CSHAS 2021 Bird Survey Report

Materials and Methods

The seabird survey was conducted from the 09/10/21 to the 26/10/21 using a single seabird surveyor on each survey leg. The seabird observer conducted visual survey effort, while also collecting and recording all survey data. The observer's survey effort was maximized and optimized during periods of sea state less than or equal to sea state 6 and with visibility of greater than 300m. Additional visual point sampling (e.g., at oceanographic sampling stations or fishing stations) and incidental recording were also employed; however line transect survey effort was prioritised by the observer. Seabird watches were conducted using a standard single platform line transect survey design while the vessel was travelling at a consistent speed and heading. All observations for seabirds were conducted from the monkey island (deck height 12 m above sea level).

The data collection methodology was based on that originally proposed by Tasker *et al.* (1984) with later adaptations applied to allow correction factors to be applied for missed birds (Camphuysen *et al.*, 2004). The method employed used a single platform line transect survey design with sub-bands to survey birds associated with the water, while flying birds were surveyed using a 'snapshot' technique. Observer effort was concentrated in a bow-beam arc of 90° to one side (i.e., to port or starboard) of the vessel's track-line, however, all seabirds observed outside this area were also recorded.

Survey effort for seabirds associating with the water were concentrated within a survey strip of 300m running parallel and adjacent to the vessels track-line and extending to the horizon. All birds surveyed within this region were be recorded as 'in-transect' and assigned to one of four distance sub-bands (A: 0-50m, B: 50-100m, C: 100-200m, D: 200-300m) according to their perpendicular distance from the track-line. This approach allows for the evaluation of biases caused by specific differences in detection probability with increasing distance from the trackline (Camphuysen *et al.* 2004). Seabirds occurring outside of this survey strip were recorded as 'off-transect' and assigned to a separate sub-band (E: >300m). The perpendicular distance to an animal was estimated using a fixed interval range finder (Heinemann, 1981), ensuring each animal is allocated to the correct distance sub-band.

Flying birds were surveyed using 'snapshots', where instantaneous counts of flying birds within a survey quadrant of 300m x 300m were conducted. The periodicity of these 'snapshots' was vessel speed dependent but timed to allow counts to occur as the vessel passes from one survey quadrant to the next. This method minimises biases in counts of flying birds relative to the movement of the vessel (Pollock *et al.,* 2000, Camphuysen *et al.* 2004).

Seabirds remaining with the vessel for more than 2 minutes were deemed to be associating with the vessel (Camphuysen *et al.* 2004) and were recorded as such. Seabirds seen associating with other vessels (i.e. fishing vessels) were also recorded as such.

Searching for seabirds was done with the naked eye, however, Leika Ultravid 8x42 HD binoculars were used to confirm parameters such as species identification, age, moult, group size and behaviour (Mackey *et al.* 2004). A Canon EOS 7D Mark II DSLR camera with a Canon EF 100-400mm F4.5-5.6 IS II USM telephoto lens was used to visually document other information of scientific interest. Data was also collected on all migratory/ transient waterfowl and terrestrial birds encountered.

The Cybertracker (http://www.cybertracker.org/) data collection software package (Version 3.514) was used to collect all positional, environmental and sightings data, and save it to a Microsoft Access database. Positional data was collected using a portable GPS receiver with a USB connection and recorded every 5 seconds.

Each line transect was assigned a unique transect number, and a new transect was started anytime the vessel activity changed (i.e. changing from on-transect to inter-transect). Each subsequent bird observation was also assigned to this unique transect number.

Environmental data was timestamped and recorded with GPS data at the beginning and end of each line transect and also as soon as any change in environmental conditions occurred. Environmental data recorded included; wind speed, wind direction, sea state, swell, visibility, cloud cover and precipitation.

Each observation was timestamped and recorded with GPS data using Cybertracker. Sighting data such as; species identification, distance band, group size, composition, heading, age, moult, behaviour and any associations with cetaceans or other vessels were also recorded on the time stamped Cybertracker sighting record page. Where species identification could not be confirmed, sightings were recorded at an appropriate taxonomic level (i.e. large gull sp., Larus sp., Commic tern, etc.).

Ancillary data such as line changes, changes in survey activity (e.g. fishing/CTD cast) and fishing vessel activity were also recorded.

Results

In total, 71 hours and 26 minutes of survey effort were conducted over the course of CSHAS 2021. In total, 66 hours and 14 minutes of survey effort were conducted using a line transect methodology, while 5 hours of effort were conducted using the point sampling methodology. A further 12 minutes of effort were conducted as a casual watch.

A total of 2879 seabird observations were recorded throughout the survey, totalling 14797 individuals (*Table 1*). In total, 4181 seabirds were recorded as "in transect", while 10616 were recorded "off transect". The species encountered included 29 species, hybrids or species groups, from eight families. A further 41 observations of terrestrial/migratory birds were also recorded, comprising of 150 individuals (*Table 2*).

Gannet (*Morus bassanus*) were the most frequently encountered species, recorded on 1006 separate occasions, accounting for 34.9% of all records. Gannet records comprised of a total of 5667 individuals (38.3% of all individual birds recorded) making gannet the most abundant species recorded on the survey. However, of these, only 758 individuals were recorded as 'in transect'.

Guillemot (*Uria aalge*) were both the second most frequently encountered and the second most abundant species accounting for 644 records (22.4% of all encounters) and comprising of 2257 individuals in total (15.3% of all encountered individuals.) Of these, 1904 individuals were recorded as 'in transect'.

Kittiwake (*Rissa tridactyla*) were the third most frequently observed species accounting for 316 sightings (11.0% of all sightings). Kittiwake were also the third most abundant species comprising of 1398 individuals in total (9.4% of all encountered individuals.) Of these, 379 individuals were recorded as 'in transect'.

A number of terrestrial/ migratory birds were encountered during the survey. A total of 41 observations of terrestrial/ migratory bird species were recorded during the survey (*Table 2*). These records comprised of 150 individuals from 19 species'. Species recorded included a Siberian chiffchaff (*Phylloscopus collybita tristis*), a black redstart (*Phoenicurus ochruros*), a wren (*Troglodytes troglodytes*) and a lone juvenile whooper swan (*Cygnus cygnus*).

Table 1. *Summary of seabird observations during the survey.*

Common Name	Species name	No. of Records	No. of Individuals	In Transect	Off Transect
Fulmar	*Fulmarus glacialis*	160	274	28	246
Great Shearwater	*Ardenna graves*	5	11	2	9
Sooty Shearwater	*Ardenna griseus*	96	499	137	362
Manx Shearwater	*Puffinus puffinus*	38	169	9	160
Storm Petrel	*Hydrobates pelagicus*	16	53	40	13
Leach's Petrel	*Oceanodroma leucorhoa*	1	1	1	0
Gannet	*Morus bassanus*	1006	5667	758	4909
Pomarine Skua	*Stercoratius pomarinus*	5	5	1	4
Arctic Skua	*Stercoratius parasiticus*	5	5	1	4
Great Skua	*Stercoratius skua*	37	51	9	42
Mediterranean gull	*Larus melanocephalus*	14	53	14	39
Common Gull	*Larus canus*	24	50	26	24
Black-headed Gull	*Larus ridibundus*	16	32	19	13
Lesser Black-backed Gull	*Larus fuscus*	65	1157	47	1110
Herring Gull	*Larus argentatus*	44	269	20	249
Yellow-legged gull	*Larus michahellis*	1	1	0	1
Great Black-backed Gull	*Larus marinus*	102	366	29	337
Kittiwake	*Rissa tridactyla*	316	1398	379	1019
Large gull sp.	*Larus sp.*	4	230	0	230
Arctic Tern	*Sterna paradisaea*	2	3	0	3
Guillemot	*Uria aalge*	644	2257	1904	353
Razorbill	*Alca torda*	133	392	268	124
Razorbill / Guillemot	*Alca torda / Uria aalge*	42	1647	380	1267
Puffin	*Fratercula arctica*	89	174	107	67
Shag	*Phalacrocorax aristotelis*	5	24	1	23
Cormorant	*Phalacrocorax carbo*	1	1	0	1
Great Northern Diver	*Gavia immer*	4	4	1	3
Total		**2879**	**14797**	**4181**	**10616**

Table 2*. Summary of terrestrial birds recorded during the survey.*

Common Name	Species name	No. of Sightings	No. of Individuals
Black Redstart	*Phoenicurus ochruros*	1	1
Blackcap	*Sylvia atricapilia*	1	1
Chiffchaff	*Phylloscopus collybita*	1	1
Dunlin	*Calidris alpina*	1	1
Goldcrest	*Regulus regulus*	2	2
Goldfinch	*Carduelis carduelis*	1	4
Grey Wagtail	*Motacilla cinerea*	1	1
House Martin	*Delichon urbica*	1	1
Linnet	*Carduelis cannabina*	1	1
Meadow Pipit	*Anthus pratensis*	13	113
Merlin	*Falco columbarius*	3	3
Pied Wagtail	*Motacilla alba*	3	3
Redwing	*Turdus iliacus*	2	3
Robin	*Erithacus rubecula*	1	1
Rock Pipit	*Anthus spinoletta*	1	2
Siberian Chiffchaff	*Phylloscopus collybita tristis*	1	1
Skylark	*Alauda arvensis*	2	3
Swallow	*Hirundo rustica*	3	6
Whooper Swan	*Cygnus cygnus*	1	1
Willow Warbler	*Phylloscopus trochilus*	1	1
Wren	*Troglodytes troglodytes*	1	1
Total		**41**	**150**