

Hemsby Wind Farm Proposal, Norfolk

Appendix 8.2: Ornithology

1. Aims

The aim of this survey was to provide information concerning the status of bird species at the proposed wind farm site at Hemsby, centred on Grid Ref: TG 488 163. This information would then be used to inform assessment of potential impacts of the development on birds, and to recommend mitigation measures if required.

2. Methodology

2.1 Vantage Point Study

Vantage point surveys were used to monitor and depict bird flight activity at the study site in accordance with best practice guidance for onshore wind farm avian impact assessment (Scottish Natural Heritage 2005). The study area was visited on 21 occasions over the period from 22nd May 2006 to 19th February 2007, and on 36 occasions from 30th March 2008 to 31st March 2009. (see **Table 1**).

The survey area included all land within at least 500m of each of the proposed wind turbine locations as specified in Scottish Natural Heritage (2005). Vantage point work was undertaken from two vantage points in order to achieve complete coverage of the site. The eastern vantage point was located outside the 500 metre buffer zone and the western vantage point was located approximately 70 metres inside the 500m buffer, as shown in **Figure 1**. The encroachment of the western vantage point to within less than 500m of the proposed turbine positions occurred due to the repositioning of the proposed turbine while the surveys were being conducted. The necessary authorities were consulted regarding the possibility of the presence of the surveyor disturbing bird use within the 500 metres, but advised that the effects would be insignificant. The positioning of the western vantage point gave an incomparably full and complete view of the two westernmost turbine locations which could not have been achieved by surveying from beyond the 500m buffer, so when the turbines were repositioned the vantage point remained in the same spot.

Only the presence/movements of target species (i.e. those considered vulnerable to collision) were fully documented. Vulnerable species were accepted as those which are listed in Langston & Pullan (2004), Scottish Natural Heritage (2006), and other species judged to be at risk based on professional opinion and other published reports. The vantage point watches were focused mainly on evaluating the use of the study site by waders, raptors, and waterfowl.

During the vantage point surveys, data was recorded for each target species sighting. Data recorded for each observation included: time of sighting, bird count, direction of flight, estimated height(s) of flight in metres, description of flight behaviour/activity, length of time observed, special notes (e.g. sex of bird observed, mobbing, hunting), and a map reference number. Maps were drawn of all flight patterns observed during each vantage point survey.

All vantage point surveys were conducted by ornithologists with 5 years or more experience in professional vantage point (wind farm) work.

Details of these surveys are as follows:

Table 3A. Western Vantage Point Survey Details

Date	Times	Duration – Hours: minutes	Weather
30/03/2008	05.50 – 09.00 10.15 – 13.30	6: 25	Overcast, good visibility, light Southerly wind, light rain 06.00 – 07.00
06/04/2008	05.40 – 08.40	3	7/8 cloud, good visibility, light North-westerly wind, hail shower 06.00
12/04/2008	05.30 – 08.30 09.00 – 12.00	6	No cloud, good visibility, light Westerly wind, becoming slightly overcast
30/04/2008	05.00 – 08.00 08.30 – 11.30	6	4/8 cloud, good visibility (poor from 05.00 to 06.00), light Easterly wind changing to moderate south-westerly
04/05/2008	05.00 – 08.00 09.00 – 12.00	6	4-8/8 cloud, good visibility, light NE wind, light rain 07.25 – 08.00
10/05/2008	05.00 – 08.00 09.00 – 12.00	6	1/8 cloud, good visibility, no wind, some low-lying mist in first hour
31/05/2008	07.00 – 10.00 10.30 – 13.30	6	8/8 cloud, good visibility, light NW wind
07/06/2008	10.30 – 13.30 15.00 – 18.00	6	7/8 cloud, good visibility, light W wind, overcast and muggy
17/06/2008	07.00 – 10.00 11.30 – 14.30	6	2-7/8 cloud, good visibility, calm, hot and sunny.
15/07/2008	07.45 – 10.45 12.45 – 15.45	6	4-7/8 cloud, good visibility, calm, dry and warm.
26/07/2008	11.00 – 14.00 15.00 – 18.00	6	0/8 cloud, good visibility, light NW wind, hot.
03/08/2008	08.30 – 11.30 12.00 – 15.00	6	2-3/8 cloud, moderate westerly breeze, visibility good, sunny.
18/08/2008	06.30 – 10.00 13.00 – 15.30	6	6-8/8 cloud, good visibility, light S wind, heavy rain between survey periods
06/09/2008	08.45 – 12.45	4	6/8 cloud, good visibility, light S wind, intermittent heavy showers
20/09/2008	11.30 – 14.17	3: 17	Overcast, moderate north-westerly wind, visibility good.
22/09/2008	18.20 – 18.55	0: 35	5/8 cloud, moderate north-easterly breeze, visibility good.
06/10/2008	07.00 – 10.00	3	Calm, overcast, visibility moderate to poor, misty for the first hour.
19/10/2008	11.00 – 14.00	3	2/8 cloud, light easterly wind, visibility good.

Date	Times	Duration – Hours: minutes	Weather
31/10/2008	06.20 – 09.20	3	2/8 cloud, calm, visibility good
09/11/2008	12.30 – 15.30	3	Overcast, light north-westerly wind, visibility moderate, intermittent rain showers.
14/11/2008	14.15 – 17.15	3	6/8 cloud, light westerly wind, visibility good, becoming more overcast.
18/11/2008	14.00 – 17.00	3	Overcast, light south-westerly wind, visibility good.
22/11/2008	06.55 – 08.25 15.15 – 16.45	3	5/8 to 8/8 cloud, light north-westerly breeze, visibility good, cold, brief snow and hail blizzards with squally winds.
05/12/2008	13.40 – 16.40	3	2/8 cloud, wind force 2, northerly, visibility good.
10/12/2008	07.00 – 08.00 13.00 – 15.00	3	2/8 cloud cover, no wind, visibility good.
17/12/2008	07.15 – 10.15	3	Clear, light south-westerly breeze, visibility good.
20/12/2008	09.00 – 10.30 15.00 – 16.30	3	Overcast, south-westerly breeze, visibility generally good but poor during occasional showers.
05/01/2009	13:40 – 16:45	3: 05	Overcast, wind force 5-6 easterly, light snow, visibility good.
07/01/2009	07:10 – 11:10	4	Overcast, south westerly wind, visibility good.
17/01/2009	07:06 – 08:06 12:30 – 14:30	3	Overcast, wind force 2 – 4 southerly, visibility good, light rain from 07:50.
20/01/2009	14:05 – 17:05	3	1/8 cloud, light south-westerly breeze, visibility good.
03/02/2009	14:00 – 16:56	2: 56	1/8 cloud, wind force 2 south-easterly, visibility good.
09/02/2009	10:00 – 11:45 16:30 – 17:46	3: 01	Overcast, wind force 1 south-westerly, visibility good, light drizzle 11:30-11:45.
12/02/2009	06:30 – 09:30	3	1/8 to 5/8 cloud, wind force 2 south-south-westerly, visibility good, freezing at dawn.
24/02/2009	10:30 – 11:30 17:10 – 18:11	2: 01	Overcast, still, visibility good, wet underfoot, sunny early on becoming gloomy.
03/03/09	16.55 – 18.26	1:31	Dry, cloudy, good visibility, wind SSW 3.
06/03/09	14.00 – 15.52	1:52	Dry, 2-4/8 cloud, good visibility, wind SW 1-2.
12/03/09	14.20 - 15.00 17.51 – 18.43	1:32	Dry, wind NW 3- 4, good visibility, cloudy
31/03/09	09.00 –	1.30	Cloudy, good visibility, SW 1.

Date	Times	Duration – Hours: minutes	Weather
	10.30		
TOTAL		146	

Table 3B. Eastern Vantage Point Survey Details

Date	Times	Duration – Hours: minutes	Weather
30/03/2008	06.00 – 09.00 10.30 – 13.30	6	Cloud cover falling 8/8 to 6/8, visibility good, light Westerly wind, rain shower at 06.40.
08/05/2008	04.30 – 07.30 08.00 – 11.00	6	7/8 cloud, good visibility, light variable wind, misty early, becoming clear.
02/06/2008	07.00 – 10.00 17.30 – 20.30	6	6/8 cloud, good visibility, light NE wind, hazy cloud soon burning off, rain after 19.45
23/06/2008	11.30 – 15.00 14.30 – 18.00	7	7/8 cloud, good visibility, moderate W breeze
24/06/2008	06.30 – 09.30 11.30 – 14.30	6	6-8/8 cloud, good visibility, light SW wind
18/07/2008	14.30 – 17.30	3	8/8 cloud, good visibility, moderate SW breeze, light occasional showers
19/07/2008	09.00 – 12.00	3	7/8 cloud, good visibility, moderate SW breeze
23/07/2008	08.00 – 11.00 13.00 – 16.00	6	8/8 cloud, good visibility, light N wind
09/08/2008	09.00 – 12.00 13.00 – 16.00	6	Overcast, light south-westerly wind, visibility good.
23/08/2008	14.30 – 17.30 18.00 – 21.00	6	3-7/8 cloud, good visibility, light W wind
06/09/2008	13.20 – 15.40	2: 20	4-8/8 cloud, good visibility, light S wind, intermittent heavy showers
11/09/2008	08.30 – 11.30 14.00 – 17.00	6	4/8 cloud, good visibility, light SE wind
20/09/2008	08.00 – 11.00	3	Overcast, north-westerly breeze, visibility good, occasional light drizzle
22/09/2008	13.30 – 18.10	4: 40	6/8 cloud, moderate north-easterly breeze, visibility good.
27/09/2008	10.30 – 13.30 14.00 – 17.00	6	Clear, easterly breeze, warm, visibility good, slightly hazy early on.
19/10/2008	14.30 – 17.30	3	2/8 cloud, light easterly wind, visibility good.
09/11/2008	09.00 – 12.00	3	Overcast, light north-westerly wind, visibility good, started raining at 11.25.

Date	Times	Duration – Hours: minutes	Weather
14/11/2008	10.45 – 13.45	3	3/8 cloud, light westerly wind, visibility good, becoming cloudier throughout.
18/11/2008	10.30 – 13.30	3	Overcast, moderate northerly breeze, visibility good, cold and blustery with light rain throughout.
22/11/2008	08.35 – 10.05 13.30 – 15.00	3	5/8 to 8/8 cloud, light north-westerly breeze, visibility good but deteriorating during brief snow and hail blizzards throughout the day.
05/12/2008	10.15 – 13.15	3	2/8 cloud, wind force 2, northerly, visibility good.
10/12/2008	08.10 – 11.10	3	Clear, light south-westerly wind, visibility good.
17/12/2008	11.30 – 14.30	3	Clear, light south-westerly breeze, visibility good.
20/12/2008	10.40 – 12.10 13.20 – 14.50	3	Overcast, light south-westerly breeze, visibility generally good but poor during occasional showers.
05/01/2009	10:00 – 13:00	3	4/8 – 8/8 cloud cover, wind force 5 – 6 easterly, visibility good, light snow.
07/01/2009	13:30 – 15:30	2	7/8 cloud, light south-westerly breeze, visibility good.
17/01/2009	08:15 – 10:15 11:15 – 12:15	3	1/8 cloud, wind force 5 southerly, visibility good, intermittent showers early on.
20/01/2009	10:00 – 13:00	3	5/8 cloud cover, southerly breeze, visibility good.
03/02/2009	14:10 – 17:10	3	2/8 cloud, light south-easterly breeze, visibility good.
09/02/2009	11:55 – 13:10 14:30 – 16:15	3	Overcast, wind force 2 south-westerly, visibility good, drizzle throughout.
12/02/2009	12:15 – 15:15	3	7/8 – 8/8 cloud, wind force 3 – 4 south-south-westerly, visibility good.
24/02/2009	11:45 – 13:45 15:00 – 17:00	4	Overcast, still, visibility good, wet underfoot, sunny early on, becoming gloomy.
03/03/09	12.00 – 15.00 16.00 – 16.43	3:43	Dry. 9 degrees. Rain 14.10 to 15.00
06/03/09	09.30 - 12.30	3	Cold but bright, SW3, good visibility
12/03/09	12.40 - 14.10, 16.05 – 17.35	3	Cloudy, NW3, good visibility
31/03/09	11.30 – 14.30	3	Cloudy, SW1, good visibility
TOTAL		146	

In addition to the vantage point surveys undertaken above, the surveys detailed below were undertaken covering the western part of the site for the previous planning submission.

Table 1B: Summer 2006 Vantage Point Survey Details

Date	Time	Duration Hours: minutes	Weather Conditions
12/07/2006	10.30-13.30 13.45-17.00	6: 15	Warm, sunny, 50% cloud, wind 1-2 SSW
24/07/2006	06.45-12.45	6	Warm, sunny, <1% cloud, Wind 1 ENE
27/07/2006	06.15-12.15	6	Warm, sunny, 30% cloud, Wind 0-1 SW
01/08/2006	09.10-12.10 13.30-16.30	6	High cloud, breezy, fresh 5/10, wind W4
04/08/2006	07.00-10.30 10.30-13.30	6: 30	Cool, 100% cloud, fresh NW breeze
10/08/2006	13.30-19.00	5: 30	Cloud 50%, light – moderate W breeze becoming overcast
TOTAL		36:15	

Table 1C. Wintering Bird Vantage Point 2006-7 Survey Details

Date	Times	Duration – Hours: minutes	Weather Conditions
25/10/2006	09.20 – 12.30	3: 10	Fair, high cloud with a light SE wind.
10/11/2006	11.00 – 14.00	3	Fine, S wind 3-4, high cloud 6/10 cover.
07/12/2006	10.00 – 13.00	3	South-west wind, cloud cover 7/8, good visibility
07/12/2006	13.15 – 16.00	2: 45	Fresh SW wind, 8/8 cloud, becoming dark.
04/01/2007	08.30 – 11.30	3	Strong NE wind, 7/8 cloud
04/01/2007	12.00 – 15.00	3	Strong NE wind, 7/8 cloud
17/01/2007	08.15 – 11.15	3	Strong wind, cloud 8/8, light rain becoming heavier.
17/01/2007	11.30 – 14.30	3	Strong wind, cloud 8/8, breaking up later.
02/02/2007	10.00 – 13.00	3	Slight wind, cloud 4/8, sunny with good visibility
02/02/2007	13.00 – 16.00	3	Strong NW wind, cloud 1/8, good visibility
19/02/2007	08.30 – 11.30	3	Light wind, cloud 8/8
19/02/2007	12.00 – 15.00	3	Moderate SW wind, cloud 8/8, decreasing visibility
TOTAL		35:55	

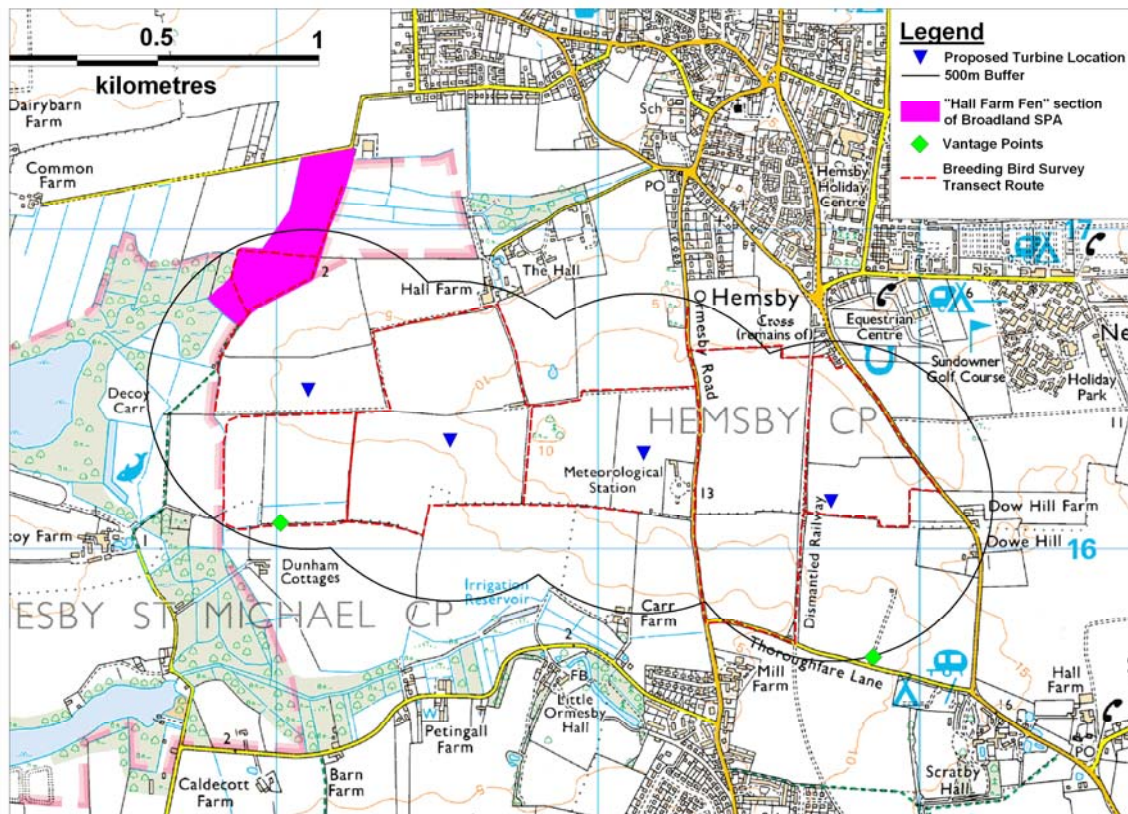


Figure 1. Bird Survey Locations

The vantage point data collected between 12th July 2006 and 19th February 2007 included further observations of Cormorant, Marsh Harrier and Pink-footed Geese, plus one sighting of two Whooper Swans on 7th December 2006. Analysis of this data has shown that the omission of the 12th July 2006 to 19th February 2007 data has a negligible effect upon the overall assessment because the rates of occurrence of these birds in these early surveys are so similar to the rates of occurrence in the surveys conducted since 30th March 2008.

2.3 Breeding birds

The survey protocol used was an abbreviated version of the methodology detailed by the British Trust for Ornithology (BTO) in their Common Birds Census (CBC) (Gilbert et al. 1998). Three survey visits, conducted between April and June 2006, were seen as an appropriate level of survey to determine which species were nesting on the site, and to give an estimate of their abundance (as opposed to the monitoring purposes of the CBC achieved using eight to ten visits). The RSPB was consulted as to the suitability of three survey visits for breeding bird assessment, and confirmed that it was a suitable survey effort.

Breeding bird surveys were conducted during the following dates and conditions:

22nd May 2006. Moderate breeze, occasional light showers, cloudy and cool.

13th June 2006. 20% cloud, light N wind, sunny and warm, excellent visibility.

23rd June 2006, 90% cloud, light SW wind, mild.

A pre-determined transect route was walked at a slow and steady pace through the study area, mapping all bird species seen and heard. All points within 500 metres of proposed turbine positions received coverage (refer to the map in **Figure 1**). Birds

just outside of the buffer zone were also recorded on the assumption that part of their territory may include some of the study site.

Nesting and territorial behaviour (singing, nest building, carrying food, fighting, copulation, nest locations, alarm calling, carrying faecal sacs) were noted by standard codes, as were the age and sex of the birds concerned where observed. Non-nesting behaviour such as over-flying the site was also noted, together with the direction of movement. Birds not considered likely to be nesting on site were still noted where observed.

When compiled after three survey visits, the Common Bird Census data was analysed to provide an estimate of bird breeding territory distribution and quantity [as described in Marchant (1983) and Bibby et al. (2000)]. This is achieved by isolating the registrations recorded for a single, selected species in each survey visit, and then plotting all of those registrations together on a single map. The resulting cluster of registrations is then interpreted by an experienced ornithologist to define distinct breeding territories. The same methodology is repeated for each species recorded exhibiting nesting and/or territorial behaviour in any or all of the five survey visits.

Potential barn owl nesting sites (nest boxes, suitable buildings, large trees) were also searched for within the study site.

All breeding bird surveys were conducted by ornithologists with 5 years or more experience in professional site assessment for breeding birds.

3. Results

3.1 Vantage Point Survey

38 species of bird that are considered to have turbine collision vulnerability were recorded flying over the study site; 30 of those species are of elevated conservation status (**Table 2**).

The other 8 target species seen are perceived to have a vulnerability to turbine collisions but are of low conservation concern (**Table 3**).

5 non-target bird species of elevated conservation concern [i.e. considered unlikely for turbine collision based on professional experience and research reviews by Langston & Pullan (2004) and SNH (2006)] were also recorded flying over the study site (**Table 4**).

Table 2: Collision-sensitive Species of Conservation Concern Observed on Site During Vantage Point Surveys

Species	Conservation status	Occurrence in study area March 2008 – March 2009	Reference(s) for impact vulnerability
Bar-tailed Godwit	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list	2 birds sighted on one occasion	Langston & Pullan 2004; Scottish Natural Heritage 2006
Brent Goose	Basic protection under WCA 1981; Amber list	A total of 149 birds sighted on 4 occasions, overflying the site. Largest flock 145.	Langston & Pullan 2004; Scottish Natural Heritage 2006

Species	Conservation status	Occurrence in study area March 2008 – March 2009	Reference(s) for impact vulnerability
Barn Owl	Schedule 1 of WCA 1981; Amber list	Regularly sighted flying below the risk window height, hunting over the site. 56 overflights, all but one of single birds	Langston & Pullan 2004; Scottish Natural Heritage 2006
Common Tern	EC Birds Directive Annex I; Green list	6 overflights totalling 19 birds June- Aug 2008	Langston & Pullan 2004
Cormorant	Basic protection under WCA 1981; Amber list	Regularly sighted overflying the 500m buffer zone. 72 overflights totalling 180 birds.	Langston & Pullan 2004
Curlew	Basic protection under WCA 1981; Amber list; UK BAP Priority Species	4 overflights totalling 4 birds May – Aug 2008	Langston & Pullan 2004; Scottish Natural Heritage 2006
Dunlin	Basic protection under WCA 1981; Amber list;	1 overflight of 2 birds on 23 rd July 2008.	Langston & Pullan 2004
Gadwall	Basic protection under WCA 1981; Amber list	2 overflights totalling 5 birds, Feb 2008 and October 2008.	Langston & Pullan 2004
Golden Plover	Basic protection under WCA 1981; EC Birds Directive Annex I; Green list	11 overflights totalling 502 birds, maximum flock 220, seen between July 2008 – Feb 2009.	Langston & Pullan 2004; Scottish Natural Heritage 2006
Gulls (Black-headed, Common, Lesser Black-backed)	Basic protection under WCA 1981; Amber list	Regular sightings of low numbers within the study area.	Everaert & Kruijken 2007
Hen Harrier	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Red list	1 overflight of 1 bird on 6 th March 2009.	Langston & Pullan 2004
Hobby	Schedule 1 of WCA 1981; Green list	19 overflights, all of single birds, June – Sept 2008	Langston & Pullan 2004
Kestrel	Basic protection under WCA 1981; Amber list	Regular sightings (82 overflights) within the 500m buffer area.	Hötker et al. 2006
Lapwing	Basic protection under WCA 1981; Amber list	31 overflights totalling 1284 birds, maximum flock of 210 birds, winter months only.	Langston & Pullan 2004
Little Egret	Basic protection under WCA 1981; Amber list	1 bird sighted on 21 st Nov 2008.	Langston & Pullan 2004

Species	Conservation status	Occurrence in study area March 2008 – March 2009	Reference(s) for impact vulnerability
Marsh Harrier	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list; SPA feature	108 overflights totalling 112 birds, throughout the year.	Langston & Pullan 2004
Mediterranean Gull	Schedule 1 of WCA 1981;	3 overflights of one bird each, Aug – Oct 2008	Everaert & Kruijken 2007
Mute Swan	Basic protection under WCA 1981; Amber list	3 overflights totalling 15 birds, maximum flock 11.	Langston & Pullan 2004
Oystercatcher	Basic protection under WCA 1981; Amber list	6 overflights totalling 12 birds.	Langston & Pullan 2004
Peregrine	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list	2 overflights of a single bird each, Feb – March 2009.	Scottish Natural Heritage 2006
Pink-footed Goose	Feature of European designated site	41 overflights totalling 5,360 birds mostly seen between Nov 2008 and Feb 2009.	Langston & Pullan 2004
Red Kite	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list	1 overflight on 12 th April 2008.	Langston & Pullan 2004
Sandwich Tern	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list	7 overflights totalling 35 birds on 23 rd July 2008	Langston & Pullan 2004
Snipe	Basic protection under WCA 1981; Amber list	18 overflights totalling 283 birds, winter 08/09	Langston & Pullan 2004
Teal	Basic protection under WCA 1981; Amber list	4 overflights totalling 22 birds	Langston & Pullan 2004
Whooper Swan	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list	2 seen during 2006/7 vantage point watches.	Langston & Pullan 2004
Wigeon	Basic protection under WCA 1981; Amber list	2 flying over 25 th Oct 06	Langston & Pullan 2004
Woodcock	Basic protection under WCA 1981; Amber list	8 overflights of one bird each, winter 08/09	Langston & Pullan 2004

Table 3: Low Conservation Concern Species with Collision Vulnerability

Species	Conservation Status	Occurrence in Study Area March 2008 – March 2009	Reference for Impact Vulnerability
Buzzard	Basic protection under WCA 1981; Green list	20 overflights totalling 21 birds, mostly during winter months.	Langston & Pullan 2004
Canada Goose	Basic protection under WCA 1981; Green list	10 overflights totalling 71 birds, largest flock 55 birds.	Langston & Pullan 2004
Egyptian Goose	Basic protection under WCA 1981; Green list	25 overflights totalling 48 birds, throughout the year.	Langston & Pullan 2004
Great Black-backed Gull	Basic protection under WCA 1981; Green list	28 overflights totalling 63 birds	Langston & Pullan 2004
Grey Heron	Basic protection under WCA 1981; Green list	72 overflights totalling 78 birds, throughout the year.	Langston & Pullan 2004
Greylag Goose	Feral populations of uncertain legal status	16 overflights totalling 109 birds, throughout the year	Langston & Pullan 2004
Mallard	Basic protection under WCA 1981; Green list	58 overflights totalling 109 birds, throughout the year.	Langston & Pullan 2004
Sparrowhawk	Basic protection under WCA 1981; Green list	37 overflights totalling 39 birds, throughout the year.	Hötcker et al. 2006

Table 4: Other Species with Low Collision Sensitivity

Species	Occurrence in study area March 2008- March 2009	Conservation status
Carrion Crow	Abundant	Green List
Fieldfare	Common in winter	Amber List; Schedule 1 of Wildlife & Countryside Act 1981 (breeding populations)
Great-spotted Woodpecker	Occasional single bird	Green List
Jackdaw	Abundant	Green List
Kingfisher	1 flying through 24 th Feb 09	Schedule 1 of WCA 1981; EC Birds Directive Annex I; Amber list
Magpie	Common	Green List
Pheasant	Abundant	Green List
Rook	Abundant	Green List
Red-legged Partridge	Occasional	Green List
Skylark	Low numbers in summer and winter	Red List

Starling	Large numbers move through in autumn	Red List
Swallow	Low numbers in summer months	Amber List
Swift	Common in summer	Green List
Wood Pigeon	Abundant	Green List

In addition, the 2006/7 vantage point surveys recorded small flocks of reed buntings and up to 23 tree sparrows, both red-listed farmland species not at risk from collision.

3.3 Breeding Birds

The CBC surveys observed a total of 39 bird species demonstrating probable breeding behaviour within the 500m buffer area. 16 of those species have an elevated conservation status (either BoCC Red or Amber List). All recorded territories of Red-listed and Amber-listed species are mapped in **Figure 2** and **Figure 3**.

In **Table 6**, those species of lower conservation concern have been grouped into categories, following an estimate of numbers. These are 1-10 territories, 11-20 territories, and 21-30 territories. Red and Amber-listed species are given to the nearest territory or as appropriate.

Table 6: Species Detected by Common Birds Census

Species	Conservation status	Status inside the 500m buffer in 2008	Nesting habitat
Blackbird	Green list (lower concern)	1-10 territories	Woods and hedges
Blackcap	Green list (lower concern)	1-10 territories	Woods
Blue Tit	Green list (lower concern)	1-10 territories	Woods and hedges
Carrion Crow	Green list (lower concern)	1-10 territories	Woods and hedges
Chaffinch	Green list (lower concern)	1-10 territories	Woods and hedges
Chiffchaff	Green list (lower concern)	1-10 territories	Woods
Cuckoo	Amber list	1 territory	Woods and hedges
Dunnock	Amber list	Up to 10 territories	Woods and hedges
Garden Warbler	Green list (lower concern)	1 territory	Scrub
Goldfinch	Green list (lower concern)	1-10 territories	Woods and hedges
Great Tit	Green list (lower concern)	1-10 territories	Woods and hedges
Greenfinch	Green list (lower concern)	1-10 territories	Woods and hedges
GS woodpecker	Green list (lower concern)	1 territory	Woods
House Martin	Amber list	Small numbers feeding over site	Buildings
House Sparrow	Red list	Up to 5 birds	Buildings

Species	Conservation status	Status inside the 500m buffer in 2008	Nesting habitat
Jackdaw	Green list (lower concern)	1-10 territories	Tree holes and buildings
Kestrel	Amber list	Up to 3 birds over site	
Linnet	Red list	Up to 2 pairs	Hedgerows
Magpie	Green list (lower concern)	1-10 territories	Woods and hedges
Mallard	Green list (lower concern)	1-10 territories	Wet ditches
Marsh Tit	Red list	1 territory	Woods
Moorhen	Green list (lower concern)	6 pairs	Ponds and ditches
Oystercatcher	Amber list	1 pair	Open fields
Pheasant	Green list (lower concern)	1-10 territories	Woods and hedges
Pied Wagtail	Green list (lower concern)	1-10 territories	Buildings
Robin	Green list (lower concern)	1-10 territories	Woods and hedges
Rook	Green list (lower concern)	No rookeries, occasional small feeding flocks	Woods
Skylark	Red list	About 15 territories	Open fields
Sparrowhawk	Green list (lower concern)	1 territory	Woods
Starling	Red list	Small post breeding numbers	
Stock Dove	Amber list	Up to 5 pairs	Tree holes and buildings
Swallow	Amber list	Small numbers (up to 20) over site	Buildings
Tufted Duck	Green list (lower concern)	1 pair	Waterbodies
Turtle Dove	Red list	1 pair	Scrub
Whitethroat	Green list (lower concern)	10-20 territories	Hedgerows
Willow warbler	Amber list	4 territories	Scrub
Woodpigeon	Green list (lower concern)	10-20 territories	Woods and hedges
Wren	Green list (lower concern)	10-20 territories	Woods and hedges
Yellowhammer	Red list	20 territories	Hedgerows
Yellow Wagtail	Amber list	4 territories	Open fields

4. Species Selected for Impact Assessment

Species requiring impact assessment (based on evidence of flight activity or nesting within the 500m buffer area, and elevated conservation status or collision sensitivity) are:

Bar-tailed Godwit
Brent Goose
Barn Owl
Common Tern
Cormorant
Curlew
Dunlin
Gadwall
Golden Plover
Gulls (Black-headed, Common, Lesser Black-backed)
Hen Harrier
Hobby
Kestrel
Kingfisher
Lapwing
Little Egret
Marsh Harrier
Mediterranean Gull
Mute Swan
Oystercatcher
Peregrine
Pink-footed Goose
Red Kite
Sandwich Tern
Snipe
Teal
Whooper Swan
Wigeon
Woodcock

Buzzard
Canada Goose
Egyptian Goose
Great Black-backed Gull
Grey Heron
Greylag Goose
Mallard
Sparrowhawk
Cuckoo
Dunnock
House Martin
House Sparrow
Kestrel
Linnet
Mallard
Marsh Tit
Oystercatcher
Reed Bunting
Skylark
Starling
Stock Dove
Swallow
Tree Sparrow
Tufted Duck
Turtle Dove
Willow warbler
Yellowhammer
Yellow Wagtail

The following species are considered to be sensitive to turbine collisions:

Bar-tailed Godwit
Brent Goose
Barn Owl
Common Tern
Cormorant
Curlew
Dunlin
Gadwall

Golden Plover
Gulls (Black-headed, Common, Lesser Black-backed)
Hen Harrier
Hobby
Kestrel
Lapwing

Little Egret
Marsh Harrier
Mediterranean Gull
Mute Swan
Oystercatcher
Peregrine
Pink-footed Goose
Red Kite
Sandwich Tern
Snipe
Teal

Whooper Swan
Wigeon
Woodcock
Buzzard
Canada Goose
Egyptian Goose
Grey Heron
Greylag Goose
Mallard
Sparrowhawk

5. Collision Risk Modelling

Of the collision sensitive species, only those recorded flying in the risk window of (**Table 7**) 14.625m to 113.625m altitude (the airspace occupied by a 82.5m-diameter rotor set on an 60m-high hub, plus buffer to cover error in bird flight height estimation) were considered for the collision risk model. Additional species excluded from collision modelling are:

- Gull species were noted during surveys as a precautionary measure in case significant numbers were over-flying the site in connection with roosting activities. The relatively small numbers observed show the area to be unimportant as a flyway.
- Mallard have not been taken further into the collision risk modelling due to a large, secure population with no level of conservation concern.
- Canada Goose, Egyptian Goose and Greylag Goose have not been modelled. Those specimens observed are believed to be part of a feral population and without conservation concerns.
- Whooper swan and wigeon were recorded only from 2006/7 data in very small numbers (2 each) and are therefore not included in modelling.

The list of species subject to collision risk modelling after selecting for activity within the relevant risk window is:

Bar-tailed Godwit
Brent Goose
Barn Owl
Common Tern
Cormorant
Curlew
Dunlin
Gadwall
Golden Plover
Hen Harrier

Hobby
Kestrel
Kingfisher
Lapwing
Little Egret

Marsh Harrier
Mediterranean Gull
Mute Swan
Oystercatcher

Peregrine
Pink-footed Goose
Red Kite
Sandwich Tern
Snipe

Teal
Woodcock
Buzzard
Grey Heron
Sparrowhawk

Table 7: Vantage Point Summary

Species	# flight events	# birds counted	# birds in risk window	Total seconds observed	Seconds below the risk window	Seconds above the risk window	Seconds within the risk window	Flight path
Bar-tailed Godwit	1	2	2	60	0	0	60	Lp
Brent Goose	4	149	147	26270	50	0	26220	P
Barn Owl	56	57	1	7705	7675	0	30	Lp
Common Tern	6	19	13	845	245	0	600	Lp
Cormorant	72	180	139	20035	225	3975	15385	p
Curlew	4	4	4	215	0	0	215	p
Dunlin	1	2	2	90	0	0	90	Lp
Gadwall	2	5	5	1440	0	0	1440	Lp
Golden Plover	11	502	133	23510	60	15790	7660	Lp
Hen Harrier	1	1	0	210	210	0	0	Lp
Hobby	19	19	20	1510	555	90	865	Lp
Kestrel	82	88	54	16030	6255	0	9775	Lp
Lapwing	31	1284	1273	94490	660	0	93830	Lp
Little Egret	1	1	1	90	0	0	90	Lp
Marsh Harrier	118	122	77	12840	2890	425	9525	Lp
Mediterranean Gull	3	3	3	135	60	0	75	Lp
Mute Swan	3	15	14	625	40	0	585	p
Oystercatcher	6	12	4	950	290	0	660	Lp
Peregrine	2	2	2	90	0	0	90	Lp
Pink-footed Goose	41	5360	1439	831255	0	684460	146795	Lp
Red Kite	1	1	1	120	0	0	120	Lp
Sandwich Tern	7	35	22	2650	770	0	1880	Lp
Snipe	18	283	238	63835	465	0	63370	Lp
Teal	4	22	21	2010	10	0	2000	Lp
Woodcock	8	8	0	135	135	0	0	Lp
Buzzard	20	21	14	2905	225	720	1960	Lp
Grey Heron	72	78	32	3547	1957	0	1590	Lp
Sparrowhawk	37	39	20	2565	910	0	1655	Lp

Species: Bird species recorded from the vantage point executing a flight path within the 500m buffer

Total Number of Flight Events: Number of flights recorded within the 500m buffer, flocks and individual birds both treated as a single flight event

Total Number of Birds Involved: The number of birds witnessed throughout the entire vantage point duration (not necessarily indicative of actual bird numbers – repeated flights by the same birds are possible)

Total Number of Birds in Risk Window: The number of birds recorded flying with the rotor swept area.

Total Bird Seconds: The number of seconds each individual bird was recorded within the 500m buffer

Time Birds Observed Below the Risk Window: The total time recorded below the level of the rotor sweep

Time Birds Observed In the Risk Window: The total time recorded below the level of the rotor sweep

Time Birds Observed Above the Risk Window: The total time birds were recorded above the level of the rotor sweep

Flight Path: **P** = Predictable flight path through the wind farm; the species flies through the wind farm in a reasonably defined direction. **L** = Less predictable flight path through the wind farm; the species occupies a recognised territory overlapping with the 500m buffer area and so flight paths are varied.

5.1 Methodology

The collision risk (**Table 8**) was calculated by using the Band Collision Risk Model (Band et al. 2007; SNH 2005). The model assesses the numbers of birds per annum, of certain species, which will be killed as a result of colliding with the wind turbines of a given site. The estimated mortality for each of the target species for the 25 year life of the wind farm is shown in **Table 9**.

In order to reach these figures, hours of vantage point survey are required to gain an idea of the numbers and species of birds regularly over-flying a site.

These will vary from season to season and at different times of day, e.g. large numbers of gulls or wildfowl may over-fly a site at dawn and dusk, commuting to and from roosts, whereas many raptor species will be at their most active from mid-morning to late afternoon.

Detailed data is required regarding the height and dimensions of the turbines, as well as the area and turbine positions of the proposed wind farm. Also the measurements of the individual bird species must be known along with their average speed of flight [Alerstam et al. (2007) and BirdGuides Ltd. (2006) were used for this purpose].

Lastly it must be assessed whether a bird is following a predictable or less predictable line of flight. Birds regularly using a site for feeding or roosting purposes will usually be thought to be following a less predictable flight path.

Those birds not directly associated with the area and observed merely passing overhead are deemed to be following a predictable flight path.

5.2 Results

Table 8: Collision Risk Summary

Species	Collision risk %	Adjusted* collision risk %	Annual bird mortality at given avoidance			
			0%	95%	99%	99.9%
Bar-tailed Godwit	7.3094	6.9439	0.1441	0.0072	0.0014	0.0001
Brent Goose	7.8008	7.4108	41.7185	2.0859	0.4172	0.0417
Barn Owl	7.6699	7.2864	0.1201	0.0060	0.0012	0.0001
Common Tern	7.3765	7.0076	2.0438	0.1022	0.0204	0.0020
Cormorant	9.7834	9.2942	55.1939	2.7597	0.5519	0.0552
Curlew	7.6165	7.2356	0.8911	0.0446	0.0089	0.0009
Dunlin	5.7476	5.4602	0.2642	0.0132	0.0026	0.0003
Gadwall	7.2073	6.8470	6.4098	0.3205	0.0641	0.0064
Golden Plover	6.3227	6.0065	22.4599	1.1230	0.2246	0.0225
Hen Harrier	No measured risk					
Hobby	7.2938	6.9291	3.0203	0.1510	0.0302	0.0030
Kestrel	7.5119	7.1363	19.8068	0.9903	0.1981	0.0198
Lapwing	6.9874	6.6381	260.4599	13.0230	2.6046	0.2605
Little Egret	9.4907	9.0161	0.3852	0.0193	0.0039	0.0004
Marsh Harrier	8.7393	8.3023	24.8991	1.2450	0.2490	0.0249
Mediterranean Gull	7.2766	6.9127	0.2441	0.0122	0.0024	0.0002
Mute Swan	12.7768	12.1380	7.2600	0.3630	0.0726	0.0073
Oystercatcher	7.4912	7.1166	2.1457	0.1073	0.0215	0.0021
Peregrine	7.7835	7.3943	0.3146	0.0157	0.0031	0.0003
Pink-footed Goose	8.4943	8.0696	444.6940	22.2347	4.4469	0.4447
Red Kite	9.6970	9.2121	0.3729	0.0186	0.0037	0.0004
Sandwich Tern	7.6099	7.2294	7.2125	0.3606	0.0721	0.0072
Snipe	6.0112	5.7106	217.4563	10.8728	2.1746	0.2175
Teal	6.3517	6.0341	5.4137	0.2707	0.0541	0.0054
Woodcock	No measured risk					
Buzzard	8.3260	7.9097	5.7965	0.2898	0.0580	0.0058
Grey Heron	11.8074	11.2170	7.0195	0.3510	0.0702	0.0070
Sparrowhawk	7.1127	6.7571	4.4407	0.2220	0.0444	0.0044

*The adjusted collision risk % is calculated based on a projected downtime of the wind farm set at 5%.

Table 9: 25 Year Collision Risk Summary

Species	Bird mortality over 25 year lifespan of the wind farm		
	95% avoidance	99% avoidance	99.9% avoidance
Bar-tailed Godwit	0.1801	0.0360	0.0036
Brent Goose	57.5945	11.5189	1.1519
Barn Owl	0.1502	0.0300	0.0030
Common Tern	2.5547	0.5109	0.0511
Cormorant	68.9924	13.7985	1.3798
Curlew	1.1138	0.2228	0.0223
Dunlin	0.3303	0.0661	0.0066
Gadwall	8.0122	1.6024	0.1602
Golden Plover	28.0749	5.6150	0.5615
Hen Harrier	No measured risk		
Hobby	3.7754	0.7551	0.0755
Kestrel	24.7585	4.9517	0.4952
Lapwing	325.5748	65.1150	6.5115
Little Egret	0.4815	0.0963	0.0096
Marsh Harrier	31.1239	6.2248	0.6225
Mediterranean Gull	0.3052	0.0610	0.0061
Mute Swan	9.0751	1.8150	0.1815
Oystercatcher	2.6821	0.5364	0.0536
Peregrine	0.3933	0.0787	0.0079
Pink-footed Goose	555.8675	111.1735	11.1174
Red Kite	0.4662	0.0932	0.0093
Sandwich Tern	9.0157	1.8031	0.1803
Snipe	271.8204	54.3641	5.4364
Teal	6.7672	1.3534	0.1353
Woodcock	No measured risk		
Buzzard	7.2456	1.4491	0.1449
Grey Heron	8.7743	1.7549	0.1755
Sparrowhawk	5.5508	1.1102	0.1110

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7. Collision Risk Data

Barn Owl

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	12508.7420	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	50034.9681	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000214	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	10.00	m/sec
Length of Bird (l)	0.34	m
Wingspan of Bird	0.89	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	8760	hr
Flight Seconds per year	31536000	sec
Number of Birds Observed in Risk Window (RWn)	1	
Total Time All Birds Spend in Risk Window (RWt)	30	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0001	
Average Time Individual Bird Within Risk Window per year (RWy)	1800	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	1800	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	0.3858	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2340	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	1.6487	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.67	%
Adjusted to include Down Time	7.2864	%
No Avoidance	0.1201	Collisions/yr
Adjusted for 95% Avoidance	0.0060	Collisions/yr
Adjusted for 99% Avoidance	0.0012	Collisions/yr
Adjusted for 99.9% Avoidance	0.0001	Collisions/yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Buzzard

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	13.30	m/sec
Length of Bird (l)	0.54	m
Wingspan of Bird	1.21	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	4481	hr
Flight Seconds per year	16131600	sec
Number of Birds Observed in Risk Window (RWn)	14	
Total Time All Birds Spend in Risk Window (RWt)	1960	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0003	
Average Time Individual Bird Within Risk Window per year (RWy)	4296.8493	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	60155.89	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	13.9956	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.1910	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	73.2839	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	8.33	%
Adjusted to include Down Time	7.9097	%

No Avoidance	5.7965	Collisions/ yr
Adjusted for 95% Avoidance	0.2898	Collisions/ yr
Adjusted for 99% Avoidance	0.0580	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0058	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Brent Goose

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m ²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m ³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m ²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	0.00	m ³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	21382.4650	m ³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	Sep to Apr	
Speed of Bird through the rotor (v)	17.70	m/sec
Length of Bird (l)	0.59	m
Wingspan of Bird	1.15	m
Vantage Point Hours Completed (VPh)	83.3	hr
Time Available for Flight Activity per year	3163.75	hr/ yr
Number of Birds Observed in Risk Window (RWn)	147	
Average Birds per Hour During Survey = RWn / VPh	1.7647	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	5583.0882	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	621.7378	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.80	%
Adjusted to include Down Time	7.4108	%
No Avoidance	46.0756	Collisions/ yr
Adjusted for 95% Avoidance	2.3038	Collisions/ yr
Adjusted for 99% Avoidance	0.4608	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0461	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Common Tern

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	Apr to Sep	
Speed of Bird through the rotor (v)	10.90	m/sec
Length of Bird (l)	0.33	m
Wingspan of Bird	0.88	m
Vantage Point Hours Completed (VPh)	58.5833333	hr
Vantage Point Seconds Completed (VPs)	210900	sec
Time available for flight activity per year	3436.25	hr
Flight Seconds per year	12370500	sec
Number of Birds Observed in Risk Window (RWn)	13	
Total Time All Birds Spend in Risk Window (RWt)	600	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0002	
Average Time Individual Bird Within Risk Window per year (RWy)	2707.18897	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	35193.4566	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	7.5110	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2138	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	35.1372	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.38	%
Adjusted to include Down Time	7.0076	%
No Avoidance	2.4623	Collisions/ yr
Adjusted for 95% Avoidance	0.1231	Collisions/ yr
Adjusted for 99% Avoidance	0.0246	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0025	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Cormorant

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	15.20	m/sec
Length of Bird (l)	0.90	m
Wingspan of Bird	1.45	m
Vantage Point Hours Completed (VPh)	146	hr
Time Available for Flight Activity per year	5601.25	hr/ yr
Number of Birds Observed in Risk Window (RWn)	139	
Average Birds per Hour During Survey = RWn / VPh	0.9521	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	5332.6969	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	593.8540	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	9.78	%
Adjusted to include Down Time	9.2942	%
No Avoidance	55.1939	Collisions/ yr
Adjusted for 95% Avoidance	2.7597	Collisions/ yr
Adjusted for 99% Avoidance	0.5519	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0552	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth Within this equation can be considered a constant

Wind Farm Area Is taken as the as a combine 500m buffer around all the turbines

Flight Hours

Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Curlew

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	16.30	m/sec
Length of Bird (l)	0.55	m
Wingspan of Bird	0.90	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	5601.25	hr
Flight Seconds per year	20164500	sec
Number of Birds Observed in Risk Window (RWn)	4	
Total Time All Birds Spend in Risk Window (RWt)	215	sec
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.62	%
Adjusted to include Down Time	7.2356	%
No Avoidance	1.2365	Collisions/ yr
Adjusted for 95% Avoidance	0.0618	Collisions/ yr
Adjusted for 99% Avoidance	0.0124	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0012	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth Within this equation can be considered a constant

Wind Farm Area Is taken as the as a combine 500m buffer around all the turbines

Flight Hours Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Golden Plover

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	Oct to Mar	
Speed of Bird through the rotor (v)	17.90	m/sec
Length of Bird (l)	0.28	m
Wingspan of Bird	0.72	m
Vantage Point Hours Completed (VPh)	72.716667	hr
Vantage Point Seconds Completed (VPS)	261780	sec
Time available for flight activity per year	2165	hr
Flight Seconds per year	7794000	sec
Number of Birds Observed in Risk Window (RWn)	133	
Total Time All Birds Spend in Risk Window (RWt)	7660	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPS	0.0002	
Average Time Individual Bird Within Risk Window per year (RWy)	1714.751	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	228061.88	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	47.5240	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.1271	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	373.9250	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	6.32	%
Adjusted to include Down Time	6.0065	%
No Avoidance	22.4599	Collisions/ yr
Adjusted for 95% Avoidance	1.1230	Collisions/ yr
Adjusted for 99% Avoidance	0.2246	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0225	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Hobby

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = $\square R^2$	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\square R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\square R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	Apr to Sep	
Speed of Bird through the rotor (v)	11.30	m/sec
Length of Bird (l)	0.33	m
Wingspan of Bird	0.87	m
Vantage Point Hours Completed (VPh)	58.583333	hr
Vantage Point Seconds Completed (VPs)	210900	sec
Time available for flight activity per year	3436.25	hr
Flight Seconds per year	12370500	sec
Number of Birds Observed in Risk Window (RWn)	12	
Total Time All Birds Spend in Risk Window (RWt)	865	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0003	
Average Time Individual Bird Within Risk Window per year (RWy)	4228.1028	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	50737.233	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	10.8283	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2062	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	52.5151	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.29	%
Adjusted to include Down Time	6.9291	%
No Avoidance	3.6388	Collisions/ yr
Adjusted for 95% Avoidance	0.1819	Collisions/ yr
Adjusted for 99% Avoidance	0.0364	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0036	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Kestrel

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = πR^2 x (d + l)	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x πR^2 x (d + l)	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	10.10	m/sec
Length of Bird (l)	0.34	m
Wingspan of Bird	0.76	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPS)	525600	sec
Time available for flight activity per year	4481	hr
Flight Seconds per year	16131600	sec
Number of Birds Observed in Risk Window (RWn)	54	
Total Time All Birds Spend in Risk Window (RWt)	9775	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPS	0.0003	
Average Time Individual Bird Within Risk Window per year (RWy)	5555.7807	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	300012.16	sec
Birds Occupancy of Rotor Swept Area = n (V_r / V_w)	64.1659	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/ v	0.2312	sec
Number of Birds Passing Through Rotors per Year = n (V_r / V_w) / t	277.5486	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.51	%
Adjusted to include Down Time	7.1363	%

No Avoidance	19.8068	Collisions/ yr
Adjusted for 95% Avoidance	0.9903	Collisions/ yr
Adjusted for 99% Avoidance	0.1981	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0198	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Lapwing

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	11.90	m/sec
Length of Bird (l)	0.30	m
Wingspan of Bird	0.85	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	5601.25	hr
Flight Seconds per year	20164500	sec
Number of Birds Observed in Risk Window (RWn)	1273	
Total Time All Birds Spend in Risk Window (RWt)	93830	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0001	
Average Time Individual Bird Within Risk Window per year (RWy)	2827.7787	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	3599762.2	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	756.7201	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.1929	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	3923.7340	

Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	6.99	%
Adjusted to include Down Time	6.6381	%
No Avoidance	260.4599	Collisions/ yr
Adjusted for 95% Avoidance	13.0230	Collisions/ yr
Adjusted for 99% Avoidance	2.6046	Collisions/ yr
Adjusted for 99.9% Avoidance	0.2605	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Little Egret

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = $\square R^2$	21382.4650	m²
Rotor Sweep Volume of Single Turbine = $\square R^2 \times (d + l)$	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x $\square R^2 \times (d + l)$	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	10.20	m/sec
Length of Bird (l)	0.60	m
Wingspan of Bird	0.92	m
Vantage Point Hours Completed (VPh)	146	hr
Time Available for Flight Activity per year	5601.25	hr/ yr
Number of Birds Observed in Risk Window (RWn)	1	
Average Birds per Hour During Survey = RWn / VPh	0.0068	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	38.3647	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	4.2723	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	9.49	%
Adjusted to include Down Time	9.0161	%

No Avoidance	0.3852	Collisions/ yr
Adjusted for 95% Avoidance	0.0193	Collisions/ yr
Adjusted for 99% Avoidance	0.0039	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0004	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Marsh Harrier

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	11.20	m/sec
Length of Bird (l)	0.52	m
Wingspan of Bird	1.23	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	4481	hr
Flight Seconds per year	16131600	sec
Number of Birds Observed in Risk Window (RWn)	77	
Total Time All Birds Spend in Risk Window (RWt)	9525	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0002	
Average Time Individual Bird Within Risk Window per year (RWy)	3796.6131	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	292339.21	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	67.4787	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2250	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	299.9051	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	8.74	%
Adjusted to include Down Time	8.3023	%
No Avoidance	24.8990828	Collisions/ yr
Adjusted for 95% Avoidance	1.2449541	Collisions/ yr
Adjusted for 99% Avoidance	0.2489908	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0248991	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Mute Swan

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	16.20	m/sec
Length of Bird (l)	1.53	m
Wingspan of Bird	2.23	m
Vantage Point Hours Completed (VPh)	146	hr
Time Available for Flight Activity per year	5601.25	hr/ yr
Number of Birds Observed in Risk Window (RWn)	14	
Average Birds per Hour During Survey = RWn / VPh	0.0959	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	537.1062	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	59.8126	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	12.78	%
Adjusted to include Down Time	12.1380	%
No Avoidance	7.2600	Collisions/ yr
Adjusted for 95% Avoidance	0.3630	Collisions/ yr
Adjusted for 99% Avoidance	0.0726	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0073	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth Within this equation can be considered a constant

Wind Farm Area Is taken as the as a combine 500m buffer around all the turbines

Flight Hours

Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Oystercatcher

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	0	
Speed of Bird through the rotor (v)	13.00	m/sec
Length of Bird (l)	0.43	m
Wingspan of Bird	0.83	m
Vantage Point Hours Completed (VPh)	58.583333	hr
Vantage Point Seconds Completed (VPs)	210900	sec
Time available for flight activity per year	3436.25	hr
Flight Seconds per year	12370500	sec
Number of Birds Observed in Risk Window (RWn)	4	
Total Time All Birds Spend in Risk Window (RWt)	660	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0008	
Average Time Individual Bird Within Risk Window per year (RWy)	9678.2006	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	38712.802	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	8.5989	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.1865	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	46.0974	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.49	%
Adjusted to include Down Time	7.1166	%
No Avoidance	3.2806	Collisions/ yr
Adjusted for 95% Avoidance	0.1640	Collisions/ yr
Adjusted for 99% Avoidance	0.0328	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0033	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Pink-footed Goose

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	Sep to Apr	
Speed of Bird through the rotor (v)	17.88	m/sec
Length of Bird (l)	0.68	m
Wingspan of Bird	1.53	m
Vantage Point Hours Completed (VPh)	92.05	hr
Time Available for Flight Activity per year	3163.75	hr/ yr
Number of Birds Observed in Risk Window (RWn)	1439	
Average Birds per Hour During Survey = RWn / VPh	15.6328	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	49458.2971	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	5507.7212	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	8.49	%
Adjusted to include Down Time	8.0696	%
No Avoidance	444.4524750	Collisions/ yr
Adjusted for 95% Avoidance	22.2226237	Collisions/ yr
Adjusted for 99% Avoidance	4.4445247	Collisions/ yr
Adjusted for 99.9% Avoidance	0.4444525	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth Within this equation can be considered a constant

Wind Farm Area Is taken as the as a combine 500m buffer around all the turbines

Flight Hours

Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Red Kite

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	12.00	m/sec
Length of Bird (l)	0.63	m
Wingspan of Bird	1.85	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPS)	525600	sec
Time available for flight activity per year	4481	hr
Flight Seconds per year	16131600	sec
Number of Birds Observed in Risk Window (RWn)	1	
Total Time All Birds Spend in Risk Window (RWt)	120	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPS	0.0002	
Average Time Individual Bird Within Risk Window per year (RWy)	3683.0137	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	3683.0137	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	0.8872	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2192	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	4.0482	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	9.70	%
Adjusted to include Down Time	9.2121	%
No Avoidance	0.3729	Collisions/ yr
Adjusted for 95% Avoidance	0.0186	Collisions/ yr
Adjusted for 99% Avoidance	0.0037	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0004	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Snipe

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = $\square R^2$	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\square R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\square R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	17.10	m/sec
Length of Bird (l)	0.26	m
Wingspan of Bird	0.46	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPS)	525600	sec
Time available for flight activity per year	5601.25	hr
Flight Seconds per year	20164500	sec
Number of Birds Observed in Risk Window (RWn)	238	
Total Time All Birds Spend in Risk Window (RWt)	63370	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPS	0.0005	
Average Time Individual Bird Within Risk Window per year (RWy)	10215.011	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	2431172.7	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	503.2723	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.1322	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	3807.9452	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	6.01	%
Adjusted to include Down Time	5.7106	%
No Avoidance	217.4563	Collisions/ yr
Adjusted for 95% Avoidance	10.8728	Collisions/ yr
Adjusted for 99% Avoidance	2.1746	Collisions/ yr
Adjusted for 99.9% Avoidance	0.2175	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours between sunrise and sunset for each month the bird is present at the site throughout the year.

Teal

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	4.04	sec
Blade Depth (d)	113.625	m
Risk Window Ceiling Height (RWc)	14.625	m
Risk Window Floor Height (RWf)	1939.5	m
Wind Farm Area (A_w)	192010.5	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	5345.6162	m³
Rotor Sweep Area of Single Turbine = πR^2	21382.4650	m²
Rotor Sweep Volume of Single Turbine = πR^2 x (d + I)	0.00	m³
Combined Volume Sweep of Turbine (V_r) = N x πR^2 x (d + I)	21382.4650	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.111361	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	13.30	m/sec
Length of Bird (l)	0.54	m
Wingspan of Bird	1.21	m
Vantage Point Hours Completed (VPh)	146	hr
Time Available for Flight Activity per year	5601.25	hr/ yr
Number of Birds Observed in Risk Window (RWn)	21	
Average Birds per Hour During Survey = RWn / VPh	0.1438	
Number of Bird Flights through Flight Risk Window (n) = RWn / VPh x Flight Hours	805.6592	
Number of Birds Passing Through Rotors per Year = n x (Ao/W)	89.7190	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	6.35	%
Adjusted to include Down Time	6.0340916	%
No Avoidance	5.4137237	Collisions/ yr
Adjusted for 95% Avoidance	0.2706862	Collisions/ yr
Adjusted for 99% Avoidance	0.0541372	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0054137	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site

Blade Depth
Wind Farm Area
Flight Hours

Within this equation can be considered a constant
Is taken as the as a combine 500m buffer around all the turbines
Are estimated by taking the total hours bewteen sunrise and sunset for
each month the bird is present at the site throughout the year.

Grey Heron

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	11.20	m/sec
Length of Bird (l)	0.94	m
Wingspan of Bird	1.85	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPs)	525600	sec
Time available for flight activity per year	5601.25	hr
Flight Seconds per year	20164500	sec
Number of Birds Observed in Risk Window (RWn)	32	
Total Time All Birds Spend in Risk Window (RWt)	1590	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPs	0.0001	
Average Time Individual Bird Within Risk Window per year (RWy)	1906.2473	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	60999.914	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	16.4269	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2625	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	62.5786	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	11.81	%
Adjusted to include Down Time	11.2170	%
No Avoidance	7.0195	Collisions/ yr
Adjusted for 95% Avoidance	0.3510	Collisions/ yr
Adjusted for 99% Avoidance	0.0702	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0070	Collisions/ yr

Risk Window Is the cross sectional height at which birds are at risk from the spinning rotors

Blade Pitch Is taken at optimum output for average windspeed on site

Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

Sparrowhawk

Model of Turbine Used to Assess Collision Risk	?	
Number of Turbines (N)	4	
Hub Height	60	m
Rotor Diameter (D)	82.5	m
Rotor Radius (R)	41.25	m
Blade Max Chord (Bc)	3.2	m
Blade Pitch (Bp)	10	°
Rotor Rotation Period (1 rotation) (Rp)	3.7500	sec
Blade Depth (d)	2	m
Risk Window Ceiling Height (RWc)	113.625	m
Risk Window Floor Height (RWf)	14.625	m
Wind Farm Area (A_w)	2358000	m²
Flight Risk Volume (V_w) = A_w x (RWc - RWf)	233442000	m³
Rotor Sweep Area of Single Turbine = πR^2	5345.6162	m²
Rotor Sweep Volume of Single Turbine = $\pi R^2 x (d + l)$	13577.8653	m³
Combined Volume Sweep of Turbine (V_r) = N x $\pi R^2 x (d + l)$	54311.4611	m³
Proportion of Flight Risk Volume with Turbines = V_r / V_w	0.000233	
Bird Species Data		
Months the Bird Uses the Site	All Year	
Speed of Bird through the rotor (v)	11.30	m/sec
Length of Bird (l)	0.33	m
Wingspan of Bird	0.63	m
Vantage Point Hours Completed (VPh)	146	hr
Vantage Point Seconds Completed (VPS)	525600	sec
Time available for flight activity per year	5601.25	hr
Flight Seconds per year	20164500	sec
Number of Birds Observed in Risk Window (RWn)	20	
Total Time All Birds Spend in Risk Window (RWt)	1655	sec
Proportional Time Individual Bird Spends in Risk Window = (RWt / RWn) / VPS	0.0002	
Average Time Individual Bird Within Risk Window per year (RWy)	3174.6811	sec
Bird Occupancy of Flight Risk Window (n) = RWn x RWy	63493.622	sec
Birds Occupancy of Rotor Swept Area = n (V_r/V_w)	13.5508	
Time Taken for Bird to Make Transit Through Rotor (t) = (d + l)/v	0.2062	sec
Number of Birds Passing Through Rotors per Year = n (V_r/V_w) / t	65.7185	
Estimated Down Time per year	5.00	%
Chance of Collision (derived from Band 2000)	7.11	%
Adjusted to include Down Time	6.7571	%
No Avoidance	4.4407	Collisions/ yr
Adjusted for 95% Avoidance	0.2220	Collisions/ yr
Adjusted for 99% Avoidance	0.0444	Collisions/ yr
Adjusted for 99.9% Avoidance	0.0044	Collisions/ yr

Risk Window	Is the cross sectional height at which birds are at risk from the spinning rotors
Blade Pitch	Is taken at optimum output for average windspeed on site
Blade Depth	Within this equation can be considered a constant
Wind Farm Area	Is taken as the as a combine 500m buffer around all the turbines
Flight Hours	Are estimated by taking the total hours bewteen sunrise and sunset for each month the bird is present at the site throughout the year.

8. Raw Data March 2008 – March 2009.

VP number	Date dd/mm/yyyy	Risk window Base Time (00:00)	Species (BTO code)	14.625 Number of Birds (n)	Risk window ceiling Direction of Flight	Min Height (m)	113.625 Max Height (m)	Activity	Time Birds Observed (sec) (t)
E	27/09/2008	12:36	BA	2	E	20	20	flying	30
W	06/04/2008	07:11	BG	2	N	10	10	flying	25
W	31/05/2008	11:27	BG	1	E - W	75	75	flying	120
E	23/06/2008	17:52	BG	1	w	100	100	flying	
E	05/12/2008	10:45	BG	145	N - NNW	100	100	flight	180
E	30/03/2008	08:34	BH	8	S	0	2	flying	
E	30/03/2008	08:50	BH	11	S	0	5	flying	20
W	07/06/2008	16:10	BH	1	s	5	5	flying	60
E	30/03/2008	08:43	BH	3	N	0	10	flying	
E	30/03/2008	07:22	BH	1	E	10	10	flying	20
E	30/03/2008	07:35	BH	4	SE	10	10	flying	30
W	30/03/2008	08:00	BH	1	S	10	10	flying	30
W	30/03/2008	08:45	BH	1	S	10	10	flying	30
E	30/03/2008	07:22	BH	5	S	8	15	flying	40
W	06/04/2008	06:02	BH	7	W	15	15	flying	20
W	30/04/2008	07:12	BH	1	W	15	15	flying	60
E	30/03/2008	08:29	BH	1	S	20	20	flying	20
W	12/04/2008	06:34	BH	1	SE	20	20	flying	60
W	07/06/2008	11:01	BH	2	w	20	20	flying	60
E	18/07/2008	14:30	BH	1	n	20	20	flying	60

E	18/07/2008	14:43	BH	1	nw	20	20	flying	60
W	30/03/2008	08:15	BH	1	NW	25	25	flying	60
W	30/03/2008	08:31	BH	1	S	25	25	flying	60
W	07/06/2008	15:41	BH	3	nw	25	25	flying	30
W	07/06/2008	16:28	BH	3	s	25	25	flying	60
E	23/06/2008	15:11	BH	5	s	25	25	flying	
E	18/07/2008	15:26	BH	1	s	25	25	flying	30
E	18/07/2008	16:00	BH	1	ne/ se	25	25	flying	60
E	19/07/2008	11:32	BH	1	w	25	25	flying	30
E	05/01/2009	12:47	BH	12	NE	25	25	flying	60
W	30/03/2008	06:05	BH	1	NE	30	30	flying	300
W	30/03/2008	08:59	BH	1	N	30	30	flying	180
E	23/06/2008	11:52	BH	1	s	30	30	flying	
W	31/05/2008	08:17	BH	2	SE	40	40	flying	120
W	30/03/2008	07:42	BH	3	S	60	60	flying	120
W	26/07/2008	16:15	BH	7	s	25	75	flying	600
E	30/03/2008	07:28	BO	1	N	1	1	flying	30
W	06/04/2008	07:25	BO	1	N	1	1	flying	20
W	06/04/2008	07:37	BO	1	N	1	1	hunting	60
W	06/04/2008	08:04	BO	1	W	1	1	flying	10
W	04/05/2008	06:04	BO	1	S	1	1	flew to perch	10
W	04/05/2008	06:10	BO	1	N	1	1	flew from perch	10
E	20/12/2008	11:25	BO	1		0	2	hunting	560
E	17/01/2009	10:02	BO	1		0	2	hunting	90
W	12/02/2009	07:29	BO	1	S	0	2	hunting	480
W	04/05/2008	05:51	BO	1	S	1	2	hunting	30
W	04/05/2008	05:52	BO	1	N	1	2	hunting	35
E	30/03/2008	08:21	BO	1	S	2	2	flying	20
W	30/03/2008	05:50	BO	2	W	2	2	flying	20



W	30/03/2008	06:33	BO	1	W	2	2	quartering	120
W	04/05/2008	05:36	BO	1		2	2	hunting	60
E	08/05/2008	06:45	BO	1	W	2	2	flying	60
W	10/05/2008	09:24	BO	1	S - N	2	2	Hunting	90
W	10/05/2008	09:39	BO	1	S	2	2	Hunting	35
W	10/05/2008	10:58	BO	1	-	2	2	Hunting; landed	
E	23/08/2008		BO	1		0	3	hunting	120
E	23/08/2008		BO	1	N	0	3	hunting	190
W	05/12/2008	16:03	BO	1	N	0	3	hunting	1200
W	17/12/2008	08:02	BO	1		0	3	hunting	120
W	20/01/2009	16:15	BO	1	N	0	3	hunting	100
W	03/03/2009	17:41	BO	1	E	0	3	hunting	30
E	30/03/2008	06:55	BO	1	N	3	3	flying	40
W	06/04/2008	06:21	BO	1	S	3	3	flying	5
W	03/08/2008	13:43	BO	1	S	3	3	flight	30
W	22/11/2008	07:38	BO	1	NE	0	5	roosting	30
W	05/12/2008	15:19	BO	1	N - S	0	5	hunting	160
W	05/12/2008	15:48	BO	1		0	5	hunting	420
W	10/12/2008	07:43	BO	1		0	5	hunting	300
W	05/01/2009	15:12	BO	1		0	5	hunting	120
E	07/01/2009	15:00	BO	1		0	5	hunting	20
E	07/01/2009	15:25	BO	1	S	0	5	hunting	80
W	07/01/2009	08:18	BO	1	E	0	5	hunting	300
E	20/01/2009	12:47	BO	1		0	5	hunting	240
W	20/01/2009	15:28	BO	1	W	0	5	hunting	30
W	03/02/2009	15:29	BO	1		0	5	flight	60
W	03/02/2009	15:38	BO	1		0	5	flight	30
W	03/02/2009	15:50	BO	1	N	0	5	flight	60
W	03/02/2009	15:52	BO	1	E - S	0	5	flight	120

W	03/02/2009	15:58	BO	1	N	0	5	flight	60
W	12/02/2009	07:53	BO	1		0	5	hunting	120
W	17/06/2008	7:22:00	BO	1		3	5	Hunting	300
W	03/08/2008	08:30	BO	1	W	5	5	flight	30
W	03/08/2008	11:02	BO	1	S	5	5	flight	30
W	20/12/2008	16:03	BO	1		5	5	hunting	15
E	20/12/2008	11:54	BO	1		0	7	hunting	180
W	18/11/2008	16:01	BO	1		0	10	hunting	480
W	22/11/2008	07:33	BO	1		0	10	hunting	150
W	22/11/2008	07:44	BO	1		0	10	hunting	660
W	07/01/2009	08:28	BO	1	NE	1	10	to roost	50
W	30/04/2008	07:45	BO	1	NE	10	10	flying	5
W	26/07/2008	16:51	BO	1	e/w	10	10	flying	30
W	14/11/2008	10:59	BO	1	W	15	15	Flight	30
W	06/03/2009	14:20	BZ	1	N - S	0	5	being mobbed	75
W	10/12/2008	07:30	BZ	1	SSE- SE	10	10	flight	25
W	17/01/2009	13:11	BZ	1	NNW	10	10	Flying through	45
W	06/03/2009	14:34	BZ	1	N - NW	10	10	Flying through	80
W	17/12/2008	07:56	BZ	1	NW	20	20	Flight	140
W	12/03/2009	14:20	BZ	1	S	20	20	flushed	15
E	02/10/2008	14:45	BZ	1		10	25	Flying through	160
W	07/01/2009	10:41	BZ	1	S	25	25	Flying through	55
W	04/05/2008	10:06	BZ	1	E	0	30	flying through	40
W	05/12/2008	15:52	BZ	1	NW	10	50	Flight	50
W	31/05/2008	08:23	BZ	1	SW	50	50	circling	300
W	30/03/2008	10:15	BZ	2	S	60	60	circling	180
W	05/01/2009	15:18	BZ	1	S	10	75	flight	180
W	07/06/2008	16:45	BZ	1	w	75	75	circling	300
W	20/09/2008	12:07	BZ	1	E	75	75	flying	60

E	09/11/2008	09:40	BZ	1	E	100	100	circling	60
W	06/03/2009	14:17	BZ	1	E	75	150	Flying through	240
W	07/06/2008	10:38	BZ	1	e	150	150	circling	120
E	18/07/2008	16:48	BZ	1	e	150	150	circling	120
E	31/03/2009	13:15	BZ	1	E	275	400	Flying through	480
W	17/01/2009	07:38	CA	5	S	5	5	Flying through	45
W	31/10/2008	06:42	CA	9	NE	15	15	Flight	120
W	31/10/2008	07:21	CA	3	SW	15	15	Flight	60
W	31/10/2008	07:52	CA	1	W	15	20	Flight	120
E	22/09/2008	15:22	CA	1	W	20	20	Flying through	80
W	31/10/2008	06:28	CA	12	NE	20	20	Flight	150
W	31/10/2008	06:54	CA	2	E	20	20	Flight	60
W	31/10/2008	07:39	CA	2	W	20	20	Flight	60
W	31/10/2008	07:56	CA	2	SW	20	20	Flight	60
E	03/02/2009	15:30	CA	3	E	20	20	flight	30
W	19/10/2008	12:06	CA	1	NE	25	25	flying	30
W	19/10/2008	13:51	CA	1	E	25	25	flying	120
W	31/10/2008	08:25	CA	1	SW	30	30	Flight	180
E	22/11/2008	08:55	CA	1	NE	30	30	flight	45
W	07/01/2009	08:07	CA	5	N	30	30	Flying through	45
W	03/02/2009	14:35	CA	1	NW - N	10	40	flight	180
W	17/06/2008	08:22	CA	1	ENE	40	40	Flying through	75
E	03/02/2009	14:42	CA	10	E	40	40	flight	30
W	09/02/2009	16:50	CA	1	W	40	40		50
E	06/09/2008		CA	2		0	50	Flying through	180
E	22/09/2008	15:40	CA	1	NE	40	50	Flying through	100
W	22/09/2008	18:38	CA	2	SW	40	50	Flying through	40
E	30/03/2008	07:40	CA	1	E	50	50	flying	30
W	18/08/2008		CA	1	NE	50	50	flying through	75



W	06/09/2008		CA	2	E	50	50	flying through	65
E	11/09/2008		CA	4	W	50	50	Flying through	80
W	03/02/2009	16:07	CA	2	SW	50	50	flight	90
W	03/02/2009	16:10	CA	1	SW	50	50	flight	60
W	03/02/2009	16:20	CA	1	S	50	50	flight	90
E	22/09/2008	16:42	CA	1	SW	40	60	Flying through	90
E	03/02/2009	15:35	CA	3	WSW	40	60	flight	180
E	03/02/2009	15:20	CA	4	S	60	60	flight	40
E	03/02/2009	15:13	CA	1	SW	60	70	flight	130
W	18/11/2008	14:29	CA	1	WSW	50	75	flying	45
W	22/11/2008	07:25	CA	4	N	50	75	flight	50
W	22/11/2008	07:34	CA	2	NNW	75	75	flying	45
W	17/12/2008	09:09	CA	1	E	75	75	flight	60
E	07/01/2009	14:17	CA	1	S	75	75	Flying through	60
E	03/02/2009	15:38	CA	1	WSW	70	80	flight	160
E	22/09/2008	16:56	CA	1	W	80	80	Flying through	70
E	03/02/2009	16:10	CA	1	W	80	80	flight	150
E	24/06/2008	07:02	CA	2	NE	75	100	Flying through	75
E	02/10/2008	14:04	CA	1	SSW	75	100	Flying through	80
W	15/07/2008	13:01	CA	1	NE	80	100	Flying through	90
W	18/08/2008		CA	5	S	100	100	flying through	45
E	06/09/2008		CA	1	SW	100	100	Flying through	100
W	06/09/2008		CA	2	W	100	100	flying through	50
W	02/10/2008	17:12	CA	1	W	100	100	Flying through	60
W	18/11/2008	14:43	CA	2	SW	100	100	flying	50
W	10/12/2008	07:40	CA	9	N	100	100	flight	600
W	10/12/2008	07:52	CA	9	N - NNE	100	100	flight	75
E	20/12/2008	11:57	CA	1	SW	100	100	flight	80
E	05/01/2009	12:02	CA	1	NE	100	100	flying	90



E	07/01/2009	13:58	CA	1	SSW	100	100	Flying through	45
E	17/01/2009	09:16	CA	1	W	100	100	Flying through	60
W	17/01/2009	07:38	CA	5	NNE	100	100	Flying through	75
W	03/02/2009	16:04	CA	1	W	100	100	flight	40
W	12/02/2009	07:16	CA	1	E	100	100	Flying through	70
W	03/02/2009	15:21	CA	4	SW	120	120	flight	90
W	03/02/2009	15:35	CA	3	SW	120	120	flight	120
W	02/10/2008	16:03	CA	1	E	150	150	Flying through	110
W	02/10/2008	17:30	CA	1	W	150	150	flying through	75
W	02/10/2008	17:51	CA	1	W	150	150	flying through	60
W	05/12/2008	14:55	CA	1	W	150	150	Flight	60
E	10/12/2008	10:55	CA	1	W	150	150	flight	60
W	03/02/2009	15:15	CA	1	SW	150	150	flight	120
E	09/02/2009	15:41	CA	3	NE	150	150	Flying through	100
W	12/02/2009	07:51	CA	2	E	150	150	Flying through	110
E	24/02/2009	16:02	CA	3	NE	150	150	Flying through	140
E	24/06/2008	11:51	CA	1	NE	200	200	Flying through	150
E	05/01/2009	12:22	CA	4	NNE	200	200	flying	120
W	03/02/2009	14:47	CA	10	SW	200	200	flight	120
W	10/05/2008	06:07	CG	2	SE	3	3	Flying through	45
W	04/05/2008	05:12	CG	1	W	8	8	flying through	25
W	10/05/2008	06:44	CG	2	S	8	8	Flying through	40
W	10/05/2008	06:25	CG	2	SW	10	10	Flying through	50
W	07/06/2008	10:31:00	CG	1	w	10	10	flying	60
W	07/06/2008	10:36:00	CG	1	s	10	10	flying	30
W	17/06/2008	12:02	CG	55	S	10	20	Flying through	50
W	30/04/2008	05:20	CG	3	E	20	20	flying	30
W	30/04/2008	10:02	CG	2	NW	20	20	flying	30
W	04/05/2008	06:18	CG	2	N	50	20	flying through	30

W	04/05/2008	07:39	CJ	2	NE	3	3	short flight	15
E	30/03/2008	08:34	CM	1	S	0	2	landed	
E	30/03/2008	08:50	CM	5	circled - S	10	10	flying	60
W	06/04/2008	06:24	CM	1	NW	10	10	flying	15
W	06/04/2008	06:40	CM	7	W	10	10	flying	10
W	06/04/2008	06:50	CM	1	W	10	10	flying	10
W	06/04/2008	06:02	CM	2	W	15	15	flying	20
W	06/04/2008	06:28	CM	5	W	15	15	flying	30
W	26/07/2008	15:57	CM	1	w	15	15	flying	30
E	30/03/2008	06:29	CM	2	NW	20	20	flying	20
E	30/03/2008	06:58	CM	3	W	20	20	flying	20
E	30/03/2008	07:52	CM	1	S	20	20	flying	20
E	30/03/2008	08:08	CM	1	S	20	20	flying	10
E	30/03/2008	08:25	CM	2	S	20	20	flying	20
E	30/03/2008	13:20	CM	1	SE	20	20	flying	10
W	30/04/2008	05:35	CM	1	E	20	20	flying	30
W	30/04/2008	08:42	CM	1	S	20	20	flying	60
E	30/03/2008	07:53	CM	2	S	50	50	flying	20
E	30/03/2008	08:57	CM	1	W - S	20	80	flying	60
E	24/06/2008	14:08	CN	1	W	5	5	Flying through	40
E	23/07/2008	15:50	CN	2	NE	6	6	Flying through	45
E	23/07/2008	10:03	CN	2	SW	5	10	Flying through	35
E	23/07/2008	13:27	CN	1	SW	10	10	Flying through	45
E	23/08/2008		CN	8	W	30	30	Flying through	50
E	23/08/2008		CN	5	S	75	75	Flying through	40
W	10/05/2008	07:15	CU	1	NE	30	30	Flying through	80
W	17/06/2008	14:24	CU	1	S	40	40	Flying through	45
E	23/08/2008	18:06	CU	2	E	50	50	Flying through	45

E	23/07/2008	09:31	DN	2	W	20	20	Flying through	45
E	09/11/2008	11:46	E.	1	E	25	25	flying	30
W	22/11/2008	15:15	EG	2		0	0	Feeding	3600
W	04/05/2008	11:21	EG	1	E	0	3	short flight	25
W	10/05/2008	06:44	EG	2	NW	3	3	Flying through	30
W	04/05/2008	07:42	EG	1		0	5	short flight	45
W	10/05/2008	11:08	EG	2	S	0	5	Flew in	30
W	05/01/2009	15:21	EG	2	W	0	5	short flight	5
W	24/02/2009	17:10	EG	1		0	5	feeding	1920
W	12/04/2008	08:15	EG	3	W	5	5	flying	30
W	10/05/2008	06:30	EG	2	S	5	5	Flying through	25
W	14/11/2008	10:46	EG	2	SE	5	5	Flight	30
W	18/11/2008	14:52	EG	2	E	5	5	flight	20
W	04/05/2008	06:24	EG	1	W	0	8	landed in tree	5
W	04/05/2008	06:41	EG	1	NE	0	8	flew to field	10
W	31/05/2008	07:12	EG	2	SE	10	10	flying	20
W	31/05/2008	10:34	EG	2	E	10	10	flying	30
E	09/11/2008	10:17	EG	2	E	10	10	flying	30
W	14/11/2008	12:46	EG	2	NE	10	10	Flight	60
W	24/02/2009	10:59	EG	3		10	10	Flying through	45
W	31/05/2008	09:36	EG	2	SE	15	15	flying	30
E	20/09/2008	08:41	EG	2	E	15	15	flying	30
W	14/11/2008	15:09	EG	2	SW	15	15	Flight	30
W	24/02/2009	11:21	EG	3	N	20	20	in to land	45
W	14/11/2008	11:28	EG	2	SW	25	25	Flight	30
W	07/01/2009	10:23	EG	2	E	20	50	Flying through	60
W	12/04/2008	11:44	EG	2	S	180	180	flying	30
W	22/11/2008	08:17	ET	1	N	0	40	flight	90
W	12/02/2009	07:12	FF	30	NE	30	30	Flying through	45

W	03/02/2009	15:59	GA	4		30	30	flight	60
W	02/10/2008	17:30	GA	1		0	50	pusuit, flying with MA	1200
W	04/05/2008	07:21	GB	1	S	10	10	flying through	30
W	12/04/2008	09:45	GB	1	S	20	20	flying	60
W	31/05/2008	11:48	GB	1	NW	20	20	flying	120
W	31/05/2008	11:53	GB	1	N	20	20	flying	60
W	31/05/2008	08:39	GB	1	N	25	25	flying	120
E	18/07/2008	16:23	GB	1	s	25	25	flying	60
W	26/07/2008	17:56	GB	1	ne	25	25	flying	60
W	12/04/2008	11:35	GB	1	SW	30	30	flying	120
W	30/04/2008	07:32	GB	3	S	30	30	flying	60
E	08/05/2008	08:05	GB	1	E	30	30	flying	30
E	08/05/2008	09:24	GB	1	S	30	30	flying	30
W	31/05/2008	09:05	GB	1	S	30	30	flying	30
E	18/07/2008	16:59	GB	2	s	30	30	flying	120
W	12/04/2008	09:27	GB	5	S	50	50	flying	60
W	07/06/2008	13:02	GB	2	sw	50	50	flying	60
W	07/06/2008	17:23	GB	3	n	50	50	circling	120
E	23/06/2008	14:11	GB	3	e	50	50	flying	300
E	19/07/2008	10:17	GB	1	s	50	50	flying	60
W	30/04/2008	07:44	GB	7	W	60	60	flying	180
W	31/05/2008	09:41	GB	1	NW	75	75	flying	60
E	23/06/2008	13:43	GB	3	e	75	75	flying	
E	19/07/2008	09:17	GB	4	s	75	75	flying	180
E	08/05/2008	08:24	GB	1	N	80	80	flying	30
E	08/05/2008	08:30	GB	1	W	80	80	flying	30
E	23/06/2008	16:58	GB	9	e	50	100	flying	300
W	30/04/2008	11:01	GB	4	W	100	100	flying	120

E	23/06/2008	16:32	GB	1	ne	100	100	circling/flying	
E	23/06/2008	13:06	GB	1	nnw	150	150	circling	
E	18/07/2008	14:33	GB	1	ne	150	150	flying	180
W	04/05/2008	07:54	GJ	2	E	5	5	flying through	25
W	10/05/2008	07:37	GJ	2	S	8	8	Flying through	25
W	04/05/2008	05:36	GJ	15	S	0	10	took off	30
W	04/05/2008	09:23	GJ	2		0	10	short flight	40
W	17/06/2008	07:46	GJ	6	SE	5	10	Flying through	90
W	30/03/2008	07:02	GJ	3	E	20	20	flying	60
W	12/04/2008	11:48	GJ	2	S	20	20	flying	20
W	30/04/2008	05:41	GJ	3	E	25	25	flying	30
E	09/11/2008	11:00	GJ	15	W	25	25	flying	180
W	04/05/2008	06:50	GJ	2	NE	30	30	flying through	30
W	14/11/2008	12:38	GJ	15	SW	30	30	flight	60
E	27/09/2008	10:37	GJ	3	NW	50	50	flying	120
W	14/11/2008	15:34	GJ	7	SW	50	50	Flight	30
E	20/09/2008	09:23	GJ	21	SE	75	75	flying	300
W	20/12/2008	10:20	GJ	4	S	75	75	flight	75
W	22/11/2008	08:08	GJ	7	W	200	200	flight	300
E	23/07/2008	10:09	GP	2	SW	10	10	Flying through	30
E	05/01/2009	12:24	GP	26	E	25	50	flying away	75
E	05/01/2009	10:44	GP	38		0	75	flew in to feed	45
W	18/08/2008		GP	4	S	75	75	flying through	25
W	09/02/2009	10:51	GP	65	S	75	75	Flying through	60
W	18/11/2008	15:19	GP	14	SSE	200	200	flying	45
W	22/11/2008	08:10	GP	7	N	200	200	Flight	60
E	20/01/2009	12:09	GP	20	S	200	200		50
W	20/01/2009	16:06	GP	18	W	200	200	Flying through	30
W	17/12/2008	08:09	GP	220	S	300	300	Flight	40

W	17/01/2009	07:42	GP	88	S	500	500	Flying through	50
W	15/07/2008	08:28	GS	1	N	8	8	Flying through	30
W	02/10/2008	15:45	GY	2		0	0	feed/loaf	1000
W	06/04/2008	06:52	H.	1	SE	0	0	landed	10
W	04/05/2008	05:43	H.	1	S	1	1	flew in to feed	17
W	10/05/2008	09:52	H.	1	S	1	1	Flying through	20
W	10/05/2008	10:33	H.	1	S	1	1	Short flight	10
W	17/12/2008	08:55	H.	1	NW	1	1	moved on	30
W	20/12/2008	09:26	H.	1	S	0	2	flight	10
W	09/02/2009	11:33	H.	1	S	0	2	feeding	15
W	24/02/2009	17:32	H.	1	N	0	2	in to feed	45
W	24/02/2009	17:50	H.	1	N	0	2	in to land	45
W	10/05/2008	05:25	H.	1	-	2	2	Flying through	40
W	10/05/2008	05:26	H.	1	E	2	2	Flying through	15
W	07/01/2009	10:07	H.	2	W	3	3	In to loaf in field	30
W	10/05/2008	11:12	H.	1	W	0	4	Flew in	25
W	15/07/2008	10:01	H.	1	N	0	5	Flying through	65
W	07/01/2009	09:36	H.	1	N	0	5	short flight	30
W	24/02/2009	11:02	H.	2		0	5	flushed	50
W	06/04/2008	07:31	H.	1	N	5	5	flying	30
W	22/11/2008	16:09	H.	1	E	5	5	flight	30
W	20/01/2009	14:35	H.	2	N	5	5	short flight	45
W	10/05/2008	09:00	H.	1	-	7	7	Feeding-flushed	70
W	30/04/2008	09:01	H.	1	S	8	8	flying	10
W	02/10/2008	15:48	H.	2		0	10	Flying through	60
W	04/05/2008	06:15	H.	1	W	0	10	flying through	20
W	06/09/2008		H.	1	N	0	10	flying through	60
W	31/10/2008	08:42	H.	1	W	0	10	Flight	180
W	18/11/2008	15:36	H.	1		0	10	flight	65

W	22/11/2008	08:15	H.	1	SE	0	10	flight	25
W	05/01/2009	14:12	H.	1	E	0	10	Flying in to feed	30
W	20/01/2009	14:05	H.	1	W	0	10	flushed	30
W	03/02/2009	15:12	H.	1	E	0	10	flight	60
W	03/02/2009	16:04	H.	1	W	0	10	flight	60
W	17/06/2008	07:34	H.	1	NW-SE	5	10	Flying through	210
W	06/04/2008	06:35	H.	1	W	10	10	flying	15
W	06/04/2008	07:02	H.	1	S	10	10	flying	15
W	12/04/2008	05:55	H.	1	NE	10	10	flying	30
W	30/04/2008	06:00	H.	1	S	10	10	flying	10
W	10/05/2008	05:25	H.	1	SE	10	10	Flying through	25
W	05/12/2008	14:04	H.	1	NNW	10	10	flight	60
W	05/12/2008	14:31	H.	1	NNE	10	10	Flight	45
W	05/12/2008	15:22	H.	1	S	10	10	Flight	30
W	07/01/2009	08:39	H.	1	NE - N	10	10	Flying through	40
W	04/05/2008	10:57	H.	1	S	12	12	flying through	60
W	17/06/2008	12:15	H.	1	S	8	15	Flying through	50
W	06/04/2008	07:23	H.	1	W	15	15	flying	10
W	12/04/2008	08:07	H.	1	E	15	15	flying	30
W	03/08/2008	08:31	H.	1	NE	15	15	flight	60
W	03/08/2008	14:35	H.	1	E	15	15	flight	30
W	14/11/2008	13:30	H.	1	SW	15	15	Flight	30
W	12/02/2009	08:58	H.	1	E - S	15	15	Flying through	35
W	06/10/2008	07:39	H.	1		10	20	Flying through	30
W	30/04/2008	07:46	H.	1	NW	20	20	flying	30
W	12/02/2009	07:22	H.	1	N	10	25	Flying through	50
W	10/05/2008	06:23	H.	1	NNE	25	25	Flying through	50
W	10/05/2008	07:20	H.	1	W	25	25	Flying through	20
W	02/10/2008	18:30	H.	1	E	25	25	Flying through	40



W	10/12/2008	07:22	H.	1	N	25	25	flight	40
W	17/12/2008	09:10	H.	1	N	25	25	Flew in to land	60
W	18/11/2008	14:20	H.	1	S	0	30	to feed	40
W	04/05/2008	06:14	H.	2	NNW	30	30	flying through	70
W	19/10/2008	13:16	H.	1	W	30	30	flying	30
W	10/12/2008	13:20	H.	1	NW	30	30	flight	30
W	24/02/2009	17:22	H.	1	S	30	30	Flying through	45
W	12/03/2009	17:54	H.	1	N	30	30	Flying through	40
W	05/01/2009	15:43	H.	1	N	40	40	Flew to roost	20
W	24/02/2009	10:42	H.	2	E	40	40	Flying through	75
E	31/03/2009	13:58	H.	1	NE	40	40	Flying through	50
W	17/06/2008	07:34	H.	1	ENE	50	50	Flying through	100
W	17/01/2009	07:13	H.	1	N	50	50	flew in to feed	60
W	20/01/2009	16:57	H.	1	E	50	50	Flying through	50
W	05/01/2009	14:54	H.	1	W	75	75	Flying through	65
E	20/01/2009	11:04	H.	1	NNE	75	75		45
W	03/03/2009	17:47	H.	1	E - NE	75	75	Flying through	160
W	30/03/2008	12:01	HG	1	SW	10	10	flying	30
E	08/05/2008	10:41	HG	1	N	10	10	flying	60
W	07/06/2008	10:35:00	HG	1	s	10	10	flying	30
E	23/06/2008	11:48	HG	5		10	10	circling	
E	18/07/2008	14:55	HG	1	ne	10	10	flying	10
E	18/07/2008	15:58	HG	1	s	10	10	flying	60
E	19/07/2008	10:05	HG	2	w	10	10	flying	180
W	30/03/2008	10:29	HG	1	N	15	15	flying	60
E	08/05/2008	10:29	HG	1	W	15	15	flying	120
W	31/05/2008	11:22	HG	1	S	15	15	flying	30
W	07/06/2008	12:39	HG	1	s	15	15	flying	60
W	07/06/2008	17:40	HG	2	w	15	15	flying	60



E	23/06/2008	16:07	HG	1	e	15	15	flying	
E	23/06/2008	17:31	HG	1	s	15	15	flying	
W	30/03/2008	06:12	HG	3	SE	20	20	flying	120
W	12/04/2008	07:25	HG	1	S	20	20	flying	120
E	08/05/2008	09:48	HG	1	SE	20	20	flying	60
W	31/05/2008	11:47	HG	1	NE	20	20	flying	120
W	31/05/2008	11:49	HG	1	NE	20	20	flying	120
W	07/06/2008	12:26	HG	2	s	20	20	flying	60
E	23/06/2008	12:32	HG	1	e	20	20	flying	
E	23/06/2008	13:21	HG	1	e	20	20	flying	
E	23/06/2008	14:30	HG	1	se	20	20	flying	
E	18/07/2008	14:32	HG	2	w	20	20	flying	60
W	31/05/2008	11:56	HG	1	N	25	25	flying	180
W	07/06/2008	17:31	HG	1	e/n	25	25	flying	120
E	23/06/2008	13:28	HG	1	w	25	25	flying	
E	23/06/2008	17:21	HG	1	ne	25	25	flying	
E	23/06/2008	17:29	HG	1	e	25	25	flying	
E	18/07/2008	14:43	HG	1	ne	25	25	flying	60
E	18/07/2008	16:22	HG	3	s	25	25	flying	30
E	19/07/2008	09:03	HG	3	n	25	25	flying	60
E	19/07/2008	09:43	HG	2	s	25	25	flying	30
E	19/07/2008	11:53	HG	1	s	25	25	flying	30
W	26/07/2008	17:19	HG	1	s	25	25	flying	120
W	26/07/2008	17:32	HG	2	ne	25	25	flying	60
W	30/03/2008	06:24	HG	1	S	30	30	flying	120
W	30/03/2008	08:15	HG	1	SW	30	30	flying	60
W	30/03/2008	08:22	HG	2	W	30	30	flying	60
W	30/03/2008	10:32	HG	1	E	30	30	flying	60
E	08/05/2008	09:05	HG	1	E	30	30	flying	30

W	31/05/2008	08:42	HG	1	W	30	30	flying	120
W	31/05/2008	09:28	HG	1	NE	30	30	flying	180
W	07/06/2008	15:42	HG	1	s	30	30	flying	30
W	07/06/2008	15:43	HG	1	w	30	30	flying	30
W	04/05/2008	05:30	HG	7	SW	25	40	flying through	75
W	31/05/2008	12:01	HG	2	W	40	40	flying	120
W	30/04/2008	11:21	HG	1	NW	50	50	flying	120
W	31/05/2008	07:03	HG	1	NW	50	50	flying	180
W	31/05/2008	09:01	HG	1	W	50	50	flying	60
W	31/05/2008	09:48	HG	1	N	50	50	flying	180
W	31/05/2008	12:21:00	HG	1	N	50	50	flying	120
W	31/05/2008	13:17:00	HG	1	W	50	50	flying	120
E	02/06/2008	18:06	HG	1	NE	50	50	Flying through	95
W	07/06/2008	13:17	HG	2	w	50	50	flying	30
W	07/06/2008	15:30	HG	1	w	50	50	flying	60
W	07/06/2008	17:52	HG	3	s	50	50	flying	120
E	23/06/2008	13:41	HG	2	s	50	50	flying	
E	23/06/2008	14:02	HG	1	s	50	50	flying	
E	23/06/2008	14:11	HG	4	e	50	50	flying	300
E	23/06/2008	15:52	HG	3	s	50	50	flying	
E	23/06/2008	17:03	HG	1	ne	50	50	flying	
E	18/07/2008	16:51	HG	2	w	50	50	flying	120
E	18/07/2008	17:00	HG	2	s	50	50	flying	120
E	19/07/2008	09:52	HG	1	s	50	50	flying	60
E	19/07/2008	10:31	HG	1	w	50	50	flying	180
E	19/07/2008	11:22	HG	1	w	50	50	flying	180
W	26/07/2008	16:15	HG	9	s	25	75	circling	600
W	31/05/2008	07:51	HG	4	W	75	75	flying	120
W	07/06/2008	10:38	HG	6	s	80	80	circling	300

W	07/06/2008	11:28	HG	1	n/s	80	80	flying	120
E	23/06/2008	16:58	HG	11	e	50	100	flying	300
W	07/06/2008	11:25	HG	3	s	100	100	circling	120
W	07/06/2008	16:01	HG	5	e	100	100	circling	300
W	26/07/2008	15:15	HG	23	S	100	300	circling	600
W	06/03/2009	15:22	HH	1	SE	150	200	Flying through	210
E	18/07/2008	16:21	HY	1	s	1	1	flying	20
E	23/06/2008	14:23	HY	1	nr	2	2	flying	35
W	03/08/2008	14:08	HY	1	SW	3	3	flight	10
E	23/07/2008	13:40	HY	1	S	6	6	Hunting	75
W	06/09/2008		HY	1	W	0	8	flew to perch	150
E	23/08/2008		HY	1	S	8	8	Flying through	25
W	06/09/2008		HY	1		5	10	Hunting	240
W	07/06/2008	15:22	HY	1	e	1	20	flying	30
W	07/06/2008	15:29	HY	1	n	5	20	flying	60
W	07/06/2008	12:09	HY	1	s/n	20	20	hunting	60
W	15/07/2008	13:15	HY	1		30	30	Hunting	10
W	03/08/2008	13:08	HY	1	SE	40	40	hunting	120
W	18/08/2008		HY	1		0	50	Hawking	5
W	07/06/2008	11:28	HY	1	s	50	50	hunting	180
W	07/06/2008	12:04	HY	1	s	50	50	hunting	180
W	15/07/2008	13:29	HY	1		50	50	Hunting	10
W	10/05/2008	06:33	HY	2	SE	30	75	Flying through	75
E	23/06/2008	12:46	HY	1	ne	20	200	hunting	60
W	17/06/2008	12:35	HY	1		200	200	Thermal / feed	90
E	11/09/2008		K.	1	NW	0	2	dropped from perch	20
E	02/06/2008	19:20	K.	1	S – E	0	3	Flying through	
E	24/06/2008	12:04	K.	1	N	0	3	Flew off	140

W	18/08/2008		K.	1	E	0	3	hunting	20
W	15/07/2008	10:01	K.	1	N	3	3	Soar / hunt	100
E	11/09/2008		K.	1		0	5	hunting	600
W	10/05/2008	09:48	K.	1	S	2	5	Aggression	20
W	06/04/2008	07:51	K.	1	SW	5	5	hunting - landed	300
W	17/06/2008	07:47	K.	1		5	5	Hovering	10
W	15/07/2008	08:47	K.	1	SW	5	5	Flying through	25
E	06/09/2008		K.	1	SE	5	5	Flying through	35
W	10/05/2008	05:50	K.	1	SW	6	6	Flying through	15
W	06/09/2008		K.	1	W	0	8	Hovering	240
E	23/07/2008	14:42	K.	1	S	8	8	Hunting	75
E	23/08/2008		K.	1	SW	8	8	flew to perch	20
E	23/08/2008		K.	1	S	8	8	Flying through	20
W	17/12/2008	08:53	K.	1	ENE	8	8	flight	40
W	07/06/2008	17:26	K.	1	nw	0	10	hunting	120
W	15/07/2008	10:31	K.	1		0	10	Hunting	5
W	18/08/2008		K.	1		0	10	Hovering	20
W	18/08/2008		K.	1		0	10	hunting	35
E	11/09/2008		K.	1	S-NW	0	10	flew to perch	300
E	02/10/2008	12:38	K.	1		0	10	hunting	50
E	18/11/2008	10:30	K.	1	E	0	10	perched	3600
W	03/02/2009	16:24	K.	1	E	0	10	flight	60
W	30/03/2008	07:10	K.	2	S	5	10	flying	60
E	23/07/2008	09:49	K.	1	SW-E	5	10	Hunting	50
E	02/06/2008	07:00	K.	1	N	6	10	Hunting	45
W	30/03/2008	13:19	K.	1	N	10	10	flew into tree	60
W	04/05/2008	06:55	K.	2		10	10	displaying	5
W	20/09/2008	13:33	K.	1	S	10	10	hunting	60
E	17/01/2009	10:12	K.	1	ESE	10	10	Flying through	40

W	15/07/2008	07:45	K.	1		0	15	Hunting	900
W	26/07/2008	17:39	K.	1	sw	0	15	hunting	600
W	18/08/2008		K.	1		0	15	hunting	90
E	20/09/2008	08:02	K.	1	SE	0	15	hunting	120
E	02/10/2008	13:57	K.	2	E	0	15	interacting	90
W	04/05/2008	05:39	K.	1	NW	6	15	flying through	35
E	24/06/2008	11:41	K.	1	W	10	15	Hunting	45
E	22/09/2008	14:10	K.	1		10	15	Flying through	70
W	31/05/2008	08:44	K.	1	W	15	15	flying	10
W	02/10/2008	17:26	K.	1	NNE	15	15	Flying through	10
W	10/12/2008	14:23	K.	1	SW	15	15	Flight	60
W	15/07/2008	09:56	K.	2		0	20	Wheeling	90
W	26/07/2008	11:37	K.	1	S	0	20	hunting	60
W	22/11/2008	15:57	K.	1		0	20	hunting	960
E	09/08/2008	13:44	K.	1	S	15	20	hunting	120
W	30/03/2008	12:51	K.	1	N	20	20	flying	60
W	30/04/2008	09:45	K.	1	S	20	20	hunting	60
W	03/08/2008	09:16	K.	1	W	20	20	hunting	30
W	14/11/2008	15:20	K.	1	W	20	20	hunting	600
W	22/11/2008	07:19	K.	1		20	20	hunting	30
E	17/12/2008	11:34	K.	1		0	25	hovering	15
E	09/02/2009	16:01	K.	1		0	25	hunt/perched	1200
E	23/06/2008	13:00	K.	1	s	25	25	hunting	30
E	18/07/2008	17:22	K.	1	s	25	25	hovering	120
E	27/09/2008	10:46	K.	1	S	25	25	hunting	600
W	14/11/2008	11:39	K.	1	W	25	25	hovering	120
E	11/09/2008		K.	1	WSW	0	30	flew to field	120
E	11/09/2008		K.	1		0	30	hunting	300
E	27/09/2008	12:41	K.	1	N	0	30	hunting	180

W	19/10/2008	11:03	K.	1	N	0	30	hovering	60
W	04/05/2008	09:55	K.	2	W	4	30	displaying	150
W	07/06/2008	10:43	K.	1	e	30	30	hunting	60
W	17/06/2008	7:12:00	K.	1		30	30	Hovering mostly	280
W	17/06/2008	11:57	K.	1	N	30	30	Hunting	60
W	15/07/2008	14:16	K.	1	SW	30	30	Flying through	90
E	27/09/2008	14:16	K.	1	W	30	30	hovering	120
E	09/11/2008	11:20	K.	1	E	30	30	hunting	120
W	14/11/2008	13:20	K.	1	E	30	30	hunting	120
E	05/12/2008	11:48	K.	1		30	30	hovering	10
W	05/01/2009	14:32	K.	2	E	30	30	Flying through	60
W	24/02/2009	10:47	K.	1	S	30	30	to perch	10
E	17/12/2008	13:14	K.	1	N	0	40	hovering	250
E	22/11/2008	14:54	K.	1	SE	20	40	flight	45
E	24/06/2008	06:53	K.	1	W	40	40	Hunting	30
W	15/07/2008	13:34	K.	1		40	40	Hunting	60
E	19/07/2008	10:17	K.	1	s	0	50	hunting	120
W	17/06/2008	08:48	K.	1	W	30	50	Hovering mostly	250
W	15/07/2008	10:37	K.	1	S	50	50	Flying through	45
W	10/12/2008	13:43	K.	1	SW - NE	75	100	hovering	360
W	17/06/2008	09:37	K.	1	N	100	100	Hovering mostly	360
W	24/02/2009	11:11	KF	1	S	0	2	short flight	30
W	12/04/2008	08:07	KT	1	E	50	50	circling	120
W	31/10/2008	07:00	L.	11	E	10	10	Flight	60
W	31/10/2008	08:55	L.	2	NW	0	20	Flight	120
E	03/02/2009	14:59	L.	4	E	0	20	landed	60
W	31/10/2008	06:56	L.	4	NE	20	20	Flight	120
W	31/10/2008	07:15	L.	3	N	20	20	Flight	120
W	07/01/2009	09:13	L.	2	W	0	25	flew in to feed	50



E	03/02/2009	16:45	L.	74	E	20	25	flight	50
E	17/01/2009	08:40	L.	17	WSW	25	25	flew in to feed	75
E	17/01/2009	08:45	L.	6	SW	25	25	flew in to feed	40
W	14/11/2008	15:28	L.	11	S	30	30	Flight	60
E	05/01/2009	11:51	L.	1	S	30	30	flying	75
W	09/02/2009	10:17	L.	40	S	30	30	short flight	30
W	07/01/2009	11:03	L.	10	NNW	40	40	Flying through	50
E	20/01/2009	12:52	L.	5	S	40	40		60
W	03/02/2009	16:45	L.	85	E	40	40	flight	60
E	09/02/2009	12:14	L.	40	E	40	40	Flying through	90
E	05/01/2009	10:00	L.	14	S	0	50	Feeding	50
E	17/01/2009	09:40	L.	210	S	0	50	short flight	120
E	17/01/2009	12:03	L.	162	SE	0	50	short flight	20
E	20/01/2009	11:47	L.	140	NE	0	50	flying between fields	120
E	09/02/2009	15:12	L.	50		0	50	wheeling	120
E	22/11/2008	08:38	L.	1	W	50	50	flight	40
E	17/01/2009	08:44	L.	41	WNW	50	50	flew in to feed	100
W	09/02/2009	10:27	L.	70	WNW	50	50	flying	45
E	05/01/2009	10:44	L.	11		0	75	flew in to feed	45
E	17/01/2009	11:57	L.	48	WNW	0	75	short flight	45
E	05/01/2009	11:17	L.	1	E	75	75	flying	60
E	23/08/2008		L.	58	SE-W	0	100	Flew in to land	60
E	17/01/2009	11:40	L.	21	S	0	100	Flying through	45
W	09/02/2009	11:42	L.	120	S	0	100	Flying through	70
W	17/12/2008	08:39	L.	22	SSW	100	100	flight	45
E	02/06/2008	07:23	LB	1	E	6	6	Flying through	20
W	04/05/2008	09:10	LB	1	E	8	8	flying through	25
W	10/05/2008	05:17	LB	1	E	8	8	Flying through	20



W	06/04/2008	06:44	LB	2	W	0	10	landed	20
E	30/03/2008	07:04	LB	1	S	10	10	flying	10
W	10/05/2008	09:07	LB	6	ESE	10	10	Flying through	50
W	04/05/2008	07:23	LB	2	SE	8	12	flying through	45
E	18/07/2008	16:26	LB	2	s	15	15	flying	30
E	19/07/2008	11:12	LB	1	s	15	15	flying	60
E	30/03/2008	07:00	LB	4	W	20	20	flying	60
E	30/03/2008	10:36	LB	1	S	20	20	flying	10
E	30/03/2008	12:14	LB	1	SE	20	20	flying	10
E	08/05/2008	06:10	LB	1	S	20	20	flying	60
E	08/05/2008	06:50	LB	1	E	20	20	flying	30
E	24/06/2008	09:04	LB	1	N	25	25	Flying through	45
E	18/07/2008	15:40	LB	4	s	25	25	flying	60
E	18/07/2008	15:55	LB	3	s	25	25	flying	60
E	19/07/2008	11:47	LB	1	e	30	30	flying	120
E	02/06/2008	08:52	LB	1	W	25	40	Flying through	70
E	02/06/2008	17:56	LB	1	ENE	40	40	Flying through	85
E	02/06/2008	08:56	LB	1	N	40	50	Flying through	95
E	02/06/2008	09:00	LB	1	NE	50	50	Flying through	110
E	02/06/2008	19:09	LB	1	N	60	80	Flying through	120
W	04/05/2008	07:14	MA	2	S	1	1	flying along ditch	10
W	04/05/2008	09:15	MA	2	W	1	1	short flight	15
W	12/04/2008	08:22	MA	1	E	2	2	flying	30
W	12/04/2008	10:10	MA	2	S	2	2	flying	10
W	31/05/2008	12:56	MA	2	N	2	2	flying	30
E	30/03/2008	08:15	MA	2	N	0	3	landed	20
W	30/03/2008	06:46	MA	3	S	3	3	flying	120
W	12/04/2008	05:45	MA	2	W	3	3	flying	30
W	31/05/2008	07:36	MA	2	N	3	3	flying	30



W	31/05/2008	08:49	MA	2	S	3	3	flying	30
W	07/06/2008	17:02	MA	2	n	3	3	circling	30
W	12/04/2008	08:26	MA	1	E	4	4	flying	10
W	10/05/2008	10:10	MA	1	NW	0	5	Landing to feed	25
W	12/04/2008	09:02	MA	2	S	5	5	flying	30
W	12/04/2008	09:03	MA	2	S	5	5	flying	10
W	12/04/2008	10:55	MA	2	W	5	5	flying	30
W	30/04/2008	08:45	MA	1	S	5	5	flying	30
W	04/05/2008	05:58	MA	1	N	5	5	flying through	20
W	10/05/2008	05:41	MA	2	W	5	5	Flying through	10
W	31/05/2008	11:28	MA	1	W	5	5	flying	10
W	07/06/2008	12:12	MA	1	s	5	5	flying	30
W	07/06/2008	13:06	MA	1	n/s	5	5	flying	30
W	30/04/2008	10:12	MA	2	S	6	6	flying	60
W	04/05/2008	11:21	MA	3	W	2	8	pursuit	30
W	04/05/2008	09:41	MA	2	SSE	8	8	flying through	35
W	04/05/2008	11:02	MA	1	E	8	8	flying through	20
W	30/04/2008	09:30	MA	1	NS	5	10	flying	60
W	17/06/2008	07:27	MA	1	SW	5	10	Flying through	30
W	15/07/2008	08:02	MA	2	SSW	5	10	Flying through	25
W	06/04/2008	05:50	MA	1	NE	10	10	flying	20
W	06/04/2008	06:35	MA	2	W	10	10	flying	15
W	06/04/2008	07:01	MA	1	SW	10	10	flying	10
W	06/04/2008	07:23	MA	1	NE	10	10	flying	20
W	12/04/2008	07:32	MA	3	W	10	10	flying	30
W	30/04/2008	05:02	MA	2	S	10	10	flying	20
W	30/04/2008	05:25	MA	2	S	10	10	flying	30
W	30/04/2008	06:10	MA	1	N	10	10	flying	20
W	30/04/2008	06:45	MA	2	N	10	10	flying	30



W	30/04/2008	10:34	MA	2	E - W	10	10	flying	10
E	08/05/2008	07:20	MA	1	E	10	10	flying	30
W	17/06/2008	13:13	MA	1	NE	10	10	Flying through	55
W	04/05/2008	09:29	MA	1	S	5	15	flying through	30
W	04/05/2008	11:48	MA	2	W	5	15	flying through	30
W	30/03/2008	11:00	MA	2	S	15	15	flying	20
W	30/04/2008	07:18	MA	1	W	15	15	flying	30
W	30/04/2008	08:52	MA	1	NE	15	15	flying	60
W	10/05/2008	10:43	MA	1	W	15	15	Flying through	20
W	30/03/2008	06:00	MA	3	N	20	20	flying	30
W	30/03/2008	07:21	MA	3	NW	20	20	flying	60
W	30/03/2008	07:30	MA	1	S	20	20	flying	60
W	10/05/2008	11:04	MA	2	W	0	25	Flew off	30
W	30/03/2008	08:07	MA	2	N	25	25	flying	120
W	12/04/2008	08:18	MA	1	N	25	25	flying	180
W	04/05/2008	07:36	MA	5		15	30	pursuit	90
W	12/04/2008	07:45	MA	2	W	30	30	flying	30
E	12/02/2009	13:45	MA	2		1	50	flew in the land	40
W	04/05/2008	05:54	MA	2	E	50	50	flying through	20
W	12/02/2009	08:12	MA	10	NE	100	100	flying through	50
E	02/06/2008	19:52	MR	1		0	3	Hunting	80
W	17/06/2008	11:44	MR	1	SE	0	3	Hunting	75
W	04/05/2008	10:54	MR	1	S	3	3	hunting	85
W	07/01/2009	09:25	MR	1	W	3	3	hunting	30
E	02/06/2008	19:40	MR	1	E - N	0	5	Hunting	20
W	15/07/2008	08:27	MR	1	S	0	5	Hunting	80
W	18/08/2008	12:57	MR	1	E	0	5	hunting	95
W	18/08/2008		MR	1	E	0	5	Hunting	95
W	02/10/2008	16:59	MR	1	W	0	5	hunting	5



W	04/05/2008	10:24	MR	1		1	5	hunting	80
W	07/06/2008	15:45	MR	1	s	3	5	hunting	180
W	07/06/2008	11:10	MR	1	w - e	5	5	hunting	300
W	17/06/2008	13:21	MR	1		0	8	Hunting	100
E	05/12/2008	10:57	MR	1	WNW	8	8	hunting	140
E	02/06/2008	19:55	MR	1		0	10	Hunting	105
W	15/07/2008	08:31	MR	1		0	10	Hunting	180
W	02/10/2008	17:14	MR	1		0	10	hunting	10
W	18/11/2008	14:46	MR	1		0	10	hunting	20
W	10/12/2008	13:04	MR	1	SE - E	0	10	hunting	150
W	10/12/2008	13:13	MR	1		0	10	hunting	180
W	09/02/2009	11:22	MR	1	E	0	10	hunting	140
W	09/02/2009	11:28	MR	2	W	0	10	Flying through	75
W	06/03/2009	15:27	MR	1	E	5	10	hunting	75
W	10/05/2008	11:53	MR	1	SE	6	10	Hunted briefly	230
E	02/06/2008	19:44	MR	1	SW	10	10	Flying through	45
W	07/06/2008	11:57	MR	1	w	10	10	flying	20
W	07/06/2008	15:34	MR	1	s	10	10	flying	60
W	18/11/2008	15:02	MR	1	NW	10	10	flying	30
W	09/02/2009	10:02	MR	1	SSE	10	10	Flying through	40
W	09/02/2009	10:42	MR	1	S - SW	10	10	hunting	45
W	06/03/2009	14:08	MR	1	NW	10	10	hunting	45
W	10/12/2008	13:01	MR	1	W - E	0	15	hunting	120
W	06/10/2008	09:11	MR	1		5	15	hunting	50
W	30/03/2008	10:48	MR	1	S	15	15	flying	30
W	30/03/2008	11:18	MR	1	W	15	15	flying	120
E	19/07/2008	10:46	MR	1	e/n	15	15	flying/dipping	300
W	17/06/2008	13:51	MR	1		0	20	Hunting	600
W	07/01/2009	09:54	MR	2	N	0	20	hunting	40



W	09/02/2009	11:23	MR	1	E	0	20	hunting	210
W	18/11/2008	15:23	MR	1	NW	10	20	flying	75
W	30/03/2008	10:20	MR	1	W	20	20	circling	60
W	30/04/2008	06:28	MR	1	SE	20	20	flying	60
W	07/06/2008	15:08	MR	1	w	20	20	flying	30
W	07/06/2008	16:51	MR	1	w	20	20	circling	30
W	18/11/2008	14:58	MR	1	SE	20	20	flying	30
E	12/02/2009	13:06	MR	1	N - W	20	20	hunting	45
W	19/10/2008	13:03	MR	1	W	10	25	flying	120
W	12/02/2009	09:27	MR	1	S	10	25	hunting	40
W	30/03/2008	11:25	MR	2	W	25	25	flying	120
W	31/05/2008	10:48	MR	1	S	25	25	flying	120
W	07/06/2008	15:36	MR	1	n	25	25	flying	180
W	03/08/2008	10:36	MR	1	W	25	25	flight	60
W	03/08/2008	10:42	MR	1	N	25	25	flight	30
W	19/10/2008	12:21	MR	1	E	25	25	flying	60
W	14/11/2008	10:51	MR	1	W	25	25	Flight	300
W	14/11/2008	12:59	MR	1	W	25	25	Flight	120
W	14/11/2008	14:31	MR	1	W	25	25	Flight	30
W	14/11/2008	14:33	MR	1	W	25	25	flight	30
W	07/01/2009	08:33	MR	1	SSE	25	25	hunting	30
W	09/02/2009	11:21	MR	1	E - SE	25	25	hunting	25
W	03/03/2009	17:54	MR	1	NW	25	25	Flying through	45
W	04/05/2008	10:04	MR	1	SW	0	30	flying through	30
W	17/12/2008	07:50	MR	1		0	30	hunting	540
W	22/11/2008	08:21	MR	1		5	30	hunting	360
W	04/05/2008	10:32	MR	1	E	30	30	flying through	25
W	26/07/2008	11:08	MR	2	W	30	30	flight	180
W	03/08/2008	13:16	MR	1	W	30	30	flight	30



W	19/10/2008	12:22	MR	1	N	30	30	flying	180
W	19/10/2008	13:00	MR	1	W	30	30	flying	300
W	14/11/2008	15:08	MR	1	W	30	30	flight	120
W	10/12/2008	13:37	MR	1	E	30	30	hunting	10
W	06/03/2009	15:24	MR	1	N - NE	10	40	hunting	135
W	17/06/2008	12:39	MR	1	W	30	40	Flying through	50
W	20/12/2008	10:03	MR	1	E	40	40	patrolling	200
W	05/01/2009	14:50	MR	1	N	40	40	hunting	30
W	05/01/2009	15:06	MR	1	E - N	40	40	hunting	75
W	07/01/2009	10:57	MR	1		40	40	hunting	30
W	12/02/2009	07:44	MR	1	SSE	40	40	Flying through	40
W	18/11/2008	14:07	MR	1	circling	0	50	flying	30
W	17/01/2009	13:52	MR	1		0	50	circled	20
W	09/02/2009	10:37	MR	1		0	50	hunting	300
W	31/03/2009	09:18	MR	1		0	50	landed	500
W	12/03/2009	14:56	MR	1		10	50	hunting	30
W	18/11/2008	14:35	MR	1	W	20	50	flying	100
W	10/12/2008	13:25	MR	1	N - NW	50	50	patrolling	160
W	20/12/2008	09:47	MR	1	E - W	50	50	patrolling	45
W	17/01/2009	14:04	MR	1	S	50	50	Flying through	45
W	09/02/2009	10:09	MR	1		50	50	circled	45
W	24/02/2009	11:01	MR	1	SE	50	50	hunting	120
W	12/03/2009	14:32	MR	1	W	50	50	hunting	120
W	15/07/2008	13:24	MR	1	W	30	60	Flying through	110
E	05/12/2008	11:48	MR	1	W	0	75	flight	85
W	31/03/2009	09:31	MR	1		0	75	circling	30
W	10/12/2008	13:41	MR	1		25	75	patrolling	60
W	17/01/2009	14:09	MR	1	SW	25	75	Flying through	160
W	20/01/2009	16:28	MR	1	SSW -	25	75	Flying through	60



					NW				
W	03/03/2009	17:29	MR	1	E	25	75	Flying through	60
W	06/03/2009	15:39	MR	1	SW - NE	25	75	hunting	660
W	10/12/2008	13:46	MR	1		75	75	patrolling	60
W	20/12/2008	09:59	MR	1	N	75	75	patrolling	60
W	12/02/2009	08:40	MR	1		75	75	circled	90
W	18/08/2008		MR	1		0	100	hunting	220
W	18/11/2008	15:21	MR	1	NW	30	100	flight	90
W	07/06/2008	11:28	MR	1	e	100	100	circling	180
W	07/06/2008	16:01	MR	1	wnw	100	100	soaring	300
W	02/10/2008	16:28	MR	1	W	120	120	Flying through	75
W	26/07/2008	15:50	MR	1	n	200	200	circling	300
W	18/08/2008		MR	1	W	200	200	flying through	50
W	04/05/2008	05:10	MS	1	E	10	10	flying	40
W	07/01/2009	08:41	MS	3	S	25	25	Flying through	30
W	05/01/2009	13:57	MS	11	WSW	50	50	Flying through	45
E	23/08/2008		MU	1	W	10	10	Flying through	30
W	31/10/2008	09:01	MU	1	W	10	10	Flight	30
E	23/08/2008		MU	1	SE	5	15	Flying through	75
E	27/09/2008	15:31	OC	2	W	5	5	flying	60
W	14/11/2008	15:22	OC	2	W	5	5	Flight	30
E	24/06/2008	07:19	OC	2	W	8	8	Flying through	25
E	24/06/2008	13:18	OC	2	E	8	8	Flew in to land	30
W	26/07/2008	11:51	OC	1	SW	20	20	flight	120
W	07/06/2008	11:34	OC	3	n/s	50	50	flying	180
W	12/02/2009	09:04	PE	1	S	15	15	Flying through	30
E	12/03/2009	17:06	PE	1	SW	20	20	Flying through	60
W	06/04/2008	06:36	PG	2	SW	15	15	flying	40
W	06/10/2008	09:43	PG	7		20	30		70



W	19/10/2008	11:41	PG	80	S	30	30	flying	120
W	31/10/2008	07:01	PG	1	SE	30	30	Flight	30
W	14/11/2008	14:36	PG	42	W	35	35	Flight	120
W	31/10/2008	07:09	PG	12	NW	40	40	Flight	120
W	07/01/2009	10:14	PG	1	NNE	50	50	Flying through	90
W	09/02/2009	11:14	PG	3	S	50	50	Flying through	45
E	19/10/2008	14:39	PG	80	E	75	75	flying	120
E	19/10/2008	16:26	PG	50	W	75	75	flying	60
E	09/11/2008	12:49	PG	3	E	75	75	flight	120
W	07/01/2009	09:14	PG	2	N	75	75	Flying through	90
W	19/10/2008	11:22	PG	200	W	80	80	flying	120
E	09/11/2008	11:06	PG	100	SW	100	100	flying	120
W	17/12/2008	08:19	PG	590	S	100	100	flight	100
W	17/12/2008	08:29	PG	230	S	100	100	flight	80
W	07/01/2009	08:34	PG	11	N	100	100	Flying through	100
E	12/02/2009	12:39	PG	25	S	100	100	Flying through	90
W	07/01/2009	10:17	PG	2	N	125	125	Flying through	90
W	17/12/2008	08:44	PG	130	SE	150	150	flight	75
W	17/12/2008	09:52	PG	21	N	150	150	Flight	120
W	12/02/2009	08:17	PG	25	S	150	150	Flying through	60
E	10/12/2008	09:27	PG	105	WSW	200	200	flight	150
E	10/12/2008	09:38	PG	155	W	200	200	flight	210
E	17/12/2008	14:05	PG	50	N	200	200	flight	150
W	05/01/2009	13:50	PG	80	N	200	200	Flying through	60
W	07/01/2009	08:24	PG	33	SSE	200	200	Flying through	90
W	07/01/2009	10:57	PG	28	N	200	200	Flying through	90
W	17/01/2009	12:30	PG	770	S	200	200	Flying through	300
E	17/12/2008	11:49	PG	12	S	250	250	flight	180
W	17/12/2008	08:36	PG	1000	S	250	250	flight	100

W	17/12/2008	08:11	PG	240	SSE - ESE	150	300	flight	90
W	02/10/2008	18:14	PG	26	S	300	300	Flying through	60
E	17/12/2008	13:12	PG	350	S	300	300	flight	180
E	17/12/2008	13:14	PG	70	S	300	300	flight	150
E	17/12/2008	14:24	PG	60	S	300	300	flight	180
W	07/01/2009	09:47	PG	340	N	300	300	Flying through	240
W	17/01/2009	13:37	PG	54	S	300	300	Flying through	150
E	17/01/2009	12:09	PG	120	S	350	350	Flying through	180
E	17/01/2009	12:12	PG	50	S	350	350	Flying through	210
W	17/01/2009	13:24	PG	200	S	350	350	Flying through	210
W	31/05/2008	12:46:00	RL	1	E	0	1	foraging	30
W	17/06/2008	14:08	RL	1	W	1	1	Short flight	10
E	20/09/2008	10:36	RL	2	NW	1	1	flying	5
E	17/01/2009	12:04	RM	1	W	25	25	Flying through	40
E	30/03/2008	06:12	SG	70	S	1	3	flying	10
E	30/03/2008	06:10	SG	3000	SW	1	5	flying	20
E	30/03/2008	06:57	SG	70	SW	1	5	flying	20
E	30/03/2008	08:02	SG	750	S	1	5	flying	10
E	30/03/2008	11:25	SG	150	S	10	10	flying	20
E	17/12/2008	11:39	SH	1	W	0	1	hunting	30
W	06/03/2009	14:02	SH	1	NW	0	1	hunting	15
W	12/03/2009	14:45	SH	1	N	0	1	Hunting	35
E	23/07/2008	10:13	SH	1	WSW	0	2	Hunting	25
W	09/02/2009	10:01	SH	1	W - SW	0	2	hunting	15
W	03/02/2009	15:06	SH	1	S	0	5	flight	60
W	06/09/2008		SH	1	W	3	5	hunting	25
E	30/03/2008	10:52	SH	1	W	5	5	flying	5
E	23/07/2008	14:19	SH	1	E	5	5	Hunting lazily	45

W	18/11/2008	14:35	SH	1		0	8	hunting	45
W	18/11/2008	15:40	SH	1	SE	0	10	hunting	35
W	18/11/2008	15:48	SH	1	SW	0	10	hunting	20
W	31/10/2008	08:57	SH	1	N	2	10	Flight	60
W	06/10/2008	08:24	SH	1		5	10	Flying through	20
W	04/05/2008	11:07	SH	1		10	10	hunting	15
W	10/05/2008	06:53	SH	2	SE	10	10	Patrol / display	150
E	23/08/2008		SH	1	w	10	10	Flying through	140
E	05/01/2009	12:41	SH	1	S	10	10	hunting	20
W	20/01/2009	16:33	SH	1	NW	15	15	flying through	45
W	03/02/2009	16:31	SH	1	SW	15	15	flight	30
W	30/03/2008	10:59	SH	2	S	20	20	flying	60
W	31/05/2008	08:02	SH	1	S	20	20	flying	10
W	15/07/2008	14:17	SH	1		20	20	Thermalling	10
W	03/08/2008	12:50	SH	1	S	25	25	circling	60
E	09/11/2008	09:17	SH	1	E	25	25	flying	60
W	20/01/2009	16:24	SH	1	S	25	25	Flying through	40
W	17/06/2008	13:27	SH	1		0	30	Thermalling	25
E	22/09/2008	16:14	SH	1	circling	20	30	Flying through	120
W	31/10/2008	08:11	SH	1	S	30	30	Flight	60
E	22/09/2008	17:51	SH	1	circling	30	40	Flying through	180
W	03/08/2008	12:02	SH	1	E	40	40	flight	60
E	11/09/2008		SH	1	S	10	50	Flying through	100
E	22/09/2008	16:49	SH	1	circling	30	50	circling	130
E	24/02/2009	15:54	SH	1	S	50	50	Flying through	45
W	06/03/2009	14:30	SH	1	W - NW	40	75	flying through	110
E	11/09/2008		SH	1	NW	75	75	thermalling	150
W	06/03/2009	15:09	SH	1	E - N	50	200	Flying through	300
E	07/01/2009	14:42	SN	1	NNE	0	1	feeding	15



E	03/02/2009	15:04	SN	3	E	0	1	took off and landed	5
W	07/01/2009	10:18	SN	1	W	1	1	flew off	20
E	05/12/2008	10:57	SN	38	NE	2	2	flushed	10
E	02/10/2008	13:18	SN	1	W	0	3	flying off	25
W	06/04/2008	06:00	SN	1	NW	0	5	flying	10
W	31/10/2008	07:11	SN	5	W	10	20	Flight	30
W	31/10/2008	07:24	SN	5	S	10	20	Flight	20
E	24/02/2009	13:40	SN	40		0	25	short flight	50
W	03/03/2009	16:59	SN	5	NNE	25	25	Flying through	30
E	09/02/2009	12:09	SN	1	SW	0	30	flew off	40
E	24/02/2009	12:52	SN	4	N	30	30	in to land	20
E	07/01/2009	13:44	SN	2	SSE	40	40	Flying through	15
E	05/12/2008	11:25	SN	38		0	50	flushed	600
W	10/12/2008	14:08	SN	2		0	50	Flew in to land	50
E	12/02/2009	14:32	SN	56		0	50	Flew in to land	180
E	09/02/2009	12:02	SN	42	SW	0	75	flew off	120
E	05/12/2008	10:58	SN	38		0	100	flight	600
W	07/01/2009	09:02	T.	1		0	5	short flight	10
W	05/12/2008	16:06	T.	16	NW	25	25	Flight	120
W	07/01/2009	11:09	T.	4	SE	30	30	Flying through	10
W	03/03/2009	17:21	T.	1	SSE	50	50	Flying through	40
E	23/07/2008	10:24	TE	2	SW	8	8	Flying through	20
E	23/07/2008	10:24	TE	1	NE	8	8	Flying through	30
E	23/07/2008	10:08	TE	5	SW	10	10	Flying through	90
E	23/07/2008	13:04	TE	5	SW	10	10	Flying through	50
E	23/07/2008	14:40	TE	16	NE	0	15	Flying through	100
E	23/07/2008	13:44	TE	1	WSW	15	15	Flying through	50
E	23/07/2008	08:34	TE	2	SW	25	25	Flying through	40



E	23/07/2008	10:18	TE	3	SW	25	25	Flying through	50
W	05/12/2008	16:24	WK	1	E	2	2	Flight	10
W	09/02/2009	17:21	WK	1	E	2	2		15
W	22/11/2008	16:05	WK	1	N	3	3	flight	20
W	05/01/2009	15:38	WK	1	S - SW	0	5	Flushed	25
W	05/01/2009	15:41	WK	1	NE - E	0	5	Flew to roost	15
W	17/01/2009	07:16	WK	1	E	5	5	flew to wood	20
W	22/11/2008	16:38	WK	1	SE	8	8	Flight	20
W	20/12/2008	16:18	WK	1	E	10	10	flight	10