.78	11119	5132	18856	3523	31.68
Gannet	0.01	14	0	37	9	63.89
Shag	0.04	37	4	79	16	41.17
Cormorant	0.02	21	0	60	16	73.92
Basking shark	0.01	9	0	25	9	100.00
Ocean sunfish	0.05	50	16	92	18	34.18
Grey seal	0.01	12	1	30	9	75.00
Harbour seal	0.12	114	8	284	66	57.87
Common dolphin	0.18	172	0	435	101	58.52

Table 87 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 12 on 01 September 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	16.41	15488	12146	19068	1662	10.73
All non-avian animals	0.53	502	277	793	128	25.34
Species group						
Wader species	0.13	123	0	303	80	64.41
Small gull species	0.19	177	80	302	52	29.08
Black-backed gull species	0.10	93	8	221	52	55.22
Large gull species	0.26	242	104	407	72	29.57
Gull species	0.10	90	9	187	39	42.31
Arctic / common tern	0.38	358	0	871	244	68.16
Tern species	0.06	57	8	121	31	54.39
Tern / small gull species	0.03	33	0	73	19	57.58
Large auk	12.34	11649	9788	13516	838	7.19
Auk species	0.24	222	119	344	48	21.25
Auk / shearwater species	0.72	680	220	1263	259	37.99
Diver species	0.04	41	8	98	25	60.98
Storm petrel species	0.02	17	0	41	11	64.71

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar / gull species	0.05	46	4	101	20	41.53
Shearwater species	1.57	1480	354	3063	710	47.94
Gannet species	0.13	126	41	234	43	34.09
Cormorant / shag	0.05	46	8	94	21	44.34
Heron species	0.02	17	0	41	12	70.59
Fish species	0.12	115	33	213	45	39.13
Shark species	0.06	58	24	103	21	36.21
Seal species	0.07	62	8	130	27	43.43
Dolphin species	0.28	267	64	510	119	44.57
Auk / small gull	0.01	13	0	32	9	69.23
Passerine species	0.01	5	0	15	5	100.00

Table 88 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 12 on 01 September 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.07	66	17	123	23	34.55
Black-headed gull	0.01	9	0	25	8	88.89
Little gull	0.02	17	0	49	16	94.12
Common gull	0.08	80	24	141	26	32.45
Great black-backed gull	0.10	90	8	212	51	55.95
Herring gull	0.23	216	95	379	68	31.24
Lesser black-backed gull	0.05	47	8	102	23	48.00
Sandwich tern	0.05	43	0	104	29	67.44
Common tern	0.24	227	0	617	172	75.77
Guillemot	11.98	11312	9532	13085	800	7.06
Razorbill	0.24	231	122	359	58	24.74
Black guillemot	0.04	41	0	106	31	75.61
Puffin	0.13	120	57	198	29	23.86
Red-throated diver	0.03	32	0	72	18	56.25
European storm petrel	0.02	17	0	41	12	70.59

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.05	48	0	105	20	39.80
Manx shearwater	2.05	1938	579	3672	783	40.37
Gannet	0.14	128	48	230	41	31.27
Shag	0.04	40	8	80	19	47.50
Grey heron	0.01	9	0	25	8	88.89
Little egret	0.01	8	0	25	9	112.50
Blue shark	0.06	59	24	104	22	37.29
Bluefin tuna	0.11	107	32	211	46	42.99
Ocean sunfish	0.01	8	0	25	8	100.00
Common dolphin	0.29	277	73	548	123	44.40
Feral pigeon	0.01	5	0	14	5	100.00
Oystercatcher	0.01	5	0	13	4	80.00
Cormorant	0.01	5	0	13	4	80.00

Table 89 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 12 on 01 September 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.09	87	33	157	28	31.79
Black-headed gull	0.01	10	0	28	9	90.00
Little gull	0.03	33	0	74	19	57.58
Common gull	0.10	96	25	178	32	32.69
Great black-backed gull	0.10	90	8	207	49	53.75
Herring gull	0.28	267	112	470	89	33.13
Lesser black-backed gull	0.05	49	8	104	23	46.04
Sandwich tern	0.06	56	9	120	29	51.79
Common tern	0.36	339	0	851	230	67.85
Guillemot	12.30	11609	9801	13353	800	6.89
Razorbill	0.26	241	129	363	59	24.12
Black guillemot	0.05	44	0	115	32	72.73
Puffin	0.14	130	63	217	32	24.14
Red-throated diver	0.04	40	0	98	26	65.00
European storm petrel	0.02	17	0	41	11	64.71

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.05	46	4	104	20	41.76
Manx shearwater	2.16	2038	656	3838	793	38.88
Gannet	0.13	126	41	233	42	33.31
Shag	0.04	41	8	82	20	48.78
Grey heron	0.01	9	0	25	9	100.00
Little egret	0.01	8	0	25	8	100.00
Blue shark	0.06	56	17	101	22	39.29
Bluefin tuna	0.11	104	31	201	45	43.27
Ocean sunfish	0.01	9	0	25	8	88.89
Common dolphin	0.28	262	65	523	116	44.27
Feral pigeon	0.01	5	0	14	5	100.00
Oystercatcher	0.01	9	0	21	6	66.67
Cormorant	0.01	5	0	13	4	80.00

Table 90 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 13 on 17 October 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	7.86	7422	4465	11763	1811	24.40
All non-avian animals	0.20	187	0	540	162	86.14
Species group						
Wader species	0.08	80	8	207	56	70.00
Small gull species	0.78	735	394	1173	172	23.27
Large gull species	0.42	395	51	1020	266	67.34
Gull species	0.09	87	16	186	44	49.64
Arctic / common tern	0.01	8	0	25	8	100.00
Large auk	5.90	5566	3167	8639	1426	25.61
Auk species	0.06	57	8	121	30	52.63
Auk / small gull	0.03	32	0	88	24	75.00
Diver species	0.03	25	0	70	19	76.00
Fulmar / gull species	0.02	23	0	57	17	73.91
Shearwater species	0.01	9	0	25	8	88.89
Gannet species	0.28	261	119	457	86	32.60
Cormorant / shag	0.08	71	16	151	33	45.42
Heron species	0.03	26	0	73	25	96.15

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Seal species	0.19	181	0	531	165	90.63
Cetacean species	0.01	5	0	12	4	80.00

Table 91 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 13 on 17 October 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.02	16	0	40	11	68.75
Kittiwake	0.72	678	328	1100	171	25.11
Common gull	0.06	61	16	117	25	39.89
Great black-backed gull	0.10	93	16	208	50	52.86
Herring gull	0.32	299	24	816	227	75.61
Arctic tern	0.01	9	0	25	8	88.89
Guillemot	5.62	5307	2944	8325	1341	25.26
Razorbill	0.03	32	0	96	25	78.12
Black guillemot	0.03	33	0	81	23	69.70
Red-throated diver	0.01	9	0	25	9	100.00
Great northern diver	0.02	17	0	41	12	70.59
Fulmar	0.03	24	0	65	18	75.00
Manx shearwater	0.01	8	0	25	8	100.00
Gannet	0.28	262	112	469	88	33.24
Shag	0.07	70	16	141	33	46.07

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Little egret	0.03	24	0	73	24	100.00
Harbour seal	0.19	180	0	517	163	90.56

Table 92 **Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 13 on 17 October 2022**

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.08	72	0	206	57	79.17
Kittiwake	0.78	732	356	1233	196	26.75
Common gull	0.07	63	17	117	25	38.62
Great black-backed gull	0.10	98	17	221	51	51.39
Herring gull	0.34	325	23	883	232	71.15
Arctic tern	0.01	9	0	25	8	88.89
Guillemot	5.83	5506	3097	8663	1432	26.00
Razorbill	0.04	34	1	85	24	70.59
Black guillemot	0.06	57	8	121	30	52.63
Red-throated diver	0.01	8	0	25	9	112.50
Great northern diver	0.02	17	0	41	12	70.59
Fulmar	0.03	24	0	64	18	75.00
Manx shearwater	0.01	8	0	24	8	100.00
Gannet	0.27	258	110	432	85	32.60
Shag	0.07	69	16	141	31	43.86

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Little egret	0.03	24	0	73	24	100.00
Harbour seal	0.19	183	0	647	170	92.90

Table 93 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 14 on 29 November 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.54	3342	2512	4200	379	11.34
All non-avian animals	0.68	641	64	1533	423	65.84
Species group						
Duck species	0.15	137	16	303	75	54.74
Wader species	0.08	73	9	171	44	60.27
Small gull species	0.88	827	592	1066	100	12.03
Large gull species	0.28	263	89	494	98	37.04
Gull species	0.02	17	0	41	11	64.71
Large auk	1.73	1633	983	2350	278	17.01
Auk species	0.08	75	25	139	29	38.67
Diver species	0.11	104	41	169	30	28.15
Gannet species	0.07	70	17	137	24	33.96
Cormorant / shag	0.13	119	53	192	27	21.91
Heron species	0.03	33	8	66	16	48.48
Seal species	0.52	489	0	1381	428	87.32
Dolphin species	0.13	122	0	318	85	69.67
Cetacean species	0.01	9	0	25	8	88.89

Table 94 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 14 on 29 November 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mallard	0.05	46	0	147	48	104.35
Eider	0.06	56	0	172	56	100.00
Red-breasted merganser	0.03	33	0	82	23	69.70
Oystercatcher	0.02	17	0	41	12	70.59
Curlew	0.02	17	0	41	11	64.71
Kittiwake	0.81	767	532	1009	105	13.57
Common gull	0.06	59	0	151	41	69.49
Great black-backed gull	0.10	94	17	196	43	44.88
Herring gull	0.17	162	53	307	58	35.62
Guillemot	0.43	409	193	661	101	24.55
Razorbill	1.27	1196	629	1875	267	22.29
Black guillemot	0.06	57	9	115	28	49.12
Great northern diver	0.11	105	49	169	29	26.94
Gannet	0.08	71	17	137	24	33.48
Shag	0.13	120	53	191	27	22.44

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Grey heron	0.03	25	0	56	14	56.00
Little egret	0.01	9	0	25	8	88.89
Grey seal	0.39	368	0	1066	350	95.11
Harbour seal	0.11	102	0	252	70	68.63
Common dolphin	0.13	125	0	318	87	69.60
Harbour porpoise	0.01	9	0	25	9	100.00
Seal species	0.01	5	0	13	4	80.00

Table 95 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 14 on 29 November 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mallard	0.05	49	0	148	49	100.00
Eider	0.06	60	0	172	57	95.00
Red-breasted merganser	0.03	33	0	82	23	69.70
Oystercatcher	0.04	37	0	86	23	62.16
Curlew	0.04	38	0	86	23	60.53
Kittiwake	0.83	780	526	1029	112	14.34
Common gull	0.06	58	0	152	41	70.69
Great black-backed gull	0.11	102	20	210	48	46.25
Herring gull	0.19	180	53	327	62	34.26
Guillemot	0.45	425	211	688	102	23.80
Razorbill	1.29	1221	673	1907	253	20.71
Black guillemot	0.06	60	16	123	29	48.33
Great northern diver	0.11	105	49	169	29	26.94
Gannet	0.07	68	17	136	24	34.96
Shag	0.13	120	54	195	27	22.44

Grey heron	0.03	25	0	57	15	60.00
Little egret	0.01	9	0	25	8	88.89
Grey seal	0.42	393	0	1113	368	93.64
Harbour seal	0.11	103	0	274	77	74.76
Common dolphin	0.13	127	0	320	87	68.50
Harbour porpoise	0.01	9	0	25	8	88.89
Seal species	0.00	4	0	12	4	100.00

Table 96 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 15 on 22 December 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	6.59	6225	3024	10630	1936	31.09
All non-avian animals	0.32	300	82	600	121	40.23
Species group						
Goose species	1.79	1685	0	4957	1547	91.81
Duck species	0.10	99	25	198	44	44.44
Wader species	0.03	25	0	65	18	72.00
Small gull species	0.53	499	266	777	120	23.86
Large gull species	0.35	335	181	516	73	21.60
Gull species	0.06	58	9	118	24	40.98
Large auk	2.78	2628	1394	4121	604	22.97
Auk species	0.28	268	121	417	67	24.97
Diver species	0.48	452	277	664	84	18.57
Fulmar / gull species	0.04	38	8	76	16	40.85
Gannet species	0.05	45	8	94	17	37.78
Cormorant / shag	0.15	146	66	231	32	21.84
Heron species	0.06	57	17	104	23	40.35
Seal species	0.15	141	33	303	73	51.14

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Dolphin species	0.15	143	0	364	93	64.88
Seal / small cetacean species	0.01	8	0	25	8	100.00
Auk / shearwater species	0.02	17	0	44	12	70.59
Cetacean species	0.01	5	0	12	4	80.00

Table 97 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 15 on 22 December 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	1.84	1736	0	4964	1647	94.87
Mallard	0.04	34	0	74	20	58.82
Teal	0.02	18	0	50	17	94.44
Eider	0.03	33	0	90	25	75.76
Red-breasted merganser	0.02	17	0	41	11	64.71
Oystercatcher	0.02	17	0	50	16	94.12
Curlew	0.01	8	0	25	9	112.50
Kittiwake	0.39	372	154	647	117	31.44
Black-headed gull	0.02	16	0	50	17	106.25
Common gull	0.13	124	63	195	32	25.46
Great black-backed gull	0.10	91	40	150	25	26.94
Herring gull	0.28	264	109	446	76	28.46
Guillemot	1.45	1365	767	2083	292	21.35
Razorbill	1.28	1205	523	1972	318	26.32
Black guillemot	0.03	25	0	71	19	76.00

Great northern diver	0.44	411	234	589	81	19.65
Fulmar	0.03	30	0	63	14	45.34
Gannet	0.05	46	9	94	18	38.03
Shag	0.13	126	41	217	32	25.26
Grey heron	0.06	56	17	99	22	39.29
Grey seal	0.02	17	0	41	11	64.71
Harbour seal	0.07	66	0	197	65	98.48
Common dolphin	0.16	147	0	403	100	67.84
Cormorant	0.01	8	0	20	6	75.00
Harbour porpoise	0.00	4	0	13	4	100.00

Table 98 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 15 on 22 December 2022

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	1.82	1720	0	4933	1570	91.28
Mallard	0.03	33	0	74	20	60.61
Teal	0.02	16	0	50	16	100.00
Eider	0.04	34	0	88	25	73.53
Red-breasted merganser	0.02	17	0	41	12	70.59
Oystercatcher	0.02	17	0	50	16	94.12
Curlew	0.01	9	0	25	8	88.89
Kittiwake	0.41	383	158	688	121	31.54
Black-headed gull	0.02	17	0	63	17	100.00
Common gull	0.13	124	57	199	34	27.05
Great black-backed gull	0.10	90	33	151	25	27.24
Herring gull	0.30	282	127	468	76	26.64
Guillemot	1.53	1448	831	2167	298	20.52
Razorbill	1.41	1330	618	2092	325	24.36
Black guillemot	0.11	107	52	175	33	30.84

Great northern diver	0.48	449	263	667	85	18.75
Fulmar	0.03	29	0	67	14	46.90
Gannet	0.05	44	8	93	17	38.64
Shag	0.14	134	49	218	32	23.24
Grey heron	0.06	59	17	105	22	37.29
Grey seal	0.03	28	9	52	12	42.86
Harbour seal	0.11	107	20	256	63	58.88
Common dolphin	0.15	145	0	370	96	66.04
Cormorant	0.01	10	2	21	6	60.00
Harbour porpoise	0.00	4	0	12	4	100.00

Table 99 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 16 on 19 January 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	4.99	4709	3750	5738	393	8.33
All non-avian animals	0.23	213	55	446	78	36.19
Species group						
Duck species	0.08	76	0	182	48	63.16
Wader species	0.05	50	9	97	23	46.00
Small gull species	0.75	706	483	964	98	13.84
Large gull species	0.18	171	73	284	42	24.08
Gull species	0.06	57	20	108	19	32.21
Large auk	2.78	2620	1985	3277	261	9.94
Auk species	0.27	257	117	432	78	30.08
Auk / small gull	0.03	29	0	67	15	50.21
Large auk / diver species	0.01	9	0	32	9	100.00
Auk / shearwater species	0.01	8	0	25	8	100.00
Diver species	0.39	368	172	591	100	27.04
Fulmar / gull species	0.03	29	0	76	19	63.58
Gannet species	0.01	9	0	25	9	100.00
Cormorant / shag	0.32	303	132	509	71	23.30

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Heron species	0.01	8	0	25	8	100.00
Seal species	0.15	137	16	324	68	49.21
Dolphin species	0.05	50	0	126	34	68.00
Cetacean species	0.03	30	0	85	25	81.10

Table 100 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 16 on 19 January 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Wigeon	0.03	33	0	97	32	96.97
Eider	0.04	41	0	121	40	97.56
Oystercatcher	0.01	8	0	25	8	100.00
Curlew	0.04	41	8	89	22	53.66
Kittiwake	0.53	498	306	717	86	17.16
Black-headed gull	0.02	17	0	49	16	94.12
Common gull	0.20	193	73	385	77	39.60
Great black-backed gull	0.09	82	21	143	26	31.66
Herring gull	0.11	102	29	193	31	30.28
Guillemot	1.96	1852	1450	2296	165	8.87
Razorbill	0.73	693	379	1045	138	19.90
Black guillemot	0.12	114	32	232	52	45.61
Red-throated diver	0.01	9	0	25	9	100.00
Great northern diver	0.35	329	149	547	95	28.73
Manx shearwater	0.01	9	0	25	8	88.89

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet	0.01	8	0	25	8	100.00
Cormorant	0.01	13	0	44	10	75.76
Shag	0.30	287	117	499	72	24.88
Little egret	0.01	9	0	25	8	88.89
Harbour seal	0.08	76	0	215	57	74.49
Common dolphin	0.05	51	0	127	34	66.67
Harbour porpoise	0.03	31	0	85	26	81.67

Table 101 Appportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 16 on 19 January 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Wigeon	0.03	32	0	97	30	93.75
Eider	0.04	41	0	121	40	97.56
Oystercatcher	0.01	9	0	25	8	88.89
Curlew	0.04	41	8	88	21	51.22
Kittiwake	0.60	564	362	809	94	16.52
Black-headed gull	0.02	17	0	49	15	88.24
Common gull	0.22	211	79	412	78	36.80
Great black-backed gull	0.09	82	28	147	26	31.66
Herring gull	0.11	101	29	190	31	30.23
Guillemot	2.09	1975	1556	2443	177	8.94
Razorbill	0.82	773	437	1162	152	19.58
Black guillemot	0.16	149	57	266	54	36.24
Red-throated diver	0.01	9	0	26	9	100.00
Great northern diver	0.38	359	164	584	102	28.27
Manx shearwater	0.01	9	0	25	8	88.89

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet	0.01	9	0	25	9	100.00
Cormorant	0.01	14	0	37	10	70.35
Shag	0.30	286	113	511	74	25.67
Little egret	0.01	8	0	25	8	100.00
Harbour seal	0.14	135	16	331	68	50.18
Common dolphin	0.05	48	0	126	33	68.75
Harbour porpoise	0.03	30	0	109	26	84.39

Table 102 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 17 on 09 February 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	7.31	6900	4716	9492	1158	16.78
All non-avian animals	0.16	154	63	257	50	32.47
Species group						
Goose species	1.21	1140	0	3273	1052	92.28
Duck species	0.04	41	0	89	23	56.10
Wader species	0.07	63	0	183	55	87.30
Small gull species	1.72	1624	1156	2146	203	12.50
Large gull species	0.27	256	142	400	62	23.94
Large auk	2.06	1946	1305	2639	291	14.94
Auk species	0.63	591	32	1631	487	82.25
Diver species	0.59	561	274	897	149	26.45
Fulmar / gull species	0.19	175	40	363	89	50.86
Gannet species	0.04	41	8	92	20	48.60
Cormorant / shag	0.42	398	61	998	267	66.87
Heron species	0.04	41	0	88	23	56.10
Fish species	0.01	9	0	25	8	88.89
Seal species	0.13	122	33	222	48	39.34

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Dolphin species	0.03	25	0	73	24	96.00
Gull species	0.00	4	0	12	4	100.00

Table 103 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 17 on 09 February 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	1.16	1092	0	3260	1039	95.15
Shelduck	0.02	17	0	49	16	94.12
Red-breasted merganser	0.03	25	0	64	18	72.00
Curlew	0.01	9	0	25	8	88.89
Kittiwake	1.51	1423	983	1923	187	13.11
Black-headed gull	0.06	55	0	170	58	105.45
Common gull	0.13	122	49	209	41	33.61
Great black-backed gull	0.11	102	47	179	33	31.62
Herring gull	0.16	154	73	248	42	26.82
Guillemot	1.43	1347	910	1839	211	15.59
Razorbill	0.62	586	247	998	165	28.15
Black guillemot	0.58	552	9	1602	499	90.22
Great northern diver	0.58	543	269	900	151	27.70
Fulmar	0.18	170	39	371	88	51.76
Gannet	0.04	42	0	93	20	47.44

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cormorant	0.03	29	0	66	15	50.21
Shag	0.39	370	40	937	266	71.66
Grey heron	0.02	16	0	49	16	100.00
Little egret	0.03	25	0	64	17	68.00
Grey seal	0.01	9	0	25	8	88.89
Common dolphin	0.03	26	0	73	24	92.31

Table 104 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 17 on 09 February 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Barnacle goose	1.12	1058	0	3272	998	94.33
Shelduck	0.02	16	0	49	16	100.00
Red-breasted merganser	0.03	25	0	63	17	68.00
Curlew	0.07	65	0	187	59	90.77
Kittiwake	1.52	1434	1006	1930	180	12.55
Black-headed gull	0.06	56	0	170	58	103.57
Common gull	0.13	122	43	207	42	34.43
Great black-backed gull	0.11	102	41	174	32	30.64
Herring gull	0.17	156	71	253	43	27.20
Guillemot	1.45	1373	909	1883	218	15.81
Razorbill	0.64	604	270	1019	162	26.67
Black guillemot	0.63	596	17	1623	530	88.76
Great northern diver	0.60	567	278	914	154	27.04
Fulmar	0.18	172	33	385	90	52.33
Gannet	0.04	41	0	93	20	47.92

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cormorant	0.03	30	0	67	15	48.53
Shag	0.40	376	40	975	269	71.32
Grey heron	0.02	17	0	49	16	94.12
Little egret	0.03	25	0	65	18	72.00
Grey seal	0.13	121	32	227	48	39.67
Common dolphin	0.03	26	0	73	24	92.31

Table 105 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 18 on 04 March 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.33	3146	2116	4325	475	15.09
All non-avian animals	0.18	166	24	410	80	47.97
Species group						
Swan species	0.01	8	0	25	8	100.00
Duck species	0.17	161	16	370	74	45.85
Wader species	0.34	319	16	909	276	86.52
Small gull species	0.52	495	306	741	97	19.41
Large gull species	0.13	120	53	206	30	24.78
Large auk	1.05	994	667	1393	170	17.01
Auk species	0.39	372	120	747	174	46.53
Diver species	0.57	541	327	820	120	22.06
Fulmar / gull species	0.01	9	0	25	8	88.89
Shearwater species	0.01	8	0	25	9	112.50
Gannet species	0.04	38	0	101	26	66.63
Cormorant / shag	0.04	38	0	101	22	57.77
Heron species	0.03	25	0	49	14	56.00
Seal species	0.09	86	0	219	51	58.33

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Dolphin species	0.09	84	0	235	64	76.19

Table 106 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 18 on 04 March 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mute swan	0.01	9	0	25	8	88.89
Shelduck	0.02	16	0	50	16	100.00
Mallard	0.02	16	0	49	16	100.00
Eider	0.12	115	0	287	70	60.75
Red-breasted merganser	0.02	17	0	49	16	94.12
Oystercatcher	0.30	287	0	816	256	89.20
Curlew	0.02	17	0	49	16	94.12
Turnstone	0.03	26	0	74	24	92.31
Kittiwake	0.32	301	151	502	80	26.55
Black-headed gull	0.02	17	0	49	17	100.00
Common gull	0.15	143	69	226	34	23.44
Great black-backed gull	0.05	44	8	91	19	41.91
Herring gull	0.08	76	17	161	29	37.22
Guillemot	0.87	821	523	1197	159	19.28
Razorbill	0.21	200	81	342	68	34.00

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Black guillemot	0.24	225	24	572	164	72.47
Great northern diver	0.58	549	334	827	122	22.12
Fulmar	0.01	9	0	25	8	88.89
Manx shearwater	0.01	9	0	25	9	100.00
Gannet	0.04	38	0	102	27	69.23
Shag	0.04	37	0	101	23	60.74
Grey heron	0.03	25	0	57	14	56.00
Grey seal	0.01	13	0	37	10	75.76
Harbour seal	0.03	24	0	78	17	69.35
Common dolphin	0.01	9	0	25	8	88.89
Bottlenose dolphin	0.08	74	0	204	59	79.73

Table 107 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 18 on 04 March 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mute swan	0.01	8	0	25	8	100.00
Shelduck	0.02	17	0	49	16	94.12
Mallard	0.02	16	0	49	16	100.00
Eider	0.12	113	0	311	74	65.47
Red-breasted merganser	0.02	16	0	49	16	100.00
Oystercatcher	0.30	286	0	821	261	91.26
Curlew	0.02	18	0	49	17	94.44
Turnstone	0.03	25	0	73	24	96.00
Kittiwake	0.34	325	171	545	85	26.11
Black-headed gull	0.02	17	0	49	17	100.00
Common gull	0.16	154	72	247	38	24.26
Great black-backed gull	0.05	44	8	93	20	44.13
Herring gull	0.08	73	16	157	29	39.73
Guillemot	0.88	830	520	1190	156	18.71
Razorbill	0.22	209	96	344	65	31.10

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Black guillemot	0.35	332	95	720	179	53.64
Great northern diver	0.58	545	339	798	116	21.17
Fulmar	0.01	9	0	32	9	100.00
Manx shearwater	0.01	8	0	25	8	100.00
Gannet	0.04	38	0	100	26	66.63
Shag	0.04	37	0	100	22	59.34
Grey heron	0.03	25	0	56	14	56.00
Grey seal	0.03	28	0	66	14	46.57
Harbour seal	0.07	63	0	166	44	69.33
Common dolphin	0.01	9	0	25	8	88.89
Bottlenose dolphin	0.08	73	0	203	60	82.19

Table 108 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 19 on 18 April 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	8.38	7906	4653	12845	1922	24.30
All non-avian animals	0.01	14	0	38	10	67.39
Species group						
Duck species	0.07	66	0	167	35	52.60
Wader species	0.28	261	24	543	121	46.14
Small gull species	1.87	1766	422	4141	943	53.39
Large gull species	0.67	633	257	1122	201	31.71
Gull species	0.05	46	0	128	24	51.86
Arctic / common tern	0.06	58	0	130	34	58.62
Tern species	0.06	54	8	114	22	40.61
Tern / small gull species	0.02	18	0	41	12	66.67
Skua species	0.01	9	0	25	9	100.00
Large auk	3.22	3039	1976	4156	477	15.68
Auk species	0.21	202	83	365	70	34.33
Auk / small gull	0.01	9	0	25	8	88.89
Auk / shearwater species	0.25	236	57	460	88	36.91
Diver species	0.47	439	217	728	124	28.13

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar / gull species	0.08	79	25	146	29	35.80
Shearwater species	0.92	870	159	2089	545	62.54
Gannet species	0.04	34	5	74	15	42.42
Cormorant / shag	0.08	72	16	147	27	36.22
Heron species	0.01	9	0	32	9	100.00
Seal species	0.01	9	0	25	8	88.89
Large auk / diver species	0.01	9	0	26	9	100.00
Cetacean species	0.01	5	0	16	5	100.00

Table 109 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 19 on 18 April 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.03	32	0	80	22	68.75
Oystercatcher	0.02	17	0	49	16	94.12
Golden plover	0.06	57	0	170	56	98.25
Whimbrel	0.10	90	0	250	74	81.30
Kittiwake	1.63	1537	319	3561	824	53.59
Little gull	0.01	8	0	25	8	100.00
Common gull	0.19	180	40	398	86	47.31
Great black-backed gull	0.06	58	9	114	22	37.66
Herring gull	0.50	469	147	992	207	44.03
Lesser black-backed gull	0.12	114	36	225	42	36.17
Sandwich tern	0.06	54	8	120	23	42.31
Common tern	0.03	25	0	49	13	52.00
Great skua	0.01	8	0	25	8	100.00
Guillemot	3.00	2833	1844	3837	449	15.84
Razorbill	0.24	222	100	352	57	25.55

Black guillemot	0.02	17	0	49	16	94.12
Puffin	0.06	54	8	117	27	49.03
Red-throated diver	0.01	13	0	38	11	79.20
Great northern diver	0.47	439	227	705	115	26.11
Fulmar	0.07	63	17	118	25	38.62
Manx shearwater	1.03	975	213	2245	547	56.07
Gannet	0.04	35	5	74	14	39.69
Cormorant	0.01	8	0	25	9	112.50
Shag	0.07	64	16	123	21	32.06
Grey heron	0.01	8	0	25	8	100.00
Eider	0.03	33	0	87	26	78.79
Curlew	0.01	9	0	26	9	100.00
Harbour porpoise	0.01	5	0	13	5	100.00

Table 110 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 19 on 18 April 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.03	32	0	78	21	65.62
Oystercatcher	0.03	26	0	66	18	69.23
Golden plover	0.09	88	0	231	61	69.32
Whimbrel	0.14	135	5	323	82	60.11
Kittiwake	1.63	1534	348	3579	823	53.60
Little gull	0.01	9	0	25	9	100.00
Common gull	0.21	198	51	430	90	45.43
Great black-backed gull	0.06	58	16	116	21	36.00
Herring gull	0.52	487	170	989	203	41.57
Lesser black-backed gull	0.12	114	38	220	41	35.11
Sandwich tern	0.06	54	8	119	23	42.31
Common tern	0.06	58	0	130	34	58.62
Great skua	0.01	9	0	25	8	88.89
Guillemot	3.08	2903	1887	3972	459	15.79
Razorbill	0.28	268	136	420	66	24.54
Black guillemot	0.03	32	4	79	22	68.75

Puffin	0.11	104	35	191	38	35.90
Red-throated diver	0.01	14	0	38	10	67.39
Great northern diver	0.46	431	217	717	118	27.29
Fulmar	0.08	79	24	145	30	37.06
Manx shearwater	1.13	1064	247	2358	553	51.89
Gannet	0.04	35	5	73	15	41.21
Cormorant	0.01	9	0	32	9	100.00
Shag	0.07	65	17	123	21	31.57
Grey heron	0.01	9	0	25	8	88.89
Eider	0.03	31	0	81	24	77.42
Curlew	0.01	12	0	30	9	75.00
Harbour porpoise	0.01	5	0	17	5	100.00

Table III Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 20 on 02 May 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	50.86	48007	23062	77712	12764	26.59
All non-avian animals	0.46	430	24	1054	252	58.45
Species group						
Duck species	0.01	9	0	25	9	100.00
Wader species	0.18	169	17	430	87	51.38
Small gull species	0.67	637	322	1000	157	24.62
Large gull species	0.68	646	180	1327	251	38.72
Gull species	0.09	86	33	150	29	32.89
Arctic / common tern	0.67	633	287	1094	175	27.56
Tern species	0.03	33	0	89	20	59.69
Large auk	15.68	14797	6961	24070	3586	24.23
Auk species	0.83	785	293	1456	288	36.66
Auk / shearwater species	0.79	741	373	1212	197	26.53
Diver species	0.45	429	216	713	121	28.11
Storm petrel species	0.08	73	8	182	44	59.47
Fulmar / gull species	0.10	94	33	168	29	30.28
Shearwater species	29.77	28101	9112	53458	10849	38.60

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.23	214	94	351	59	27.36
Cormorant / shag	0.09	86	8	189	44	50.34
Seal species	0.03	29	0	61	14	46.90
Dolphin species	0.44	416	0	1042	265	63.46
Jellyfish	0.00	4	0	12	4	100.00

Table 112 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 20 on 02 May 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mallard	0.01	9	0	25	8	88.89
Oystercatcher	0.02	16	0	49	17	106.25
Whimbrel	0.16	151	0	407	89	58.60
Kittiwake	0.65	614	330	956	147	23.92
Common gull	0.08	71	24	127	27	37.05
Great black-backed gull	0.20	185	9	480	105	56.57
Herring gull	0.31	291	74	580	129	44.03
Lesser black-backed gull	0.23	220	71	463	92	41.57
Little tern	0.03	29	0	76	18	60.22
Common tern	0.06	57	16	114	26	45.61
Arctic tern	0.38	362	117	671	144	39.52
Guillemot	14.84	14004	6825	22194	3258	23.26
Razorbill	0.90	849	365	1445	232	27.23
Black guillemot	0.48	453	25	1124	297	65.35
Puffin	0.14	134	58	217	37	27.37

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.43	407	203	667	115	28.14
European storm petrel	0.09	83	16	192	43	51.12
Fulmar	0.10	91	33	159	28	30.39
Manx shearwater	30.44	28729	9707	54440	11212	39.02
Gannet	0.23	214	102	347	57	26.43
Cormorant	0.02	18	0	41	12	66.67
Shag	0.07	65	0	165	40	60.49
Common dolphin	0.43	402	0	1024	264	65.42
Bottlenose dolphin	0.01	9	0	25	9	100.00

Table 113 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 20 on 02 May 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Mallard	0.01	8	0	25	8	100.00
Oystercatcher	0.02	18	0	52	16	88.89
Whimbrel	0.17	157	8	417	87	54.95
Kittiwake	0.65	615	340	952	145	23.58
Common gull	0.08	72	24	136	27	36.54
Great black-backed gull	0.20	185	9	471	107	57.80
Herring gull	0.30	282	73	559	125	44.02
Lesser black-backed gull	0.23	216	64	441	92	42.29
Little tern	0.03	33	0	90	20	59.69
Common tern	0.08	75	24	132	29	38.67
Arctic tern	0.60	562	228	993	167	29.60
Guillemot	15.28	14419	7236	23631	3309	22.94
Razorbill	0.99	932	405	1568	250	26.75
Black guillemot	0.60	564	96	1270	292	51.60
Puffin	0.18	166	86	251	37	22.22
Great northern diver	0.44	417	203	677	114	27.23

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
European storm petrel	0.09	83	16	194	44	52.31
Fulmar	0.10	91	32	158	28	30.39
Manx shearwater	29.99	28311	8530	53094	10751	37.97
Gannet	0.23	216	102	358	60	27.56
Cormorant	0.02	17	0	41	12	70.59
Shag	0.07	68	0	166	42	60.94
Common dolphin	0.41	391	0	1008	261	66.52
Bottlenose dolphin	0.01	8	0	25	8	100.00

Table 114 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 21 on 03 June 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	33.97	32062	16434	52722	8367	26.10
All non-avian animals	0.27	252	91	440	74	29.17
Species group						
Duck species	0.03	33	0	91	26	78.79
Wader species	0.03	25	0	66	19	76.00
Small gull species	0.49	465	237	762	97	20.85
Large gull species	1.18	1111	592	1761	281	25.26
Gull species	0.03	29	0	67	15	50.21
Arctic / common tern	0.14	136	37	255	42	30.65
Tern species	0.02	21	0	53	12	55.74
Large auk	15.09	14240	7813	22282	3214	22.56
Auk species	0.34	319	175	476	61	19.04
Auk / shearwater species	3.57	3371	532	7381	1670	49.53
Diver species	0.03	29	0	78	19	63.58
Storm petrel species	0.02	17	0	45	11	63.63
Fulmar / gull species	0.06	59	4	126	24	40.43
Shearwater species	12.42	11727	2251	25178	5427	46.27

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Gannet species	0.14	132	60	225	33	24.43
Cormorant / shag	0.08	79	16	170	31	38.56
Jellyfish	0.01	9	0	25	9	100.00
Seal species	0.10	97	25	218	49	49.66
Dolphin species	0.13	126	25	262	54	42.19
Cetacean species	0.02	22	0	62	18	79.38

Table 115 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 21 on 03 June 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.01	9	0	25	9	100.00
Mallard	0.03	26	0	75	25	96.15
Oystercatcher	0.02	18	0	50	17	94.44
Curlew	0.01	9	0	25	9	100.00
Kittiwake	0.27	253	111	435	61	24.06
Common gull	0.18	170	72	286	50	29.31
Great black-backed gull	0.25	235	60	485	113	47.73
Herring gull	0.52	491	294	717	99	20.04
Lesser black-backed gull	0.37	347	137	625	107	30.69
Sandwich tern	0.01	13	0	37	9	68.80
Common tern	0.03	25	0	62	14	53.67
Arctic tern	0.06	55	12	106	19	34.31
Guillemot	14.63	13810	7786	21836	3100	22.44
Razorbill	0.28	263	74	522	99	37.45
Black guillemot	0.01	9	0	32	9	100.00

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Puffin	0.19	176	66	302	47	26.43
Great northern diver	0.03	25	0	58	17	68.00
European storm petrel	0.02	17	0	45	11	63.63
Fulmar	0.06	53	0	127	24	45.01
Manx shearwater	15.88	14990	3765	31944	6850	45.70
Gannet	0.14	132	54	225	34	25.09
Cormorant	0.05	43	0	105	21	48.39
Shag	0.04	38	8	79	18	45.96
Lion's mane jellyfish	0.01	9	0	26	9	100.00
Grey seal	0.03	27	0	66	19	70.37
Common dolphin	0.13	126	24	269	56	43.94
Harbour porpoise	0.02	22	0	63	17	74.97

Table 116 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 21 on 03 June 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Shelduck	0.01	9	0	25	8	88.89
Mallard	0.03	26	0	75	25	96.15
Oystercatcher	0.02	16	0	50	16	100.00
Curlew	0.01	9	0	25	9	100.00
Kittiwake	0.32	304	127	528	73	23.97
Common gull	0.20	187	78	315	52	27.79
Great black-backed gull	0.25	234	55	495	113	47.96
Herring gull	0.54	506	313	740	101	19.84
Lesser black-backed gull	0.38	356	148	627	104	29.17
Sandwich tern	0.02	21	0	53	13	60.23
Common tern	0.05	44	2	93	19	41.78
Arctic tern	0.10	93	30	170	27	28.95
Guillemot	14.88	14041	8017	22293	3127	22.27
Razorbill	0.28	268	70	517	98	36.56
Black guillemot	0.02	17	5	39	10	58.82
Puffin	0.32	300	166	457	57	18.82

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Great northern diver	0.03	26	0	65	18	69.23
European storm petrel	0.02	16	0	45	10	62.50
Fulmar	0.06	58	4	126	23	38.75
Manx shearwater	16.50	15578	3790	31524	6702	43.02
Gannet	0.14	131	53	221	34	25.28
Cormorant	0.04	41	0	104	21	50.75
Shag	0.04	37	8	78	17	44.57
Lion's mane jellyfish	0.01	9	0	32	9	100.00
Grey seal	0.10	93	25	214	50	53.76
Common dolphin	0.13	126	17	275	56	44.17
Harbour porpoise	0.02	23	0	62	18	75.93

Table 117 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 22 on 19 July 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	16.43	15504	7651	26051	4366	28.15
All non-avian animals	0.20	190	71	345	74	38.95
Species group						
Wader species	0.69	656	17	1822	573	87.23
Small gull species	1.08	1022	539	1633	238	23.25
Large gull species	0.45	428	195	716	128	29.83
Arctic / common tern	1.00	940	426	1540	231	24.56
Tern species	0.19	177	64	341	76	42.43
Large auk	2.52	2382	1811	3034	265	11.12
Auk species	1.83	1725	839	2985	484	28.00
Auk / shearwater species	0.76	721	224	1403	269	37.30
Fulmar / gull species	0.07	63	17	109	19	29.18
Shearwater species	7.50	7076	1834	15238	3395	47.97
Gannet species	0.01	9	0	25	9	100.00
Cormorant / shag	0.15	145	53	288	52	35.46
Heron species	0.01	8	0	25	8	100.00
Fish species	0.04	34	0	81	22	64.71

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Seal species	0.03	33	8	64	15	45.45
Dolphin species	0.13	123	25	259	63	51.22
Tern / small gull species	0.01	5	0	12	4	80.00
Storm petrel species	0.01	5	0	13	4	80.00

Table 118 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 22 on 19 July 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.61	574	0	1778	562	97.77
Curlew	0.04	38	0	91	20	51.10
Kittiwake	0.96	908	460	1411	208	22.89
Black-headed gull	0.01	9	0	25	9	100.00
Common gull	0.09	82	16	168	36	43.31
Great black-backed gull	0.07	66	25	113	24	36.36
Herring gull	0.33	316	113	584	114	35.87
Lesser black-backed gull	0.05	43	0	98	21	47.94
Sandwich tern	0.07	64	32	105	20	31.25
Little tern	0.12	110	0	295	80	71.91
Common tern	0.41	386	127	705	119	30.75
Arctic tern	0.33	314	115	598	106	33.52
Guillemot	2.66	2515	1886	3204	284	11.27
Razorbill	0.02	20	0	62	16	77.62
Puffin	1.58	1493	592	2817	493	32.99

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Fulmar	0.06	54	9	98	18	32.34
Manx shearwater	8.03	7580	2053	16916	3737	49.29
Gannet	0.01	8	0	25	8	100.00
Shag	0.14	132	33	253	50	37.74
Grey heron	0.01	8	0	25	9	112.50
Bluefin tuna	0.02	17	0	63	17	100.00
Ocean sunfish	0.02	18	0	49	16	88.89
Grey seal	0.02	17	0	41	12	70.59
Common dolphin	0.13	119	25	253	61	51.26
Little gull	0.02	16	0	32	9	56.25
European storm petrel	0.00	4	0	13	4	100.00
Cormorant	0.01	5	0	12	4	80.00

Table 119 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 22 on 19 July 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.67	631	0	1781	543	85.93
Curlew	0.04	38	1	86	21	53.67
Kittiwake	0.97	911	486	1440	212	23.23
Black-headed gull	0.01	9	0	25	9	100.00
Common gull	0.09	83	17	165	36	42.60
Great black-backed gull	0.07	67	25	114	24	35.82
Herring gull	0.34	323	106	600	116	35.71
Lesser black-backed gull	0.04	42	0	97	21	49.08
Sandwich tern	0.07	66	32	105	20	30.30
Little tern	0.12	111	0	289	79	70.36
Common tern	0.56	529	201	914	148	27.88
Arctic tern	0.45	423	160	764	126	29.71
Guillemot	2.72	2568	1932	3251	286	11.13
Razorbill	0.04	42	7	99	23	53.72
Puffin	1.74	1647	788	2929	475	28.79
Fulmar	0.06	61	23	106	19	30.14

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Manx shearwater	8.14	7681	2153	16635	3657	47.60
Gannet	0.01	9	0	25	9	100.00
Shag	0.15	142	41	256	49	34.39
Grey heron	0.01	9	0	25	9	100.00
Bluefin tuna	0.02	17	0	49	16	94.12
Ocean sunfish	0.02	17	0	49	17	100.00
Grey seal	0.03	32	8	64	15	46.88
Common dolphin	0.13	124	25	265	64	51.61
Little gull	0.02	17	4	36	9	52.94
European storm petrel	0.01	5	0	13	4	80.00
Cormorant	0.01	5	0	12	4	80.00

Table 120 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 23 on 17 August 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	19.95	18828	12686	26443	3367	17.88
All non-avian animals	0.41	383	47	853	210	54.62
Species group						
Wader species	0.17	159	48	329	75	47.17
Small gull species	0.25	239	80	424	80	33.16
Large gull species	0.27	258	120	425	70	26.76
Arctic / common tern	0.25	234	8	646	210	89.74
Tern species	0.12	114	0	325	97	85.09
Skua species	0.03	25	0	54	13	52.00
Large auk	4.04	3809	1970	6220	1057	27.74
Auk species	0.06	60	8	141	34	55.40
Auk / shearwater species	0.02	17	0	40	11	64.71
Storm petrel species	0.04	34	0	76	15	41.80
Fulmar / gull species	0.23	215	99	353	56	25.62
Shearwater species	14.01	13220	7945	19617	2803	21.20
Great / Cory's shearwater	0.09	86	8	187	41	47.67
Gannet species	0.45	428	209	672	88	20.52

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cormorant / shag	0.06	60	0	131	29	47.73
Heron species	0.04	39	0	117	34	87.18
Fish species	0.03	32	0	88	19	58.71
Seal species	0.16	147	0	424	133	89.84
Dolphin species	0.22	205	32	445	107	52.20

Table 121 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 23 on 17 August 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.04	40	0	97	28	70.00
Curlew	0.03	33	8	64	15	45.45
Bar-tailed godwit	0.02	17	0	41	12	70.59
Kittiwake	0.13	121	24	267	54	43.93
Black-headed gull	0.02	21	0	53	13	60.23
Common gull	0.08	72	8	190	49	68.06
Great black-backed gull	0.02	21	0	53	12	55.74
Herring gull	0.22	206	88	363	65	31.37
Lesser black-backed gull	0.04	34	0	69	15	42.11
Sandwich tern	0.12	112	0	320	93	83.04
Common tern	0.23	221	0	629	196	88.69
Great skua	0.03	24	0	55	13	54.17
Guillemot	3.93	3709	1954	5939	981	26.44
Razorbill	0.13	126	9	296	72	56.71
Puffin	0.03	29	0	76	19	63.58

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
European storm petrel	0.03	33	0	75	15	43.07
Fulmar	0.23	218	99	346	54	24.70
Cory's shearwater	5.45	5145	3455	7078	789	15.33
Sooty shearwater	0.06	54	16	109	23	41.41
Great shearwater	1.15	1088	454	1890	335	30.72
Manx shearwater	7.40	6982	3139	12118	2367	33.89
Gannet	0.45	424	212	665	87	20.43
Shag	0.06	58	0	131	29	49.37
Grey heron	0.02	17	0	41	12	70.59
Little egret	0.03	24	0	73	25	104.17
Ocean sunfish	0.03	32	0	87	19	58.71
Grey seal	0.06	59	0	182	55	91.78
Common dolphin	0.22	209	32	444	112	53.59

Table 122 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 23 on 17 August 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.08	76	0	171	45	59.21
Curlew	0.06	59	16	127	29	49.15
Bar-tailed godwit	0.03	29	0	65	17	58.62
Kittiwake	0.15	142	43	292	57	39.97
Black-headed gull	0.02	21	0	54	13	60.23
Common gull	0.09	81	8	204	51	62.96
Great black-backed gull	0.02	21	0	52	13	60.23
Herring gull	0.22	207	78	365	66	31.70
Lesser black-backed gull	0.03	33	0	75	14	42.21
Sandwich tern	0.12	110	0	313	94	85.45
Common tern	0.25	236	8	644	204	86.44
Great skua	0.03	25	0	55	13	52.00
Guillemot	3.89	3671	1913	5947	1028	27.99
Razorbill	0.14	131	9	311	75	56.82
Puffin	0.06	61	8	140	35	56.12

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
European storm petrel	0.04	34	0	76	15	41.80
Fulmar	0.22	211	91	348	56	26.11
Cory's shearwater	5.43	5121	3498	7224	787	15.36
Sooty shearwater	0.06	53	16	107	23	42.19
Great shearwater	1.14	1077	465	1880	332	30.82
Manx shearwater	7.34	6931	2998	12516	2392	34.50
Gannet	0.45	426	209	668	89	20.85
Shag	0.06	59	0	130	29	48.21
Grey heron	0.02	17	0	40	11	64.71
Little egret	0.03	24	0	73	24	100.00
Ocean sunfish	0.03	33	0	87	19	56.93
Grey seal	0.16	147	0	424	136	91.88
Common dolphin	0.22	207	17	448	109	52.66

Table 123 Density and population estimates of species groups in the Fuinneamh Sceirde Teoranta survey area during Survey 24 on 16 September 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	2.02	1908	1417	2442	235	12.28
All non-avian animals	0.12	115	32	224	51	44.35
Species group						
Wader species	0.19	178	25	428	111	62.36
Small gull species	0.18	173	58	314	58	32.99
Large gull species	0.23	218	70	482	110	50.03
Tern / small gull species	0.01	8	0	25	8	100.00
Large auk	0.93	881	617	1174	114	12.85
Auk species	0.20	188	57	343	71	37.37
Fulmar / gull species	0.03	25	0	56	14	56.00
Shearwater species	0.04	37	0	85	19	49.84
Gannet species	0.12	112	52	186	28	24.87
Cormorant / shag	0.06	55	13	106	19	34.31
Heron species	0.04	42	0	104	27	64.29
Fish species	0.01	9	0	25	8	88.89
Seal species	0.10	98	9	210	51	52.04

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Cetacean species	0.01	9	0	25	9	100.00

Table 124 Unapportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 24 on 16 September 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.01	9	0	25	9	100.00
Curlew	0.04	34	8	65	16	47.06
Bar-tailed godwit	0.03	33	0	98	30	90.91
Knot	0.11	108	0	321	108	100.00
Kittiwake	0.16	147	27	284	57	38.30
Black-headed gull	0.01	9	0	25	9	100.00
Common gull	0.02	17	0	41	12	70.59
Great black-backed gull	0.09	83	8	214	59	71.08
Herring gull	0.13	119	48	228	46	38.05
Lesser black-backed gull	0.02	17	0	41	12	70.59
Guillemot	0.83	784	572	1026	92	11.63
Razorbill	0.09	85	0	251	71	82.46
Black guillemot	0.05	49	0	105	26	53.06
Puffin	0.12	116	25	227	54	46.55
Fulmar	0.02	17	0	41	12	70.59

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Manx shearwater	0.04	38	0	87	20	51.10
Gannet	0.12	113	53	186	28	24.65
Shag	0.05	47	8	92	18	37.16
Grey heron	0.02	17	0	41	11	64.71
Little egret	0.03	24	0	65	19	79.17
Ocean sunfish	0.01	9	0	25	9	100.00
Grey seal	0.09	84	0	184	47	55.95
Harbour porpoise	0.01	9	0	25	8	88.89
Cormorant	0.01	5	0	13	4	80.00

Table 125 Apportioned density and population estimates of species in the Fuinneamh Sceirde Teoranta survey area during Survey 24 on 16 September 2023

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Oystercatcher	0.01	9	0	25	9	100.00
Curlew	0.03	33	8	66	17	51.52
Bar-tailed godwit	0.03	33	0	98	32	96.97
Knot	0.12	111	0	323	110	99.10
Kittiwake	0.16	147	34	288	57	38.30
Black-headed gull	0.01	9	0	25	9	100.00
Common gull	0.02	17	0	41	12	70.59
Great black-backed gull	0.09	85	8	215	58	68.24
Herring gull	0.13	121	41	233	46	37.34
Lesser black-backed gull	0.02	17	0	42	12	70.59
Guillemot	0.84	797	572	1041	95	11.88
Razorbill	0.09	84	0	249	68	80.85
Black guillemot	0.07	63	14	124	29	46.03
Puffin	0.12	117	17	235	58	49.57
Fulmar	0.03	25	0	57	14	56.00

Category	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Manx shearwater	0.04	37	0	88	20	53.10
Gannet	0.12	114	53	186	29	25.26
Shag	0.05	49	13	94	18	34.87
Grey heron	0.02	17	0	41	12	70.59
Little egret	0.03	26	0	66	19	73.08
Ocean sunfish	0.01	9	0	25	9	100.00
Grey seal	0.10	98	17	204	49	50.00
Harbour porpoise	0.01	9	0	25	8	88.89
Cormorant	0.01	6	0	15	5	83.33

Appendix II: Absolute population estimates

- 223 Population estimates for four species (guillemot, razorbill, puffin and harbour porpoise) were divided by a correction factor as outlined in section 2.5.3 to take account of availability bias and give estimates of absolute abundance. Adjusted absolute estimates for harbour porpoise are presented below alongside relative estimates. Tables for guillemot, razorbill and puffin are presented in the main report.

Table 126 Absolute monthly density and population estimates for harbour porpoise in the Fuinneamh Sceirde Teoranta survey area between October 2021 and September 2023, accounting for the potential number of animals estimated as being unavailable for detection

Survey Date	Relative population estimates						Absolute population estimates			
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)
28 October 2021	0.00	0	0	0	0	0.00	0.00	0	0	0
27 November 2021	0.01	8	0	25	8	100.00	0.04	34	0	107
10 December 2021	0.00	0	0	0	0	0.00	0.00	0	0	0
21 January 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
01 March 2022	0.01	8	0	25	8	100.00	0.03	26	0	80
19 March 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
01 April 2022	0.04	40	0	104	29	72.50	0.11	108	0	280
27 May 2022	0.01	8	0	25	8	100.00	0.03	25	0	77
18 June 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
11 July 2022	0.03	32	0	88	25	78.12	0.11	113	0	311
06 August 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
01 September 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
17 October 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
29 November 2022	0.01	9	0	25	8	88.89	0.04	39	0	107
22 December 2022	0.00	4	0	12	4	100.00	0	16	0	49

Survey Date	Relative population estimates						Absolute population estimates			
	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km ²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)
19 January 2023	0.03	30	0	109	26	84.39	0.11	107	0	387
09 February 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
04 March 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
18 April 2023	0.01	5	0	17	5	100.00	0.03	14	0	47
02 May 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
03 June 2023	0.02	23	0	62	18	75.93	0.07	77	0	208
19 July 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
17 August 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
16 September 2023	0.01	9	0	25	8	88.89	0.04	39	0	107