Final Report

FEHMARNBELT FIXED LINK
BIRD SERVICES (FEBI)

Bird Investigations in Fehmarnbelt - Baseline

Birds in land-approach areas on Lolland and Fehmarn

E3TR0011 Volume IV

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Please cite as:
FEBI (2013). Fehmarnbelt Fixed Link EIA.
Bird Investigations in Fehmarnbelt – Baseline.
Volume IV. Birds in land-approach areas on Lolland and Fehmarn.
Report No. E3TR0011

Report: 78 pages

May 2013

ISBN 978-87-92416-53-7

Maps:
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Geodatastyrelsen (formerly Kort- og Matrikelstyrelsen), Kort10 and 25 Matrikelkort
GEUS (De Nationale Geologiske Undersøgelser for Danmark og Grønland)
HELCOM (Helsinki Commission – Baltic Marine Environment Protection Commission)
Landesamt für Vermessung und Geoinformation Schleswig-Holstein (formerly Landesvermessungsamt Schleswig-Holstein) GeoBasis-DE/LVermGeo SH

Photos:
Thomas W. Johansen (Cover page)

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

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Lists of figures and tables are included as the final pages

Note to the reader:
In this report the time for start of construction is artificially set to 1 October 2014 for the tunnel and 1 January 2015 for the bridge alternative. In the Danish EIA (VVM) and the German EIA (UVS/LBP) absolute year references are not used. Instead the time references are relative to start of construction works. In the VVM the same time reference is used for tunnel and bridge, i.e. year 0 corresponds to 2014/start of tunnel construction; year 1 corresponds to 2015/start of bridge construction etc. In the UVS/LBP individual time references are used for tunnel and bridge, i.e. for tunnel construction year 1 is equivalent to 2014 (construction starts 1 October in year 1) and for bridge construction year 1 is equivalent to 2015 (construction starts 1st January).

1 INTRODUCTION

Fehmarnbelt A/S plans to construct a fixed link between the islands of Lolland, Denmark and Fehmarn, Germany, which might be realized as either a bridge or a tunnel. The land-approaches of either bridge or tunnel solution would lead to direct and indirect effects on birds and their habitats on the two islands, as this will lead to road construction, habitat loss and habitat change including direct and indirect effects. According to German and Danish Environmental Laws, the environmental impacts of the project shall thus be described and assessed in an Environmental Impact Study (EIS). For the two land approach areas on Lolland and Fehmarn, separate Environmental Impact Studies will be submitted with the other planning documents as required by the national authorities of Denmark and Germany. The following expertise serves as a background document for the EIS and provides the relevant information on breeding and resting birds.

The overall aim of this study is to understand and quantify the importance of land habitats in the vicinity of the land approach for breeding and staging birds. The surveys were intended to provide quantitative estimates of breeding bird species in the areas, following national standards of Denmark and Germany. It should be borne in mind that the national standards for baseline surveys associated with road EIAs differ between the two countries.

2 BIRD CENSUS ON DANISH LAND APPROACH (LOLLAND)

2.1 Study area and Methods

2.1.1 Breeding birds

Aims and method

Breeding birds have been mapped in the region along the eastern alignment of the land approach on Lolland. A total of 10 surveys have been carried out during April – July 2009 and March – April 2010 within 29 selected sub-areas. The sub-areas were defined as either areas of natural vegetation or wetlands following the classification made on the basis of the baseline investigations of the Danish Land Approach areas (COWI 2009). The study area comprises ca. 5,400 ha on Lolland of which about 350 ha were surveyed for breeding or staging birds. In the Danish land approach areas the survey method has been based on the territorial behaviour of birds. By marking the locations of observed birds on a high resolution map during several visits within the breeding season, it was possible to count the number of breeding bird territories in the area. The mapping method follows the methodological standards described by Südbeck et al. (2005).

Survey area

The survey effort for both breeding and staging birds covered the 29 sub-areas consisting of primary bird habitats, naturally vegetated areas and wetlands (Figure 2.1, Table 2.1). At the request of Fehmarn Belt A/S, the study area on Lolland was restricted to the eastern corridor. Following the Danish standard for EIAs these sub-areas were selected on the basis of their potential importance as breeding or non-breeding habitats for birds, here especially for priority species of birds either listed in Annex 1 of the EC Birds Directive or appearing on the Danish Red List (Agency for Spatial and Environmental Planning 2009). In order to prioritise the available resources (man hours), aerial photos were used to select any areas with a visible water surface, meadows and coherent vegetation and deselect agricultural fields, residential areas and gardens. On the first day of observations many areas were evaluated and the 29 sub-areas were selected in the final prioritisation.

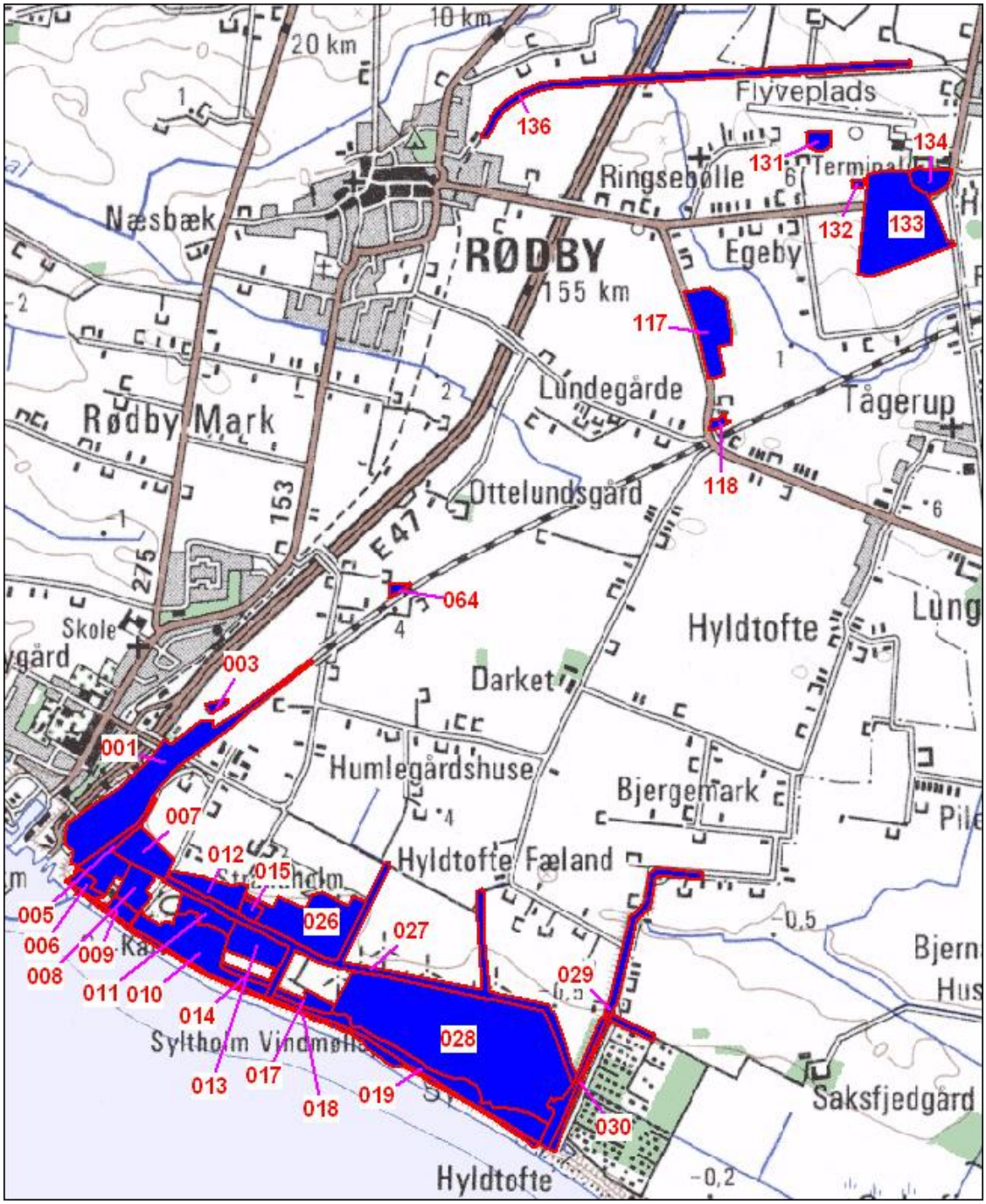

Figure 2.1 *Survey areas for mapping of breeding birds and counts of staging birds carried out on the Danish side (Lolland) from April 2009 to April 2010. Borders of sub-areas are in red, numbers refer to individual sites.*

Table 2.1 Short description of survey areas for mapping of breeding birds and counts of staging birds carried out on the Danish side (Lolland); see Figure 2.1

Locality	Size (ha)	Description
1	33.0	Open area along the railroad, surrounded by trees and bushes.
3	0.8	Small and deep lake.
5	7.9	Damp wood with small lakes and reed beds. Partly with dense undergrowth and old trees.
6	2.3	Small, shallow lake with a reed bed.
7	8.1	Larger lake for angling. Small reed beds and bushy vegetation along the edges.
8	5.6	Part of a factory-area, lots of rubble, but also a shallow lake.
9	2.4	Meadow overgrown with reeds and shrub.
10	18.1	Shallow lake with reed beds. To the east a meadow overgrown with shrubs.
11	5.0	Meadow overgrown with high grass.
12	6.7	Grassy meadow.
13	8.3	Meadow overgrown with high grass. To the south a canal with narrow reed beds.
14	1.9	Canal with narrow reed beds. To the east an area with bushes and trees.
15	1.7	Canal with narrow reed beds.
17	3.2	Meadow overgrown with high grass and a small canal with reed beds.
18	10.5	Dike stretching along the coast, mostly covered with grass.
19	14.6	Coastal thicket, mainly consisting of pine and willow scrub.
26	15.3	Grassy meadows, the north-eastern part wet in spring.
27	26.3	Long canal, mostly with just grassy sides.
28	91.3	Grassy meadow with damper areas.
29	14.1	Old dike complex with many bushes and trees. To the south a small lake surrounded by reeds.
30	2.8	Gardens, summer residences.
64	0.8	Small pond.
117	12.4	Old bog.
118	0.8	Small damp meadow.
131	2.2	Small lake
132	0.5	Small lake.
133	32.9	Mixed wood with some old oak trees.
134	4.1	Meadow with cattle grazing and a pond with reed beds.
136	15.9	Path along railroad, with older trees and bushes.

Equipment and time needed

The observations were recorded in the field on maps. Field binoculars (Leica 10x50) were used for observations. The time needed to carry out the observations depended on the size and terrain of the census area as well as on bird density. On Lolland, some naturally vegetated areas are found along the coastline, and one habitat stretches as a narrow corridor northwards from Rødbyhavn along the train line. Gardens associated with the urban areas of Rødbyhavn and Rødby have not been covered. In general, the aim was to cover 30 ha per hour (i.e. 2 min/ha) but because of some long and narrow sub-areas slightly lower coverage per hour was achieved. Observations were conducted from nearest road or path.

Census period and number of visits

The censuses were designed to coincide with the peak of most active singing and territorial behaviour of the particular species breeding in the area. The censuses covered a period from the beginning of April to July 2009 and again March-April 2010. In April 2010, a census was also undertaken in the coastal wetlands to the west of Rødbyhavn. In open habitats, such as the Danish study areas, where bird

densities are usually lower than in forests, five visits were deemed sufficient to record breeding land birds (see Südbeck et al. 2005). Species were registered as breeding birds when at least two observations at the same sub-area indicated a territory (singing, courtship, alarm calls, territory defence, etc.). When particular breeding behaviour (e.g. nest building, feeding or guiding young) was recorded, one observation was deemed sufficient. Here the term T2p refers to recorded breeding birds fulfilling the above requirements, while T1 refers to birds showing territorial behaviour (typically song) but only recorded at one visit. All visits were carried out in fair weather (i.e. neither windy nor rainy) by the same professional ornithologist. Eight of the 10 visits were undertaken during morning, one in the evening and one at night.

Table 2.2 Breeding bird surveys carried out on the Danish side (Lolland) from April 2009 to April 2010.

Observation	Date	Time
1	24-04-2009	Morning
1	25-04-2009	Morning
1	27-04-2009	Morning
2	30-04-2009	Morning
2	03-05-2009	Morning
2	04-05-2009	Morning
3	07-05-2009	Morning
3	10-05-2009	Morning
3	11-05-2009	Morning
4	01-06-2009	Morning
4	02-06-2009	Morning
4	03-06-2009	Morning
5	05-06-2009	Night
5	07-06-2009	Night
6	14-06-2009	Evening
6	19-06-2009	Evening
6	20-06-2009	Evening
6	21-06-2009	Evening
7	23-06-2009	Morning
7	24-06-2009	Morning
7	25-06-2009	Morning
8	17-07-2009	Morning
8	26-07-2009	Morning
8	27-07-2009	Morning
16	07-03-2010	Morning
16	12-03-2010	Morning
16	21-03-2010	Morning
17	09-04-2010	Morning
17	10-04-2010	Morning
17	11-04-2010	Morning

Evaluation of breeding bird communities

In the Danish study, breeding bird areas are defined as being important as follows:

Very high value
Areas are credited with a very high value if they regularly contain species protected by the EU Bird Directive (Annex 1 of the EU Council Directive 79/409/EEC).

High value
Areas are credited with a high value if they regularly contain species categorised as threatened (critically endangered or endangered; CR, EN) on the Danish Red List.

Medium value
Areas are credited with a medium value if they regularly contain species categorised as vulnerable or near threatened (VU, NT) on the Danish Red List.

Low value
Areas of no particular importance to birds.

2.1.2 Staging birds

Aims, methods and survey area

Staging land birds in the 29 selected bird habitats (350 ha) to the east and north of Rødbyhavn (see Figure 2.1) were identified and counted by an observer walking along and inside these areas. Visual observations as well as acoustic clues were used. In order to eliminate observer bias, all observations were carried out by the same professional ornithologist.

Census period and number of visits

Seven visits covering 19 days were carried out in fair weather between August 2009 and February 2010 by the same professional ornithologist. Except for the surveys in August the surveys covered most of the daylight hours (Table 2.3). The localities did not include coastline or sea.

Table 2.3 Staging bird surveys carried out on the Danish side (Lolland) from July 2009 to March 2010.

Observation	Date	Time
9	22-08-2009	Morning
9	23-08-2009	Morning
9	24-08-2009	Morning
10	19-09-2009	Morning-Day
10	20-09-2009	Morning-Day
11	14-10-2009	Morning-Day
11	15-10-2009	Morning-Day
12	01-11-2009	Morning-Day
12	06-11-2009	Morning-Day
12	30-11-2009	Morning-Day
13	10-12-2009	Morning-Day
13	27-12-2009	Morning-Day
13	29-12-2009	Morning-Day
14	23-01-2010	Morning-Day
14	24-01-2010	Morning-Day
14	29-01-2010	Morning-Day

Observation	Date	Time
15	15-02-2010	Morning-Day
15	17-02-2010	Morning-Day
15	18-02-2010	Morning-Day

Evaluation of staging bird areas

In the Danish study, staging bird areas are defined as being important as follows:

Very high value
Areas are credited with a very high value if they regularly contain species protected by the EU Bird Directive (i.e. Annex 1 of the EU Council Directive 79/409/EEC), or regularly contain concentrations of waterbirds of international importance *sensu* the Ramsar Convention (≥ 1 % of bio-geographic population; Ramsar Convention Bureau 1988).

High value
Areas are credited with a high value if they regularly contain concentrations of waterbirds of national importance (≥ 0.5 % of bio-geographic population).

Medium value
Areas are credited with a medium value if they regularly contain concentrations of waterbirds of local importance (≥ 0.1 % of bio-geographic population).

Low value
Areas of no particular importance to birds.

2.2 Results

2.2.1 Breeding birds

A total of 72 species holding 963 territories was recorded (Table 2.4) according to the T2p-criteria listed in chapter 2.1.1; a detailed breakdown of breeding birds per locality is given in Appendix I. Number of territories and breeding species together with the most common breeding birds per locality are given in Table 2.5, while Figure 2.2 gives the overall density of breeding birds (number of territories per ha per locality).

The majority of the recorded T2p-territories were held by passerines (78%, 752 territories) while waterbirds (swans, geese, ducks, grebes, coots) constituted 11% (108 territories) and shorebirds (waders, gulls) 5% (46 territories).

Among the breeding species (T2p), one (Garganey *Anas querquedula*) is on the Danish Red List (NT = near threatened), while two (Marsh Harrier *Circus aeruginosus* and Red-backed Shrike *Lanius collurio*) are listed under Annex I. The distribution of these three species is given in Figure 2.3, see also Table 2.10.

Among the species only recorded at one visit (T1), one species (Common Rosefinch *Carpodacus erythrinus*) is on the Danish Red List as VU (vulnerable). The recorded birds, however, most likely represent individuals on migration.

Table 2.4 Recorded species and number of territories of breeding birds on the Danish side (Lolland), April 2009 to April 2010. T2p - number of territories recorded according to the criteria listed in chapter 2.1.1. T1 - number of possible territories for birds only recorded at one visit. Protection status refers to the following Red List categories: CR-critically endangered, EN- endangered, VU-vulnerable, NT-near threatened.

English name	Latin name	T2p	T1	Protection
Little Grebe	*Tachybaptus ruficollis*	1	1	
Great Crested Grebe	*Podiceps cristatus*	1		
Red-necked Grebe	*Podiceps griseigena*	7	2	
Mute Swan	*Cygnus olor*	4		
Greylag Goose	*Anser anser*	11	1	
Shelduck	*Tadorna tadorna*	4		
Mallard	*Anas platyrhynchos*	24	1	
Garganey	*Anas querquedula*	1		NT
Shoveler	*Anas clypeata*	7		
Pochard	*Aythya ferina*	6		
Tufted Duck	*Aythya fuligula*	10		
Marsh Harrier	*Circus aeruginosus*	1		Annex 1
Common Buzzard	*Buteo buteo*	1	1	
Common Kestrel	*Falco tinnunculus*	3	1	
Grey Partridge	*Perdix perdix*	5	1	
Common Pheasant	*Phasianus colchicus*	1		
Quail	*Coturnix coturnix*		1	
Moorhen	*Gallinula chloropus*	4	3	
Coot	*Fulica atra*	33		
Oystercatcher	*Haematopus ostralegus*	1		
Little Ringed Plover	*Charadrius dubius*	2		
Ringed Plover	*Charadrius hiaticula*	1	1	
Lapwing	*Vanellus vanellus*	31	2	
Common Snipe	*Gallinago gallinago*	1	1	
Common Redshank	*Tringa totanus*	7	1	
Common Gull	*Larus canus*	4		
Stock Dove	*Columba oenas*	1		
Woodpigeon	*Columba palumbus*	29		
Cuckoo	*Cuculus canorus*	10	2	
Tawny Owl	*Strix aluco*	1		
Great Spotted Woodpecker	*Dendrocopos major*	3	2	
Skylark	*Alauda arvensis*	31	3	
Tree Pipit	*Anthus trivialis*		2	
Meadow Pipit	*Anthus pratensis*	30	3	
Yellow Wagtail	*Motacilla flava*	1		
Pied Wagtail	*Motacilla alba*	11	2	
Wren	*Troglodytes troglodytes*	7	2	
Dunnock	*Prunella modularis*	17	1	
Robin	*Erithacus rubecula*	7	7	
Thrush Nightingale	*Luscinia luscinia*	6		
Black Redstart	*Phoenicurus ochruros*	1	2	
Common Redstart	*Phoenicurus phoenicurus*	1	1	
Winchat	*Saxicola rubetra*	1	1	
Northern Wheatear	*Oenanthe oenanthe*		2	
Blackbird	*Turdus merula*	37	2	
Song Thrush	*Turdus philomelos*	9	2	
Marsh Warbler	*Acrocephalus palustris*	17	2	

English name	Latin name	T2p	T1	Protection
Reed Warbler	*Acrocephalus scirpaceus*	25	2	
Icterine Warbler	*Hippolais icterina*	21	2	
Lesser Whitethroat	*Sylvia curruca*	35	2	
Common Whitethroat	*Sylvia communis*	72	2	
Garden Warbler	*Sylvia borin*	24	3	
Blackcap	*Sylvia atricapilla*	36	1	
Chiffchaff	*Phylloscopus collybita*	41	2	
Willow Warbler	*Phylloscopus trochilus*	48	1	
Goldcrest	*Regulus regulus*	2	3	
Spotted Flycatcher	*Muscicapa striata*	2	2	
Pied Flycatcher	*Ficedula hypoleuca*		1	
Long-tailed Tit	*Aegithalos caudatus*	3	1	
Marsh Tit	*Parus palustris*	5	3	
Coal Tit	*Parus ater*	6	2	
Blue Tit	*Parus caeruleus*	18	1	
Great Tit	*Parus major*	31		
Nuthatch	*Sitta europaea*	1		
Common Treecreeper	*Certhia familiaris*		2	
Red-backed Shrike	*Lanius collurio*	2		Annex 1
Jay	*Garrulus glandarius*	1	1	
Carrion Crow	*Corvus corone*	1		
Carrion/Hooded Crow	*Corvus corone/cornix*	2		
Hooded Crow	*Corvus cornix*	7	6	
Raven	*Corvus corax*		1	
Starling	*Sturnus vulgaris*	2	2	
Tree Sparrow	*Passer montanus*		1	
Chaffinch	*Fringilla coelebs*	56	1	
Greenfinch	*Carduelis chloris*	39	2	
Goldfinch	*Carduelis carduelis*	5	5	
Sisken	*Carduelis spinus*	2		
Linnet	*Carduelis cannabina*	12	4	
Redpoll	*Carduelis flammea*		2	
Common Rosefinch	*Carpodacus erythrinus*		5	VU
Yellowhammer	*Emberiza citronella*	34	7	
Reed Bunting	*Emberiza schoeniclus*	39	2	
Total		**963**	**122**	
Number of species		72	58	

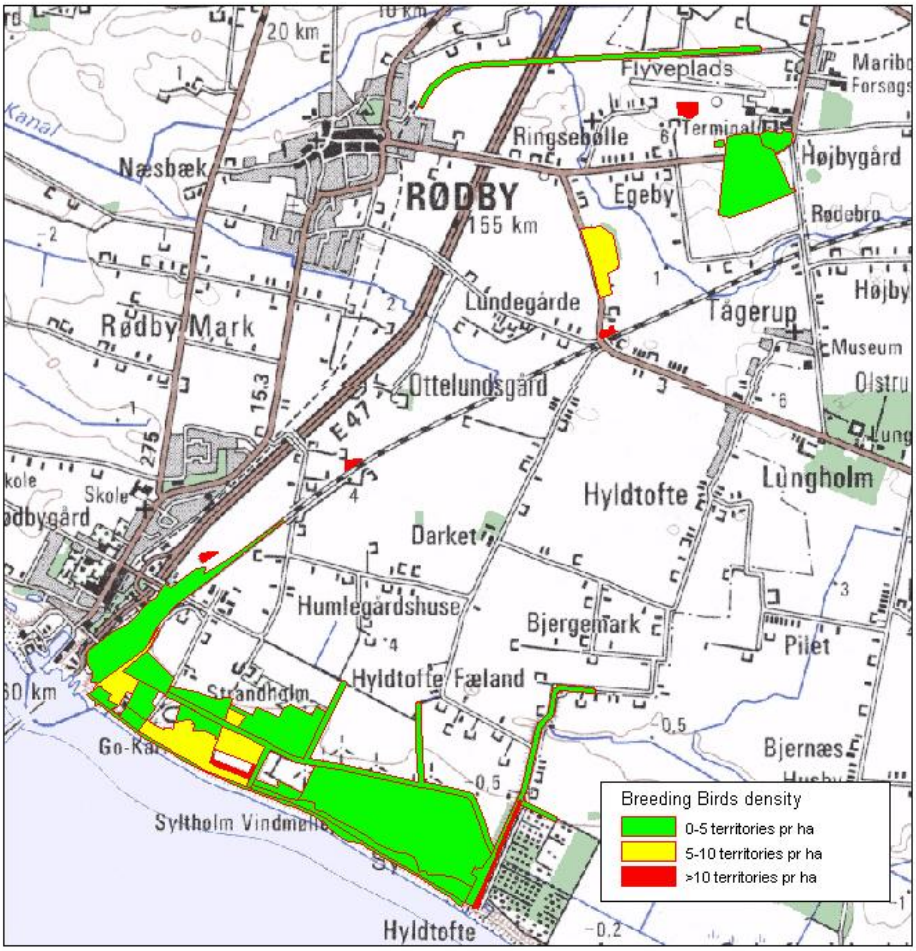

Figure 2.2 Density (T2p per ha per locality) of breeding birds on the Danish side (Lolland), April 2009 to April 2010.

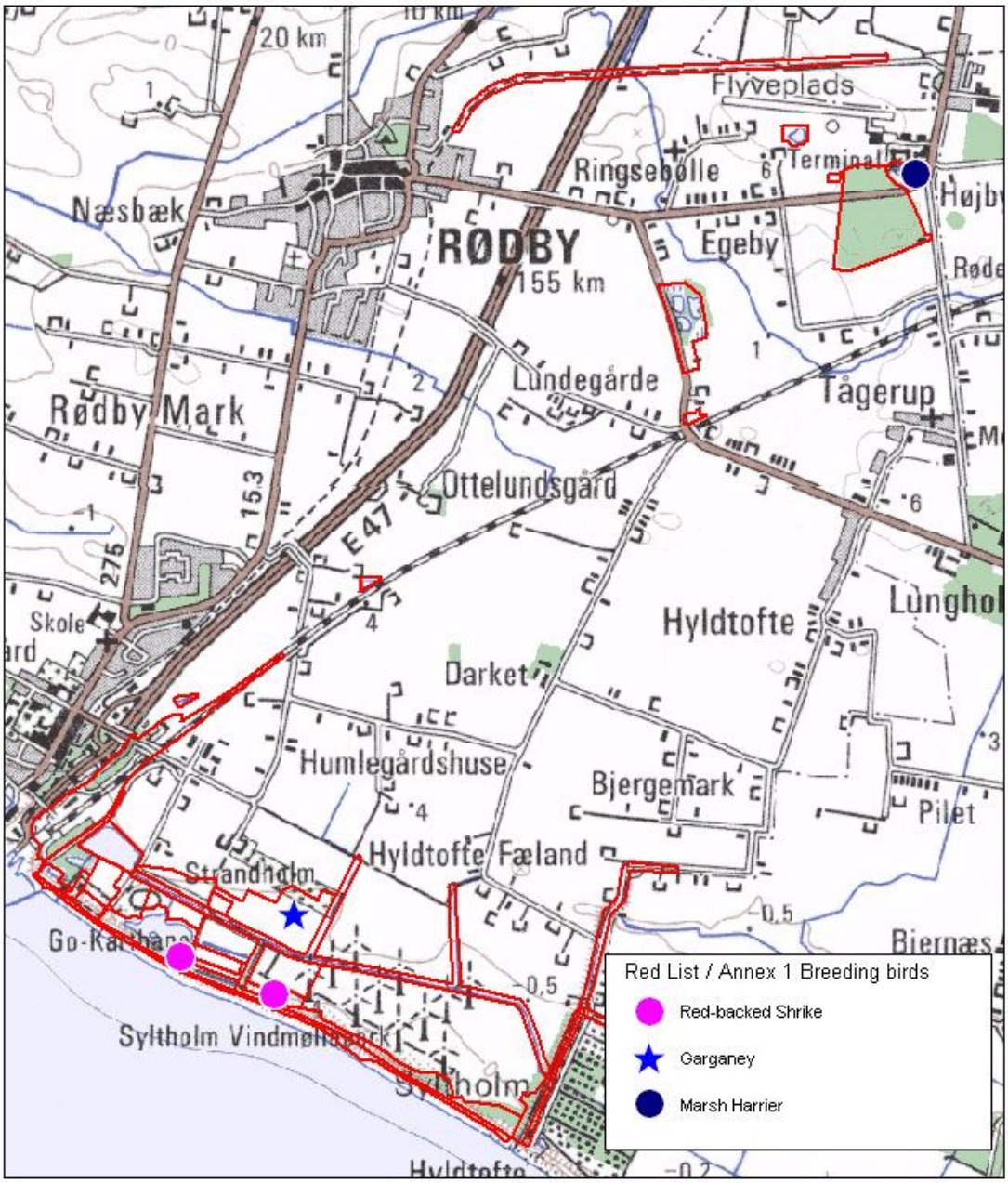

Figure 2.3 *Territories of breeding birds (T2p) of the Danish Red List and the EU Birds Directive Annex 1 List at the Danish side (Lolland), April 2009 to April 2010.*

Table 2.5 Number of T2p territories, breeding species and most common breeding species per locality on the Danish side (Lolland), April 2009 to April 2010.

Locality	Territories	Species	Most common species
1	77	22	Lesser Whitethroat, Common Whitethroat, Chiffchaff, Chaffinch.
3	8	6	Meadow Pipit, Reed Warbler.
5	56	24	Blackbird, Garden Warbler, Blackcap, Chiffchaff.
6	9	5	Greylag Goose, Marsh Warbler.
7	31	15	Mallard, Reed Warbler, Lesser Whitethroat.
8	21	10	Coot, Lapwing, Common Redshank.
9	18	12	Warblers, Finches.
10	74	31	Common Whitethroat, Reed Bunting, Yellowhammer.
11	8	5	Skylark.
12	11	7	Skylark, Common Whitethroat.
13	44	21	Common Whitethroat, Willow Warbler, Greenfinch.
14	25	16	Reed Warbler, Blackbird.
15	9	4	Coot.
17	8	8	
18	11	3	Skylark.
19	46	16	Willow Warbler, Chaffinch, Yellowhammer.
26	25	11	Lapwing.
27	20	9	Tufted Duck.
28	53	9	Lapwing, Skylark, Meadow Pipit, Reed Bunting.
29	62	23	Common Whitethroat, Willow Warbler.
30	40	17	Willow Warbler, Chifchaff, Chaffinch.
64	19	14	Coot.
117	82	32	Coot, Blackcap, Chiffchaff, Willow Warbler.
118	13	6	Lapwing.
131	24	15	Shoveler, Pochard.
132	3	3	
133	87	26	Blackcap, Chiffchaff, Chaffinch.
134	3	3	
136	76	22	Common Whitethroat, other warblers, finches.

2.2.2 Staging birds

During the 19 censuses of staging birds, a total of 12,602 birds of 107 species was recorded (Table 2.6); a detailed breakdown of maximum numbers of staging birds per locality is given in Appendix I. Overall density of staging birds (total number per ha per locality) is given in Figure 2.4.

The majority of the recorded birds were waterbirds (58%, 20 species; swans, geese, ducks, grebes, coots and herons) and passerines (34%, 64 species). Numbers of waterbirds were high throughout August – February, while the numbers of passerines peaked in August-September and were lowest in February. The distribution of total numbers of waterbirds and passerines per locality is given in Table 2.7.

Among the waterbirds, four species constituted 75% of the observed individuals – Bean Goose, Wigeon, Mallard and Tufted Duck. The monthly distribution of these species is given in Table 2.8. The vast majority of these four species were recorded at localities 7, 10, 12 and 26. Locality 10 also held good numbers of Little Grebe, a total of 63 birds recorded here.

A number of uncommon birds were recorded irregularly, Table 2.9.

Table 2.6 Total and maximum number of staging birds on the Danish side (Lolland), August 2009 to February 2010.

English Name	Latin Name	Total number	Max. Number
Little Grebe	*Tachybaptus ruficollis*	67	23
Great Crested Grebe	*Podiceps cristatus*	1	1
Cormorant	*Phalacrocorax carbo*	5	4
Common Bittern	*Botaurus stellaris*	4	1
Grey Heron	*Ardea cinerea*	27	4
Mute Swan	*Cygnus olor*	123	101
Whooper Swan	*Cygnus cygnus*	3	3
Bean Goose	*Anser fabalis*	1510	700
Greylag Goose	*Anser anser*	935	400
Canada Goose	*Branta canadensis*	114	100
Wigeon	*Anas penelope*	749	550
Gadwall	*Anas strepera*	5	2
Teal	*Anas crecca*	4	4
Mallard	*Anas platyrhynchos*	1033	270
Shoveler	*Anas clypeata*	4	4
Pochard	*Aythya ferina*	325	290
Tufted Duck	*Aythya fuligula*	2138	1840
Goosander	*Mergus merganser*	21	7
Marsh Harrier	*Circus aeruginosus*	1	1
Hen Harrier	*Circus cyaneus*	2	1
Sparrowhawk	*Accipiter nisus*	6	2
Common Buzzard	*Buteo buteo*	33	3
Rough-legged Buzzard	*Buteo lagopus*	1	1
Osprey	*Pandion haliaetus*	1	1
Common Kestrel	*Falco tinnunculus*	16	1
Grey Partridge	*Perdix perdix*	28	10
Water Rail	*Rallus aquaticus*	1	1
Moorhen	*Gallinula chloropus*	8	4
Coot	*Fulica atra*	205	60
Lapwing	*Vanellus vanellus*	25	25
Purple Sandpiper	*Calidris maritima*	2	2
Common Snipe	*Gallinago gallinago*	3	2
Woodcock	*Scolopax rusticola*	2	3
Common Redshank	*Tringa totanus*	3	3
Common Sandpiper	*Actitis hypoleucos*	1	1
Black-headed Gull	*Larus ridibundus*	49	21
Common Gull	*Larus canus*	130	120
Herring Gull	*Larus argentatus*	14	7
Stock Dove	*Columba oenas*	80	70
Woodpigeon	*Columba palumbus*	626	151
Collared Dove	*Streptopelia decaocto*	32	30
Short-eared Owl	*Asio flammeus*	1	1
Common Kingfisher	*Alcedo atthis*	2	1
Wryneck	*Jynx torquilla*	2	1
Great Spotted Woodpecker	*Dendrocopos major*	10	2
Skylark	*Alauda arvensis*	25	16
Sand Martin	*Riparia riparia*	5	5
Swallow	*Hirundo rustica*	275	275
Tree Pipit	*Anthus trivialis*	17	5
Meadow Pipit	*Anthus pratensis*	252	200
Water Pipit	*Anthus spinoletta*	1	1
Yellow Wagtail	*Motacilla flava*	2	2

English Name	Latin Name	Total number	Max. Number
Grey Wagtail	*Motacilla cinerea*	1	1
Pied Wagtail	*Motacilla alba*	26	20
Wren	*Troglodytes troglodytes*	65	5
Dunnock	*Prunella modularis*	10	4
Robin	*Erithacus rubecula*	95	11
Black Redstart	*Phoenicurus ochruros*	1	1
Common Redstart	*Phoenicurus phoenicurus*	19	10
Winchat	*Saxicola rubetra*	11	6
Blackbird	*Turdus merula*	167	32
Fieldfare	*Turdus pilaris*	59	31
Song Thrush	*Turdus philomelos*	44	9
Redwing	*Turdus iliacus*	140	40
Mistle Thrush	*Turdus viscivorus*	2	2
Marsh Warbler	*Acrocephalus palustris*	3	1
Reed-/Marsh Warbler	*Acro. palustris/scirpaceus*	13	10
Reed Warbler	*Acrocephalus scirpaceus*	14	4
Icterine Warbler	*Hippolais icterina*	4	1
Lesser Whitethroat	*Sylvia curruca*	5	2
Common Whitethroat	*Sylvia communis*	80	16
Garden Warbler	*Sylvia borin*	8	7
Blackcap	*Sylvia atricapilla*	16	6
Chiffchaff	*Phylloscopus collybita*	118	19
Willow Warbler	*Phylloscopus trochilus*	167	52
Goldcrest	*Regulus regulus*	47	22
Firecrest	*Regulus ignicapillus*	5	2
Pied Flycatcher	*Ficedula hypoleuca*	9	3
Bearded Tit	*Panurus biarmicus*	12	12
Long-tailed Tit	*Aegithalos caudatus*	36	17
Marsh Tit	*Parus palustris*	20	6
Coal Tit	*Parus ater*	21	5
Blue Tit	*Parus caeruleus*	182	20
Great Tit	*Parus major*	110	10
Nuthatch	*Sitta europaea*	9	2
Common Treecreeper	*Certhia familiaris*	11	3
Penduline Tit	*Remiz pendulinus*	1	1
Red-backed Shrike	*Lanius collurio*	1	1
Great Grey Shrike	*Lanius excubitor*	1	1
Jay	*Garrulus glandarius*	2	1
Magpie	*Pica pica*	4	1
Rook	*Corvus frugilegus*	45	40
Carrion Crow	*Corvus corone*	3	1
Carrion/Hooded Crow	*Corvus corone/cornix*	30	15
Hooded Crow	*Corvus cornix*	105	50
Starling	*Sturnus vulgaris*	12	10
Tree Sparrow	*Passer montanus*	94	25
Chaffinch	*Fringilla coelebs*	124	20
Brambling	*Fringilla montifringilla*	1035	1035
Greenfinch	*Carduelis chloris*	54	12
Goldfinch	*Carduelis carduelis*	32	15
Sisken	*Carduelis spinus*	119	50
Linnet	*Carduelis cannabina*	25	25
Twite	*Carduelis flavirostris*	170	170
Redpoll	*Carduelis flammea*	90	50
Common Crossbill	*Loxia curvirostra*	14	12

English Name	Latin Name	Total number	Max. Number
Yellowhammer	*Emberiza citrinella*	146	38
Ortulan Bunting	*Emberiza hortulana*	2	2
Reed Bunting	*Emberiza schoeniclus*	34	6
Total		12,602	

Table 2.7 Total number of staging waterbirds and passerines per locality on the Danish side (Lolland), August 2009 to February 2010.

Locality number	Waterbirds	Passerines
1	9	374
3		4
5	10	164
6	47	
7	2959	34
8	1	30
9		30
10	1305	68
11		8
12	1452	281
13	10	66
14	15	48
15		15
17		53
18	10	4
19		146
26	1001	340
27	12	
28		275
29	1	251
30		221
64	57	48
117	72	230
131	315	4
132		4
133	2	1331
134	3	1
136		232
Total	7281	4262

Table 2.8 Seasonal numbers of selected waterbirds staging on the Danish side (Lolland), August 2009 to February 2010.

	Bean Goose	**Wigeon**	**Mallard**	**Tufted Duck**
	Anser fabalis	*Anas penelope*	*Anas platyrhynchos*	*Aythya fuligula*
August	0	150	187	16
September	0	47	175	60
October	0	550	30	36
November	0	0	52	186
December	0	1	11	0
January	310	1	368	1840
February	1200	0	210	0
Total	1510	749	1033	2138

Table 2.9 Uncommon staging birds recorded at the Danish side (Lolland), August 2009 to February 2010.

English name	**Latin name**	**Number**	**Period**	**Locality**
Bittern*	*Botaurus stellaris*	4	Dec - Feb	5, 7
Common Kingfisher*	*Alcedo atthis*	2	Sep + Dec	7
Wryneck	*Jynx torquilla*	2	Aug	19, 64
Firecrest	*Regulus ignicapillus*	5	Nov - Dec	1, 5, 7
Bearded Tit	*Panurus biarmicus*	12	Oct	14
Penduline Tit	*Remiz pendulinus*	1	Sep	13
Ortulan Bunting*	*Emberiza hortulana*	2	Aug	117

* *Listed on Annex 1 to the EC Birds Directive*

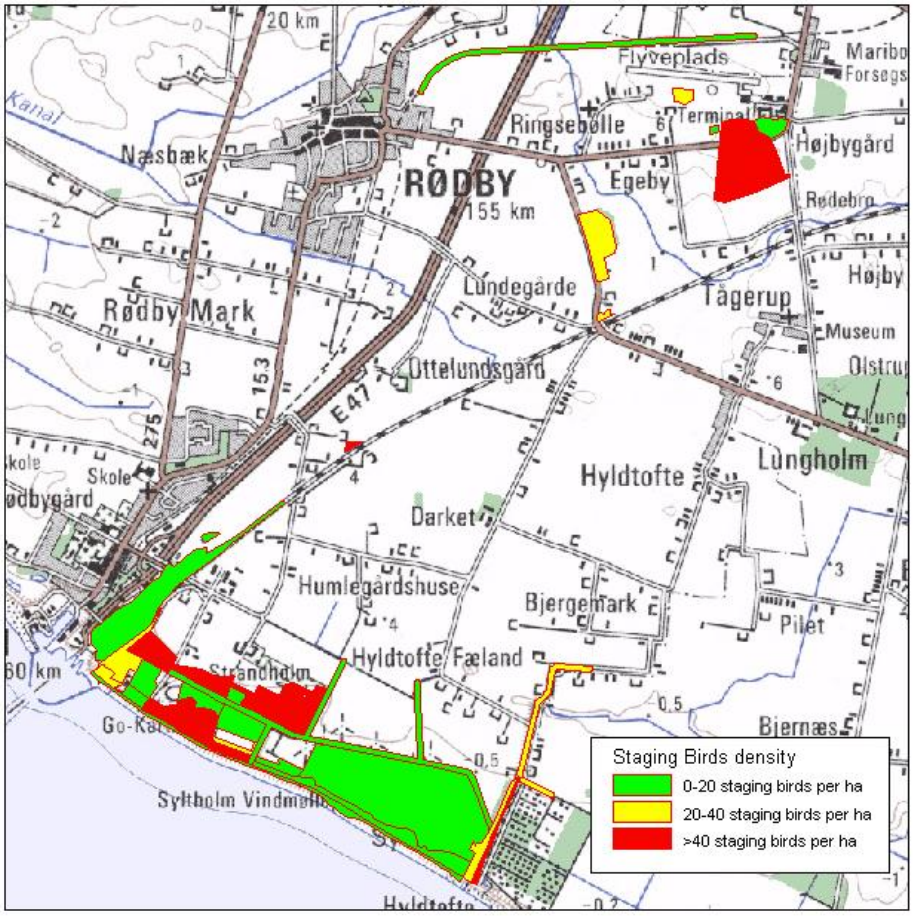

Figure 2.4 *Density (maximum daily number per ha per locality) of staging birds on the Danish side (Lolland), August 2009 to February 2010.*

2.3 Evaluation of importance

2.3.1 Breeding birds

The surveyed areas regularly held three species which are on the Danish Red List/the EU Birds Directive Annex 1 list (Table 2.10). Generally, the species composition and density seems to be typical for the selected types of habitats in southern Lolland.

According to the criteria of importance listed in chapter 2.1.1, three localities have been given status as of Very High Value (localities 10, 17, 134), one as of Medium Value (locality 26) and the remaining areas as of Low Value (Figure 2.5).

Apparently, based on queries to the Dofbasen ornithological database (www.dofbasen.dk), no historical data for the 29 surveyed localities exists.

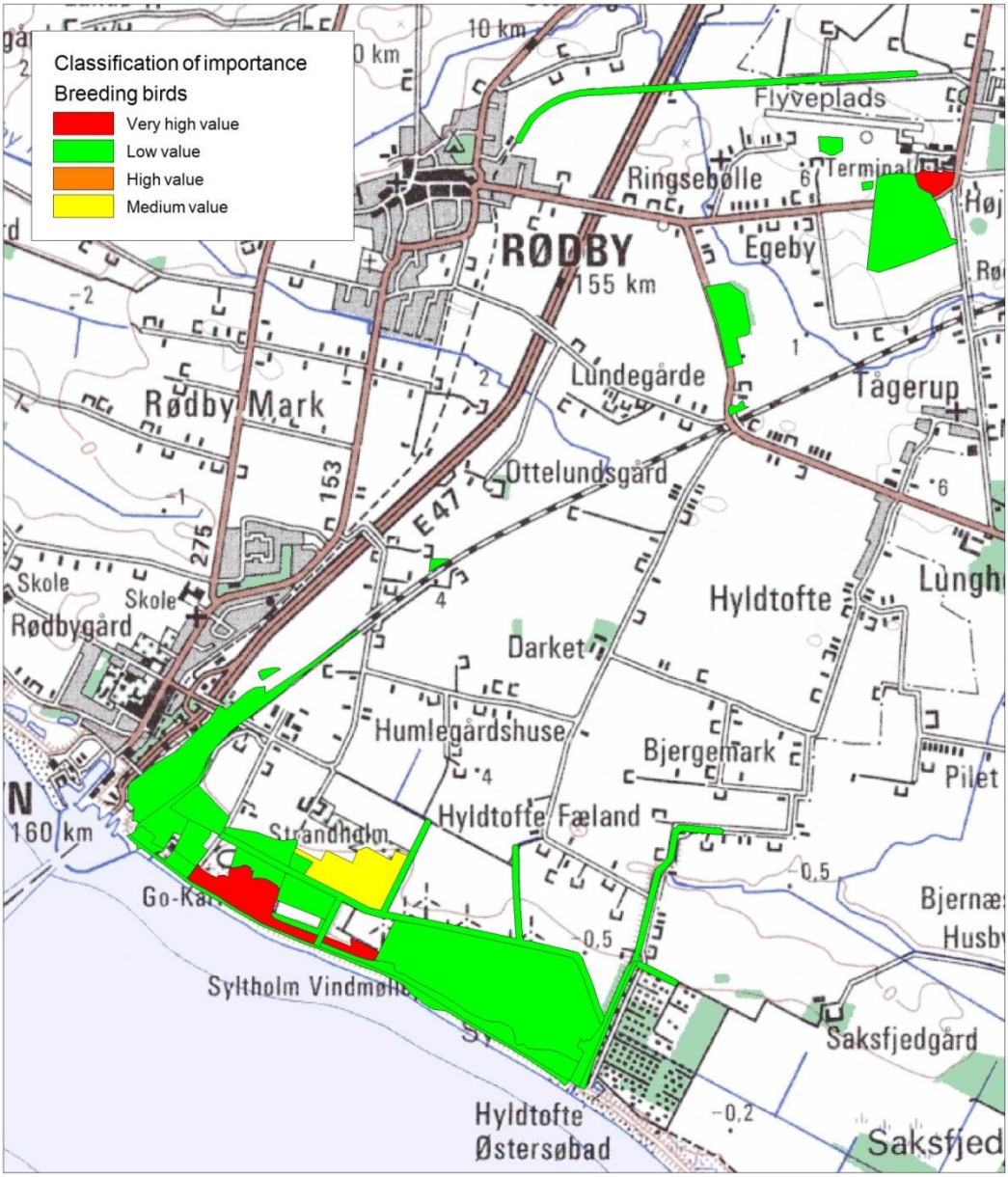

Figure 2.5 *Level of importance of the studied areas for breeding birds.*

Table 2.10 *Lolland – breeding birds (T2p) on the Danish Red List and on the Annex I of the EU Council Directive 79/409/EEC of 2 April 1979. * - information from www.dofbasen.dk, ** - information from www.dof.dk.*

Species	**Garganey**	**Marsh Harrier**	**Red-backed Shrike**
	Anas querquedula	***Circus aeruginosus***	***Lanius collurio***
Number	1	1	2
Protection status	NT	Annex 1	Annex 1
Locality	26	134	10, 17
Lolland population	1-3 pairs 2008*	28-30 pairs 2008*	9-14 pairs 2008*
Danish population	300-500 pairs 2000**	650 pairs 2000**	1500-3000 pairs 2000**

*Table 2.11 Lolland – numbers of breeding birds (T2p), habitat, uncommon species and species on the Annex 1/Red list per locality on the Danish side (Lolland), April 2009 to April 2010. For a more detailed description of the habitats see Table 2.1. * Uncommon species include the following species: Little Grebe, Red-necked Grebe, Shoveler, Pochard, Little Ringed Plover, Stock Dove, Tawny Owl and Thrush Nightingale.*

Locality	Number of territories	Number of species	Number of uncommon species*	Species on Annex 1/Red list	Habitat (short form)
133	87	26	2		Wood
117	82	32	3		Pond/lake
1	77	22			Thicket
136	76	22	1		Thicket
10	74	31	3	1	Pond/lake
29	62	23	1		Thicket
5	56	24			Wood
28	53	9			Damp meadow
19	46	16			Thicket
13	44	21			Dry meadow
30	40	17			Thicket
7	31	15	1		Pond/lake
14	25	16			Canal
26	25	11	2	1	Damp meadow
131	24	15	3		Pond/lake
8	21	10	2		Pond/lake
27	20	9			Canal
64	19	14	1		Pond/lake
9	18	12			Dry meadow
118	13	6			Damp meadow
18	11	3			Dike
12	11	7			Dry, grassy meadow
15	9	4			Canal
6	9	5			Pond/lake
17	8	8		1	Dry meadow
11	8	5			Dry, grassy meadow
3	8	6			Pond/lake
134	3	3		1	Damp meadow
132	3	3			Pond/lake

2.3.2 Staging birds

According to the criteria of importance listed in chapter 2.1.2, all of the localities have been given status as of Low Value, as none of the localities regularly contain species listed in Annex 1 of the EC Birds Directive or concentrations of waterbirds of international, national or local importance (Figure 2.6).

The most numerous waterbird species recorded were Tufted Duck (29%), Bean Goose (21%), Mallard (14%), and Wigeon (10%) (Table 2.8).

None of the staging birds were regularly recorded in numbers of international, national or local importance, but on three localities (7, 12 and 26) high numbers of Bean Geese and Tufted Duck were recorded once (Figure 2.6).

Thus, 500 Bean Geese were recorded in area 12 on 17 February 2010 and 700 in area 26 on 18 February 2010, constituting 5 and 7 percent of the estimated total Danish winter population of 10,000 birds (PETERSEN ET AL. 2010). On 10 December 2009, 1,840 Tufted Ducks were recorded in area 7, constituting 1.1 % of the estimated total Danish winter population of 162,000 birds (PETERSEN ET AL 2010). It is, however, not known whether these numbers of Bean Geese and Tufted Ducks occur regularly in the surveyed areas or whether their occurrences were influenced

by the unusually severe winter of 2009-2010. Lolland is an important wintering area for both species (PETERSEN ET AL 2010).

Generally, localities 7, 10, 12, and 26 held the highest numbers of staging waterbirds (Table 2.7). These localities are part of the band of small lakes, ponds and meadows stretching along the coast.

In the case of the staging passerines, several of the localities either held a high number of staging birds, or hosted uncommon species or had a high diversity of species. Three localities had a relatively high number of staging passerines (localities 1, 26 and 133; Table 2.7), while a series of localities had a medium high number of staging passerines (localities 12, 26, 28, 29, 30, 117, and 136; Table 2.7). A number of uncommon staging birds were recorded at the different sites (Table 2.9). The uncommon birds were either Annex I species or species rarely seen on migration in Denmark. The uncommon species were seen in low numbers at different localities, primarily locality 5 and 7. Locality 1, 5 and 117 had a remarkably high number of different species in comparison to other localities.

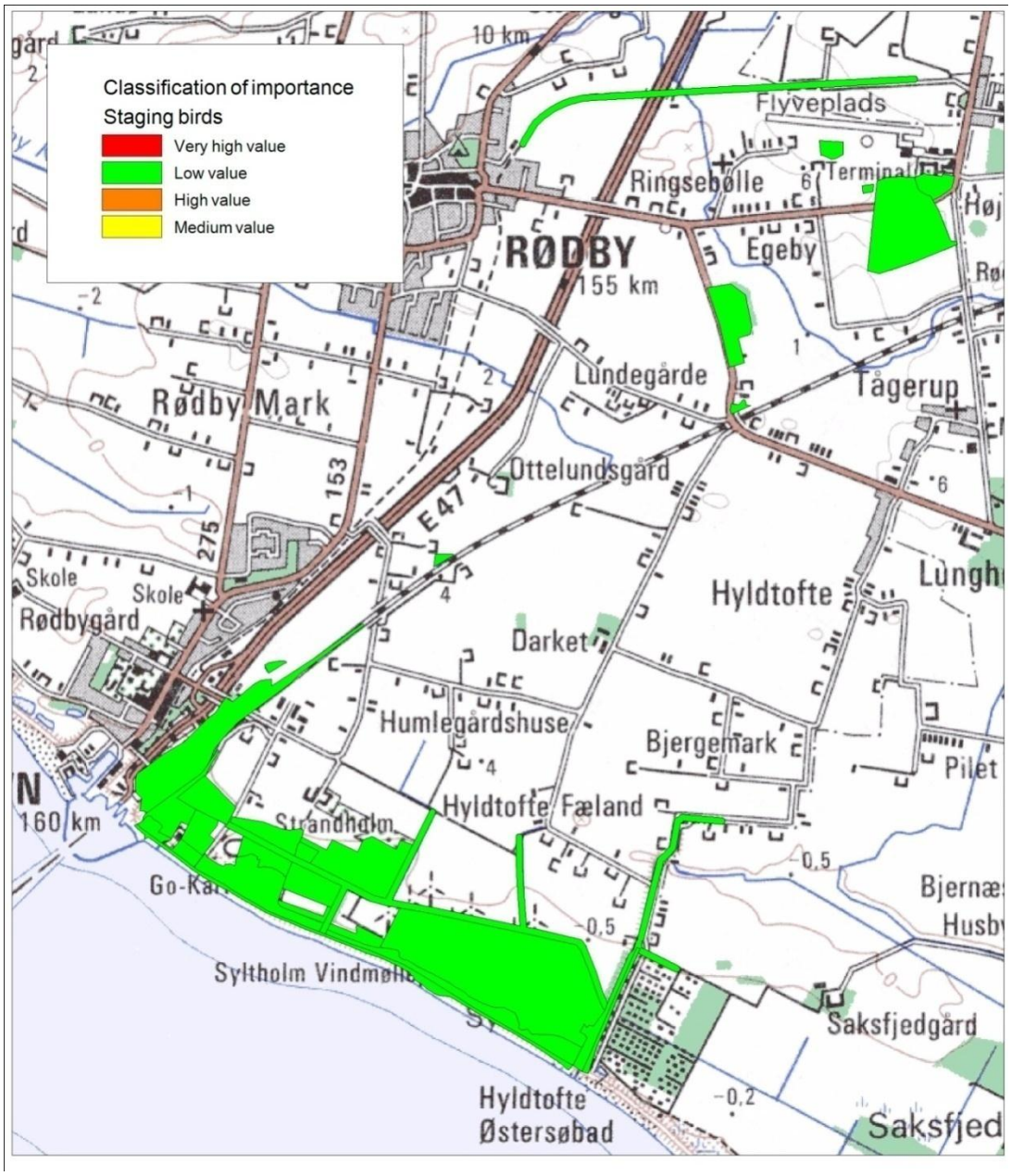

Figure 2.6 Classification of importance of the studied areas for staging waterbirds.

2.4 Discussion

2.4.1 Breeding birds

During breeding bird censuses in 29 selected sub-areas of natural vegetation or wetlands on southern Lolland a total of 72 species were recorded, holding 963 territories. Generally, the species composition and density of birds seems to be typical for the selected types of habitats in southern Lolland. Unfortunately, no historical data exist for these sub-areas (www.dofbasen.dk). The majority of the recorded breeding territories were held by passerines (78%), while waterbirds (swans, geese, ducks, grebes, coots) constituted 11% and shorebirds (waders, gulls) 5%.

The censuses recorded three breeding bird species which are prioritised by EU and Danish legislation. The Garganey is listed as 'near threatened' on the Danish Red List, while Marsh Harrier and Red-backed Shrike are listed under Annex I to the EC Birds Directive. The occurrence of breeding Garganey is surprising, as only 1-3 pairs were found on Lolland in 2008 (www.Dofbasen.dk), while the Marsh Harrier with 28-30 pairs and Red-backed Shrike with 9-14 pairs in 2008 (www.Dofbasen.dk) were to be expected. Accordingly, three wetland localities have been given status as of Very High Value, one as of Medium Value and the remaining areas as of Low Value.

2.4.2 Staging birds

The above-mentioned localities are part of the band of small lakes, ponds and meadows stretching along the south coast of Lolland. The same localities constitute the prime habitats used by birds during the non-breeding season. During the 19 censuses of staging birds, a total of 12,602 birds of 107 species were recorded. This number and diversity is judged as typical for smaller wetlands on Lolland. Larger numbers of birds and a higher diversity of birds would be expected in larger and less-disturbed wetland habitats like the ones further east of the study area in Saxfjed Inddæmning and Hyllekrog (www.Dofbasen.dk). The majority of the recorded birds were waterbirds (58%) and passerines (34%). Numbers of waterbirds were high throughout August – February, while the numbers of passerines peaked in August-September and were lowest in February. Among the waterbirds, four species constituted 75% of the observed individuals – Bean Goose, Wigeon, Mallard and Tufted Duck. The vast majority of Bean Goose and Wigeons were recorded on two wet meadows, while Mallards and Tufted Ducks were mainly recorded in two smaller lakes. Despite the relatively sizable occurrence of waterbirds all of the localities were classified as of Low Value, as none of the localities seemed to regularly contain species listed in Annex 1 of the EC Birds Directive or concentrations of waterbirds of international, national or local importance. Having said that, single large observations of especially Bean Geese and Tufted Ducks were recorded indicating that occurrences of significant numbers of waterbirds may take place in the coastal wetlands. However, neither the baseline observations nor historic data provide information on the regularity of such concentrations (www.Dofbasen.dk).

In the same coastal band of wetlands a number of uncommon birds were recorded irregularly, including Annex 1 species Bittern, Common Kingfisher and Ortulan Bunting. In addition, the Common Rosefinch, which is listed on the Danish Red List as vulnerable, was recorded during late spring/early summer. Two localities had relatively more observations of uncommon birds; a damp wood with small lakes and reed beds, partly with dense undergrowth and old trees, and a larger lake for angling with small reed beds and bushy vegetation along the edges.

3 BIRD CENSUS ON THE GERMAN LAND APPROACH (FEHMARN)

3.1 Study Area and Methods

3.1.1 Breeding birds

Aims

Breeding birds have been surveyed in areas defined by the consultants responsible for the EIS services of the land-approach on Fehmarn. According to German ornithological standards within the scope of EIS (see SÜDBECK et al. 2005), a complete survey of breeding territories of all species was performed. However, in towns and villages with high densities of mostly common species, only the territories of threatened species and building-associated birds were recorded precisely on maps.

Study area

The study area comprises ca. 3,200 ha in the north-eastern part of Fehmarn (see Figure 3.1). In this area, open landscapes with fields, grassland and some small woods dominate. Larger forests are absent. Intensive farming is characteristic for most of the agricultural habitats which cover 88 % of the area. The northern and eastern borders of the study area are formed by the beaches of the Baltic Sea. The remaining parts are covered by towns and villages, roads, railway lines and agricultural roads. There are several windfarms in the north-eastern part of study area.

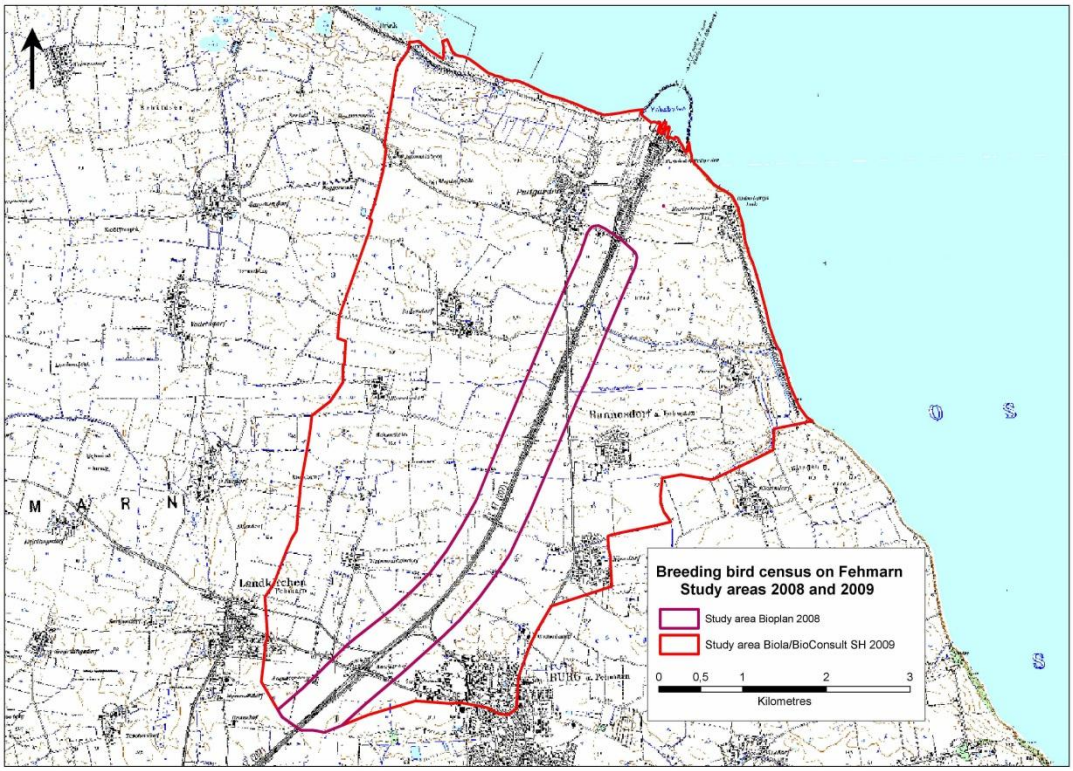

Figure 3.1 Breeding bird census on Fehmarn – Study areas 2008 (BIOPLAN) and 2009 (BIOLA/BIOCONSULT SH) (see text below for explanation of study areas).

According to the recommendations of FLADE (1994) (see below), the study area was divided into the habitat types listed in Table 3.1.

Table 3.1 Fehmarn Belt land approach study – habitat types according to FLADE (1994).

Code	German name	English name	Hectares	%
A 3	Strände	Beaches	45.5	1.4
D 4	Gehölzarme Felder (Gehölzanteil < 3 %)	Crops (proportion of woods < 3 %)	2,395.5	74.7
D 5	reichstrukturierte Feldlfur, Knicklandschaften (Gehölzanteil 5 - 50 %)	Crops with tree lines, hedges and small woods (proportion of woods 5 - 50 %)	419.4	13.1
D 6	halboffene, reichstrukturierte Niedermoore (Gehölzanteil 4 - 30 %)	semi-open fens mixed with tree lines, hedges, small woods and water-fringe vegetation (proportion of woods 4 - 30 %)	34.4	1.1
F 5	Gartenstädte	Garden cities	55.8	1.7
F 6	Dörfer	Villages	131.4	4.1
F 9	Industriegebiete und Bahnanlagen	Industrial areas and railway facilities	84.8	2.6
–	Verkehrsflächen	Traffic areas	39.6	1.2
			3,206.4	

As the table shows, most of the area (74.7%) is covered by habitat type D 4 (Crops), which is in intensive agricultural use. Habitat type D 5 (Crops with tree lines, hedges and small woods) makes up 13.1% and is found at two sites in the western and eastern part of the study area. Intensive farming is characteristic here, too. A semi-open fen (D 6) is situated in the north-western corner of the area (1.1%). Beaches (A 3) cover a narrow strip along the coastline (1.4%). Industrial areas and railway facilities (F 9) as well as traffic areas make up 3.9% of the study area. Villages (F 6) and garden cities (F 5) cover 5.8%.

Methods

The survey method focuses on the territorial behaviour of birds. By marking the locations of observed birds on a detailed map during several visits within the breeding season, it is possible to determine the number of territories in an area.

The census was conducted from the beginning of April to the mid of June 2009 (see Table 3.2). The census followed the methodological standards described by SÜDBECK et al. (2005). Five surveys were considered sufficient for recording breeding birds in the open habitats of the survey area (see SÜDBECK et al. 2005).

The surveys were evenly distributed during the census period. The main census time was usually from dawn until 10 - 11 a.m. After a very cold night, the surveys were delayed and during very warm weather they were prolonged due to lower bird activity. Some surveys were conducted in the evening or at night in order to record species commonly active at these times. The surveys were performed in fair weather conditions (neither windy nor rainy). Each survey was carried out by a permanent team of five experienced ornithologists, who were recording in different parts of the area.

Table 3.2 Breeding bird surveys carried out on Fehmarn from April to June 2009.

Survey no	Date	morning (m)/ evening respectively night (n) survey
1	2009-04-08	m
2	2009-04-20	m
2	2009-04-21	m
2	2009-04-23	m
2	2009-04-24	m
3	2009-05-05	m
3	2009-05-06	m
3	2009-05-08	m
3	2009-05-09	m
4	2009-05-19	m
4	2009-05-20	m/n
4	2009-05-21	m/n
4	2009-05-24	n
4	2009-05-25	m/n
4	2009-05-26	m/n
4	2009-05-27	m
5	2009-06-08	n
5	2009-06-09	m/n
5	2009-06-10	m/n
5	2009-06-11	m/n
5	2009-06-17	m/n

In open landscapes within the study area, field observations were recorded on 1:10,000-scale topographic maps. All observations were marked on the maps using standard codes. The codes were placed at the exact location of the bird sighting. Special attention was given to bird behaviour activities that confirm breeding. Species were interpreted as breeding birds when observations indicating a territory (singing, courtship, alarm calls, territory defence, etc.) were made at the same location during at least two separate surveys. When particular breeding behaviour (e.g. nest-building, feeding or guiding young) was recorded, one observation was sufficient.

In towns and villages with high densities of mostly common species, only the territories of threatened species and building-associated birds (e.g. House Sparrow, Black Redstart, House Martin, Swallow) were recorded with exact location on the maps. The numbers of territorial pairs of other species were only listed in tables.

A 300 m strip on both sides of the B 207 road was not investigated in 2009 (see Figure 3.1) because data from a 2008 study by BIOPLAN concerning the expansion of the B 207 road was available (BIOPLAN 2009 and written notification 2011). These territories were adopted by this report and relate to the habitat types D 4, D 5 and Traffic areas.

Threat status

Conservation and protection categories of the recorded species were taken from the Red Lists of threatened species of Germany (SÜDBECK et al. 2009; as of November

2007) and Schleswig-Holstein (KNIEF et al. 2010; as of October 2010). The Red List categories are provided in Table 3.3:

Table 3.3 Categories used in the Red List of Germany (Red List D 2007; SÜDBECK et al. 2009) and Schleswig-Holstein (Red List S-H 2010; KNIEF et al. 2010)

Red List D 2007		
Category	**German name**	**English name** (according to BFN 2009, p. 78)
0	Ausgestorben oder verschollen	Extinct
1	Vom Aussterben bedroht	Critically Endangered
2	Stark gefährdet	Endangered
3	Gefährdet	Vulnerable
R	Extrem selten	Rare (not an IUCN Red List category)
V	Vorwarnliste	Near Threatened
Red List S-H 2010		
Category	**German name**	**English name** (according to BFN 2009, p. 78)
0	Ausgestorben oder verschollen	Extinct
1	Vom Aussterben bedroht	Critically Endangered
2	Stark gefährdet	Endangered
3	Gefährdet	Vulnerable
R	Extrem selten bzw. Arten mit geografischer Restriktion	Rare (not an IUCN Red List category)
V	Zurückgehend, Vorwarnliste	Near Threatened

NB: Category V includes species which have declined markedly but are not currently considered as being under threat. Thus, Category V does not belong to the Red List categories in the narrower sense. By definition, a species is Near Threatened when it has been evaluated against the criteria but does not qualify for the categories Critically Endangered, Endangered or Vulnerable at this time, but is close to qualifying for, or is likely to qualify for, one of those categories in the near future.

Furthermore, so-called strictly protected species (streng geschützte Arten) as listed in the Federal Nature Conservation Act of Germany (Bundesnaturschutzgesetz; BNatSchG; § 7 (2) Nr. 14) and the species listed in Annex I of the EU Birds Directive (Council Directive 79/409/EEC) are taken into account to describe the conservation status of the recorded species.

Characterization of the breeding bird fauna in habitat types

The breeding bird fauna within the habitat types of the study area was characterized following the Indicator Species Model described by FLADE (1994). FLADE (1994) analysed the breeding bird communities of central and northern Germany to provide foundations for the use of ornithological data in landscape planning processes. According to FLADE (1994), Indicator species are specialized species, whose presence or absence at a site gives more information about habitat qualities than the presence/absence of others. Based on 1,600 census plots (territorial mapping) investigated by numerous field ornithologists in central and northern Germany between 1950 and 1990, the ecological profiles of 210 breeding bird species were calculated, showing their frequencies and densities in 68 different habitats. These profiles describe specialization and habitat preferences of each species. On the basis of the ecological profiles, a group of 3 - 16 indicator species can be determined for every habitat type.

FLADE (1994) defined indicator species (in German: Leitarten) to be species, which have a significantly higher frequency (and normally a much higher density) in one or more (max. 6) habitat types than in all others. Indicator species find the habitat

structures and requisites needed more frequently and more regularly in their significantly preferred habitat types than in all other habitats types.

Furthermore, the following species are considered by FLADE (1994):

- species, which reach their maximum density in a certain habitat type (in German: lebensraumholde Arten)
- species with a high frequency (80 - 100 %) in a certain habitat type (in German: stete Begleiter)

Additionally, FLADE (1994) provides structural parameters of the breeding bird communities of every habitat type such as the number of species or density.

Besides of those species described above, species, which are relevant or remarkable in a habitat type, were taken into consideration to characterize the breeding bird fauna in the habitat types of the study area.

Species which are not breeding on the island of Fehmarn (see BERNDT et al. 2005) or which are extinct in Schleswig-Holstein (KNIEF et al. 2010) were not considered in the analysis of breeding bird communities according to FLADE (1994). Furthermore, the Feral Pigeon (*Columba livia domestica*) was excluded from this study.

Within large-scale habitat types, small deviant fragments of other habitat types were not considered separately.

Evaluation of the breeding bird fauna in habitat types

To ensure the comparability of the evaluation method with the BIOPLAN-study, the evaluation matrix for the breeding bird fauna developed by BIOPLAN (2009) was adopted with minor modification.

All habitat types of the avifauna in the study area were evaluated on a five level evaluation scale in accordance with BRINKMANN (1998) (see Table 3.4). Within the habitat types, the occurrences of threatened species as well as those of Red List category V (Near Threatened) were assigned an evaluation level depending on their current threat status according to the Red List of Schleswig-Holstein (KNIEF et al. 2010). Furthermore, species listed in Annex I of the EU Birds Directive were considered. For those species, the national threat status was taken into account additionally.

Structural parameter of the breeding bird communities such as the number of species or density were also taken into account. Additionally, the determined importance of breeding bird communities within the habitat types according to WILMS et al. (1997) was integrated into the evaluation matrix. This procedure is described below.

Table 3.4 Evaluation matrix for the breeding bird fauna.

Evaluation level	Criteria
V very high importance	- habitat type with national or federal state importance according to WILMS et al. (1997) or - occurrence of a Critically Endangered species (Red List S-H: 1) or - occurrence of at least three Endangered species (Red List S-H: 2) or species of Red List category R (Rare) or - occurrence of two Endangered species (Red List S-H: 2) or species of Red List category R (Rare) in above-average densities or - occurrence of altogether at least eight species of Red List categories 2 (Endangered), 3 (Vulnerable) and R (Rare) or - occurrence of altogether at least four species of Red List categories 2 (Endangered), 3 (Vulnerable) and R (Rare) in above-average densities or - occurrence of a species listed in Annex I of the EU Birds Directive, which is also listed as Endangered in the Red List of Schleswig-Holstein or

Evaluation level	Criteria
	Germany (Red List S-H/D: 2) or - occurrence of at least two species listed in Annex I of the EU Birds Directive, which are also listed as Vulnerable or Rare in the Red List of Schleswig-Holstein or Germany (Red List S-H/D: 3 or R)
IV high importance	- habitat type with regional or local importance according to WILMS et al. (1997) or - occurrence of an Endangered species (Red List S-H: 2) or a species of Red List category R (Rare) or - occurrence of at least three Vulnerable species (Red List S-H: 3) or - occurrence of a Vulnerable species (Red List S-H: 3) in an above-average densities or - occurrence of a species listed in Annex I of the EU Birds Directive, which are also listed as Vulnerable in the Red List of Schleswig-Holstein or Germany (Red List S-H/D: 3) or - occurrence of at least two species listed in Annex I of the EU Birds Directive, which are not listed in the Red Lists of Schleswig-Holstein or Germany
III medium importance	- occurrence of Vulnerable species (RL S-H: 3), which were not being classified with high or very high importance or - occurrence of a species listed in Annex I of the EU Birds Directive, which is not listed in the Red Lists of Schleswig-Holstein or Germany or - habitat type with federal state-wide above-average densities of a species listed in category V (Near Threatened) or - habitat type with medium to local abundant occurrences of species listed in category V (Near Threatened) or - species-rich habitat type without occurrence of threatened species
II moderate importance	- species-poor habitat type without occurrence of threatened species or - habitat type with sporadical occurrence of species listed in category V (Near Threatened)
I low importance	- very species-poor habitat type without occurrence of threatened species and those listed in category V (Near Threatened) or - all other areas, particularly those having a negative impact on birds

The results of the schematic evaluation of the habitat types were subject to revision by the expert. Minor up- and downgrading - not exceeding one evaluation level - was undertaken in specific cases and justified by written argumentation (see Table 3.24 to Table 3.35 in chap. 3.3.1).

Evaluation of breeding bird communities according to WILMS et al. (1997)

The evaluation of breeding bird communities followed the procedure described by WILMS et al. (1997). The aim of this method was to determine the importance of an area at different spatial levels: local importance (natural geographic region), regional importance (Red List region), federal state importance (Schleswig-Holstein) and national importance (Germany).

The national importance was analysed on the basis of the Red List of Germany (SÜDBECK et al. 2009), the federal state importance on the basis of the Red List of Schleswig-Holstein (KNIEF et al. 2010). According to their Red List category and abundance in the study area (number of territorial pairs), the recorded breeding bird species were assigned scores (see Table 3.5). Due to the lack of a specific Red List for natural geographic regions in Schleswig-Holstein (e.g. Wadden Sea, marshland), the regional and local importance was also analysed on the basis of the Red List given for the federal state of Schleswig-Holstein (KNIEF et al. 2010).

Table 3.5 Determination of scores for the evaluation of breeding bird areas (WILMS et al. 1997).

No of territorial pairs	Red List category		
	1 (Critically Endangered) scores	2 (Endangered) scores	3 (Vulnerable) scores
1	10	2	1
2	13	3.5	1.8
3	16	4.8	2.5
4	19	6	3.1
5	21.5	7	3.6
6	24	8	4
7	26	8.8	4.3
8	28	9.6	4.6
9	30	10.3	4.8
10	32	11	5
each further	1.5	0.5	0.1

The sum of scores was divided by an area factor. This factor corresponds to the size of the study area in km^2 (at least 1.0). For example: at a size of 180 ha (= 1.8 km^2) the sum of scores is divided by 1.8.

The final ranking of importance was given on the basis of the following threshold values (Table 3.6).

Table 3.6 Determination of national, federal state, regional and local importance of breeding bird areas (WILMS et al. 1997).

Importance	Minimum score sum on basis of the Red List D 2007	Minimum score sum on basis of the Red List S-H 2010
national	25	–
federal state	–	16
regional	–	9
local	–	4

For the habitat types presented in Table 3.1, the importance of breeding bird areas was determined as described above.

3.1.2 Staging birds

Aims

Roads may affect the behaviour and the habitat use of staging or moulting birds. The aim of this study was to estimate the importance of areas for staging birds around the land approach.

Study area

The study area is illustrated in Figure 3.2. The area comprises 1,858 ha. The study considered only birds on land areas. Birds resting on the Baltic Sea were not counted. Birds sitting on the harbour walls as artificial constructions were outside the counting area and were also not included into the results.

The southern border of the study area runs south of the village of Bannesdorf, as from here different route courses of the land approach have to be considered in the EIS. For the area south of Bannesdorf, data of the BIOPLAN-study in 2008 (BIOPLAN 2009) was integrated. This area comprises additional 471 ha, the resulting study area size is 2,329 ha.

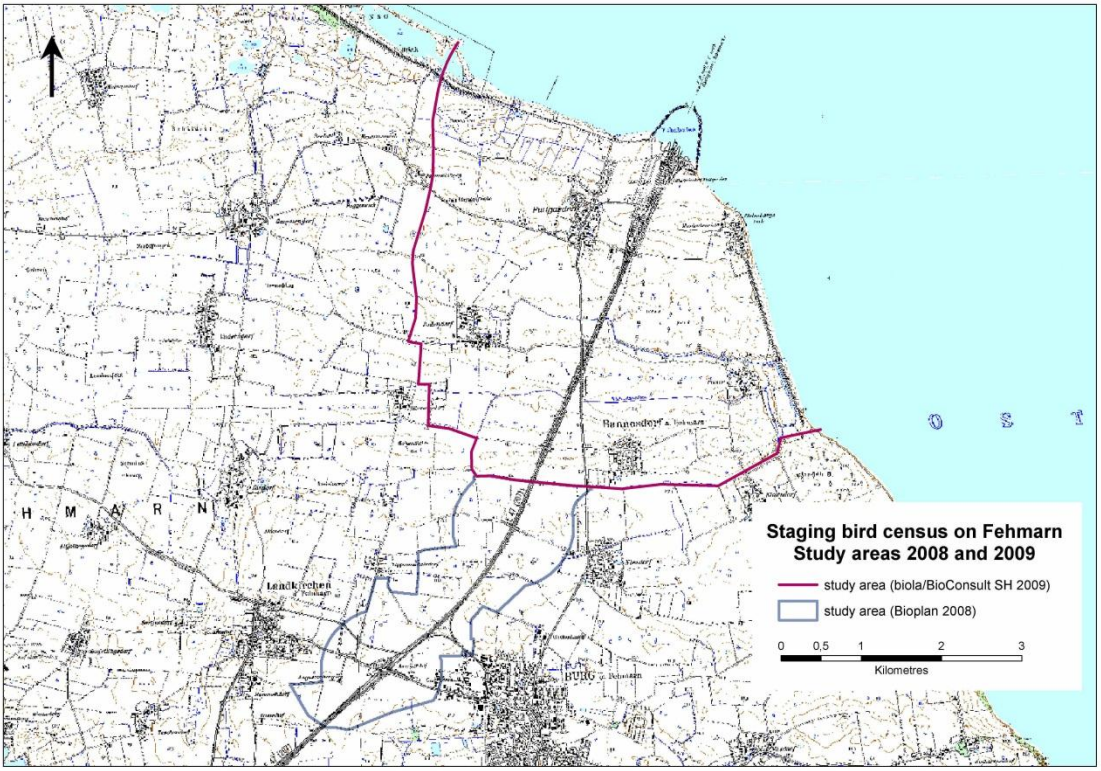

Figure 3.2 Staging bird census on Fehmarn – Study area from February 2009 to June 2010 (BIOLA/BIOCONSULT SH, borders in red). The area south of Bannesdorf was derived from the Bioplan-study (borders in blue)

Methods

Observations were made with naked eye or binoculars (10 x 42) from public roads. The coastline and other areas not accessible by car were covered by foot. Depending on agriculture use and crop size, fields were scanned several times. The accessibility to all areas has been good and the entire study area was covered in every survey.

Within the given borders of the investigation area, the staging birds have been counted once a month from February 2009 to June 2010 (Table 3.7). The surveys were conducted in the entire study area, even when the area was covered by snow (December 2009, January and February 2010).

For the area south of Bannesdorf, data of the BIOPLAN (2009) study was integrated. The results of the study by BIOCONSULT SH/ARSU (2010) on birds and wind farms on Fehmarn cannot be integrated, as the results are given in cumulative, classed values not matching the threshold values for the evaluation of importance levels for the staging bird fauna given below.

Table 3.7 Staging bird surveys carried out on Fehmarn from February 2009 to June 2010.

Survey no	Date
1	2009-02-09
2	2009-03-20
3	2009-04-22
4	2009-05-12
5	2009-06-23
6	2009-07-14
7	2009-08-20
8	2009-09-23

Survey no	Date
9	2009-10-21
10	2009-11-20
11	2009-12-30
12	2010-01-14
13	2010-02-19
14	2010-03-23
15	2010-04-21
16	2010-05-20
17	2010-06-23

The survey results are given in tables by species and date for the study area. For sub-areas, the highest numbers registered during one survey are given, as those are relevant for the evaluation.

Evaluation of staging bird communities

To ensure the comparability of the evaluation method with the BIOPLAN study, the evaluation matrix for the staging bird fauna developed by BIOPLAN was used in this study (BIOPLAN 2009). As new staging bird numbers for Schleswig-Holstein were published in 2010 (LLUR 2010) those values were used for federal state to local importance.

The evaluation method is closely related to BURDORF et al. (1997), who developed an evaluation method for staging bird areas in Lower Saxony (Germany). It is primarily a quantitative approach providing criteria to determine the importance of an area at different spatial levels (international, national, federal state, regional and local) for waterbirds and waders. Data are usually derived from international waterbird counts covering some decades. For other species, songbirds especially, there is no such evaluation method. Yet most of the staging bird community in the study area comprises of waterbirds and waders.

In this study, staging bird areas of high and very high importance according to BRINKMANN (1998) are such of international, national, federal state, regional or local importance. Only these areas are relevant for the planning and are illustrated as sub-areas - if such sub-areas occur.

The evaluation method of BURDORF et al. (1997; and thereby KRÜGER et al. 2010) was adapted by BIOPLAN (2009) to take account of more recent flyway population estimates and a reference to staging bird population estimates in Schleswig-Holstein (see below). The threshold values for the evaluation were newly defined by BIOPLAN (2009).

Since 2010 there are new staging bird population estimates and 2 % threshold values for waterbirds in Schleswig-Holstein (LLUR 2010).

The threshold values for the evaluation are given in Table 3.9. The definition and sources of threshold values for the evaluation of importance are:

A staging bird area is of ***international importance*** when:

regularly > 1% of the flyway population of waterbirds and waders or

regularly > 20,000 waterbirds and waders occur.

Sources for international flyway population are:

DELANY, S. & D. SCOTT (2006): Waterbird Population Estimates. Fourth Edition. – Wetlands International, Wageningen, The Netherlands.

WAHL, J., GARTHE, S., HEINICKE, T., KNIEF, W., PETERSEN, B., SUDFELDT, C. & P. SÜDBECK (2007): Anwendung des internationalen 1%-Kriteriums für wandernde Wasservogelarten in Deutschland. – Ber. Vogelschutz 44: 83-105.

Nationally important areas were defined as areas in which > 1% of the German staging bird population of waterbird and wader species occur. There is a minimum value of 50 individuals of a bird species to be taken into consideration.

Sources for national flyway populations are documented in BIOPLAN (2009).

Federal state, regional and local importance:

Federal state importance

The threshold values for the evaluation of federal state importance were calculated by the formula: 2 % of federal state population estimate (LLUR 2010) (minimum value) multiplied by a responsibility factor (see BURDORF et al. 1997, KRÜGER et al. 2010, BIOPLAN 2009).

Schleswig-Holstein as a federal state with large parts of the German North Sea and Baltic shores has a special / high responsibility in protection of staging birds. Therefore, a responsibility factor was calculated for those species with high shares of the national staging bird population. A high responsibility was defined by > 20 % of the national staging bird population. If lower and upper limits for national staging bird populations are given (e.g. in LLUR 2010), the average was used.

Regional and local importance is reached, when waterbird and wader species regularly occur in 50 % or 25 % of the threshold values of the federal state importance.

Threshold values for federal state, regional and local importance were rounded to:

straight 50 if more than 1,000

straight 10 if more than 100

straight 5 if more than 10

For federal state importance, there is a minimum value of 10 individuals, for the others 5 individuals of a bird species to be taken into consideration.

The source for the federal state population estimates is LLUR (2010). The values used by BIOPLAN (2009) are documented as well.

In text and maps, only sub-areas of high or very high importance are highlighted. Those were defined by reaching the threshold values by 90 % or for more each importance level. As this study has a limited effort compared to international waterbird and wader counts with datasets covering some decades, a single event of reaching 90 % or more of the threshold values is sufficient to state an importance.

For species other than waterbirds and waders, threshold values were defined as:

Sub-areas with occurrence of > 1,000 Ind. of one species are at least of local importance

Sub-areas with occurrence of > 5,000 Ind. of one species are at least of regional importance

In this study, these threshold values were not applicable (no sub-area with > 1,000 Ind. of one species other than waterbirds and waders).

The evaluated importance levels (criteria) derived from the method of BURDORF et al. (1997) and BIOPLAN (2009) were transferred to evaluation levels defined by BRINKMANN 1998) (see Table 3.8).

Table 3.8 Evaluation matrix for the staging bird fauna.

Evaluation level (BRINKMANN 1998)	Criteria (BURDORF et al. 1997)
V very high importance	area of international, national or federal state importance to staging birds
IV high importance	area of regional or local importance to staging birds
III medium importance to I low importance	not applicable, as the evaluation following BURDORF et al. (1997) is a selective method to evaluate important areas for staging birds

As the importance levels from the method of BURDORF et al. (1997) and BIOPLAN (2009) were developed to define areas of high and very high importance for staging birds, there is no definition for areas of lower importance (evaluation levels I to III according to BRINKMANN 1998).

The population estimates and responsibility factors used for the calculation of threshold values can be obtained from Table 26 in BIOPLAN (2009) and LLUR (2010).

The threshold values used in this study to define the importance levels are shown in Table 3.9.

Table 3.9 Threshold values for the evaluation of importance levels for the staging bird fauna derived from BURDORF et al. (1997), BIOPLAN (2009) and LLUR (2010).

species	international	national	federal state BIOPLAN (2009)	federal state LLUR (2010)	regional LLUR (2010)	local LLUR (2010)
Black-headed Gull	20,000	3,000	1,800	2.200	1.100	550
Common Coot	17,500	3,000	1,000	1.000	500	250
Common Gull	20,000	1,600	420	1.000	500	250
Curlew Sandpiper	10,000	n.d.	n.d.	n.d.	n.d.	n.d.
Dunlin	13,300	4,000	3,900	6.550	3.300	1.650
Eurasian Jackdaw	n.d.	n.d.	> 1,000	n.d.	n.d.	n.d.
Eurasian Wigeon	15,000	2,100	1,900	2.900	1.450	720
Fieldfare	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Golden Plover	7,500	2,200	1,600	2.000	1.000	500
Goosander	2,700	n.d.	n.d.	n.d.	n.d.	n.d.
Great Black-backed Gull	4,400	230	60	60	30	15
Green-winged Teal	5,000	400	180	500	250	120
Greylag Goose	5,000	1,250	480	540	270	140
Herring Gull	5,900	2,100	1,200	1.400	700	350
Lapwing	20,000	3,800	2,600	2.000	1.000	500
Little Grebe	4,000	625	55	80	40	20
Mallard	20,000	9,000	2,300	2.300	1.150	570
Mute Swan	2,500	750	110	110	60	30
Northern Shoveler	400	70	70	120	60	30

species	international	national	federal state BIOPLAN (2009)	federal state LLUR (2010)	regional LLUR (2010)	local LLUR (2010)
Oystercatcher	10,200	2,300	1,700	2.200	1.100	550
Red-breasted Merganser	1,700	110	30	30	15	7
Ringed Plover	730	180	170	320	160	80
Rook	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Shelduck	3,000	2,000	2,000	3.000	1.500	740
Tufted Duck	12,000	3,250	1,300	1.500	750	370
Woodpigeon	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

n.d.: no data available

Those sub-areas which reach or exceed the threshold values for at least local importance (BURDORF et al. 1997, BIOPLAN 2009 and LLUR 2010) and which have at least high importance (BRINKMANN 1998) will be illustrated in a map. Within these sub-areas, observations which reach or exceed the threshold values will be illustrated by species and date.

3.2 Results

3.2.1 Breeding birds

Species composition (entire study area)

During the breeding bird census carried out in 2008 (BIOPLAN 2009, 2011) and 2009 (BIOLA/BIOCONSULT SH) on Fehmarn, 75 breeding bird species with a total of 2,993 territories have been recorded (see Table 3.10). The number of recorded species includes approximately 38% of all species regularly breeding in Schleswig-Holstein (see BERNDT et al. 2002) and 85% of the species regularly breeding on Fehmarn (see BERNDT et al. 2005).

The most abundant species were House Sparrow (12.5% of all territories) and Rook (8.7 %), followed by Woodpigeon (6.0%), Blackbird (5.5%), Yellow Wagtail (5.3%), Whitethroat (4.9%), House Martin (4.7%) and Skylark (4.2%). These species are common and widespread in Schleswig-Holstein.

Three species listed in the Red List of Schleswig-Holstein (KNIEF et al. 2010) were recorded:

Red List S-H 2: Ringed Plover
Red List S-H 3: Lapwing, Skylark.

Recorded nationally threatened species were (SÜDBECK et al. 2009):

Red List D 1: Ringed Plover
Red List D 2: Grey Partridge, Lapwing
Red List D 3: Green-winged Teal, Northern Shoveler, Skylark.

The following species are considered as Near Threatened (Category V) in the federal state and national Red Lists: Barn Owl, Common Gull, Cuckoo, Eurasian Jackdaw, Grey Partridge, Grasshopper Warbler, House Martin, House Sparrow, Linnet, Meadow Pipit, Moorhen, Sedge Warbler, Swallow, Tree Sparrow and Water Rail.

Avocet and Marsh Harrier are listed in Annex I of the EU Birds Directive.

Strictly protected species according to § 7 (2) Nr. 14 BNatSchG are: Avocet, Barn Owl, Eurasian Buzzard, Eurasian Kestrel, European Sparrow Hawk, Lapwing, Long-eared Owl, Marsh Harrier, Moorhen, Ringed Plover and Sedge Warbler.

Table 3.10 Recorded species and number of territorial pairs (TPs) of breeding birds in 2008 and 2009 on Fehmarn (entire study area) and their conservation status (sorted in alphabetic order of English names).

Latin name	English name	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	%	Red List S-H 2010	Red List D 2007	EU Birds Direc rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
Recurvirostra avosetta	Avocet		1	**1**	0.0			Ann. I	§§
Tyto alba	Barn Owl		1	**1**	0.0	V			§§
Phoenicurus ochruros	Black Redstart		21	**21**	0.7				§
Pica pica	Black-billed Mag-pie		14	**14**	0.5				§
Turdus merula	Blackbird	11	155	**166**	5.5				§
Sylvia atricapil-la	Blackcap	2	10	**12**	0.4				§
Parus caeruleus	Blue Tit		30	**30**	1.0				§
Branta cana-densis	Canada Goose		1	**1**	0.0				§
Corvus corone corone	Carrion Crow	4	29	**33**	1.1				§
Fringilla coelebs	Chaffinch	17	58	**75**	2.5				§
Phylloscopus collybita	Chiffchaff	4	66	**70**	2.3				§
Streptopelia decaocto	Collared Dove		48	**48**	1.6				§
Fulica atra	Common Coot	3	24	**27**	0.9				§
Larus canus	Common Gull		17	**17**	0.6	V			§
Corvus corax	Common Raven		1	**1**	0.0				§
Carduelis flammea	Common Redpoll		2	**2**	0.1				§
Sturnus vulgar-is	Common Starling		36	**36**	1.2				§
Cuculus cano-rus	Cuckoo		6	**6**	0.2	V	V		§
Prunella modu-laris	Dunnock	6	53	**59**	2.0				§
Buteo buteo	Eurasian Buzzard		9	**9**	0.3				§§
Corvus monedula	Eurasian Jack-daw		4	**4**	0.1	V			§
Falco tinnuncu-lus	Eurasian Kestrel		2	**2**	0.1				§§
Accipiter nisus	European Spar-row Hawk		1	**1**	0.0				§§
Anas strepera	Gadwall		5	**5**	0.2				§
Sylvia borin	Garden Warbler	9	19	**28**	0.9				§
Carduelis car-duelis	Goldfinch		15	**15**	0.5				§
Locustella nae-via	Grasshopper Warbler	1	1	**2**	0.1		V		§
Picoides major	Great Spotted Woodpecker	1	0	**1**	0.0				§
Parus major	Great Tit	5	91	**96**	3.2				§
Carduelis chlo-ris	Greenfinch	3	115	**118**	3.9				§
Anas crecca	Green-winged Teal		1	**1**	0.0		3		§
Perdix perdix	Grey Partridge	1	1	**2**	0.1	V	2		§
Anser anser	Greylag Goose		4	**4**	0.1				§
Coccothraustes coccothraustes	Hawfinch		1	**1**	0.0				§
Larus argenta-tus	Herring Gull		7	**7**	0.2				§
Delichon urbica	House Martin	1	141	**142**	4.7		V		§
Passer domes-ticus	House Sparrow		374	**374**	12.5		V		§

Latin name	English name	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	%	Red List S-H 2010	Red List D 2007	EU Birds Direc rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
Hippolais ic-terina	Icterine Warbler	7	21	**28**	0.9				§
Vanellus vanel-lus	Lapwing	14	27	**41**	1.4	3	2		§§
Sylvia curruca	Lesser White-throat	1	46	**47**	1.6				§
Carduelis can-nabina	Linnet	8	76	**84**	2.8		V		§
Asio otus	Long-eared Owl		1	**1**	0.0				§§
Anas platyrhyn-chos	Mallard	2	33	**35**	1.2				§
Circus aeru-ginosus	Marsh Harrier	1	6	**7**	0.2			Ann. I	§§
Acrocephalus palustris	Marsh Warbler		10	**10**	0.3				§
Anthus praten-sis	Meadow Pipit		3	**3**	0.1	V	V		§
Gallinula chlo-ropus	Moorhen	2	9	**11**	0.4		V		§§
Cygnus olor	Mute Swan		1	**1**	0.0				§
Anas clypeata	Northern Shovel-er		3	**3**	0.1		3		§
Haematopus ostralegus	Oystercatcher		7	**7**	0.2				§
Phasianus col-chicus	Pheasant		16	**16**	0.5				§
Phoenicurus phoenicurus	Redstart		14	**14**	0.5				§
Emberiza schoeniclus	Reed Bunting		21	**21**	0.7				§
Acrocephalus scirpaceus	Reed Warbler		28	**28**	0.9				§
Charadrius hi-aticula	Ringed Plover	1	0	**1**	0.0	2	1		§§
Erithacus ru-becula	Robin		6	**6**	0.2				§
Corvus frugile-gus	Rook		260	**260**	8.7				§
Acrocephalus schoenobaenus	Sedge Warbler		12	**12**	0.4		V		§§
Tadorna tador-na	Shelduck		5	**5**	0.2				§
Alauda arvensis	Skylark	27	100	**127**	4.2	3	3		§
Turdus phil-omelos	Song Thrush		11	**11**	0.4				§
Muscicapa striata	Spotted Fly-catcher	1	10	**11**	0.4				§
Columba oenas	Stock Dove		5	**5**	0.2				§
Hirundo rustica	Swallow	1	93	**94**	3.1		V		§
Apus apus	Swift		41	**41**	1.4				§
Passer monta-nus	Tree Sparrow	1	9	**10**	0.3		V		§
Aythya fuligula	Tufted Duck		6	**6**	0.2				§
Rallus aquat-icus	Water Rail		1	**1**	0.0		V		§
Motacilla alba	White Wagtail	6	73	**79**	2.6				§
Sylvia com-munis	Whitethroat	20	127	**147**	4.9				§
Phylloscopus trochilus	Willow Warbler	4	11	**15**	0.5				§
Troglodytes troglodytes	Winter Wren	1	31	**32**	1.1				§
Columba pa-	Woodpigeon	5	175	**180**	6.0				§

Latin name	English name	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	%	Red List S-H 2010	Red List D 2007	EU Birds Direc rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
lumbus									
Motacilla flava	Yellow Wagtail	73	87	**160**	5.3				§
Emberiza cit-rinella	Yellowhammer		1	**1**	0.0				§
	Sum territo-rial pairs	**243**	**2,750**	**2,993**					

The following maps show the distribution of the recorded territories of breeding birds in the study area (these maps are presented in a higher resolution in Figure B.1 to Figure B.3 in Appendix B).

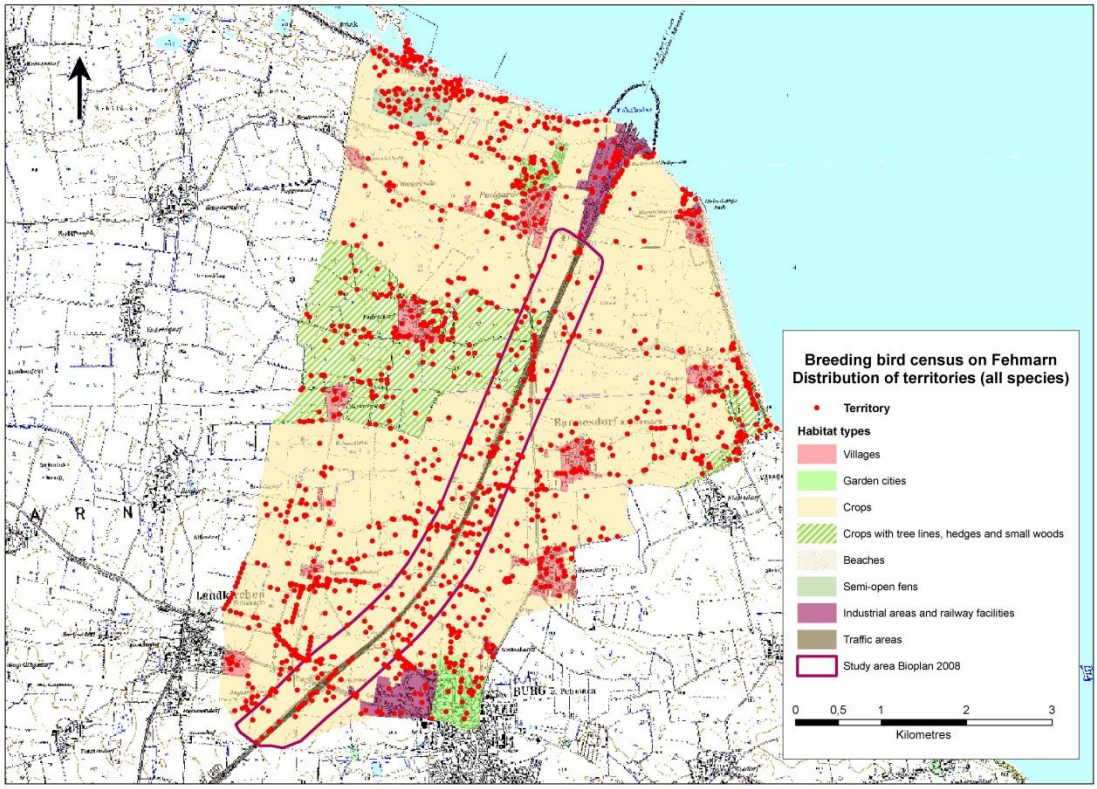

Figure 3.3 Breeding bird census on Fehmarn – distribution of territories of all recorded species (in villages only territories of threatened/protected and building-associated species are shown).

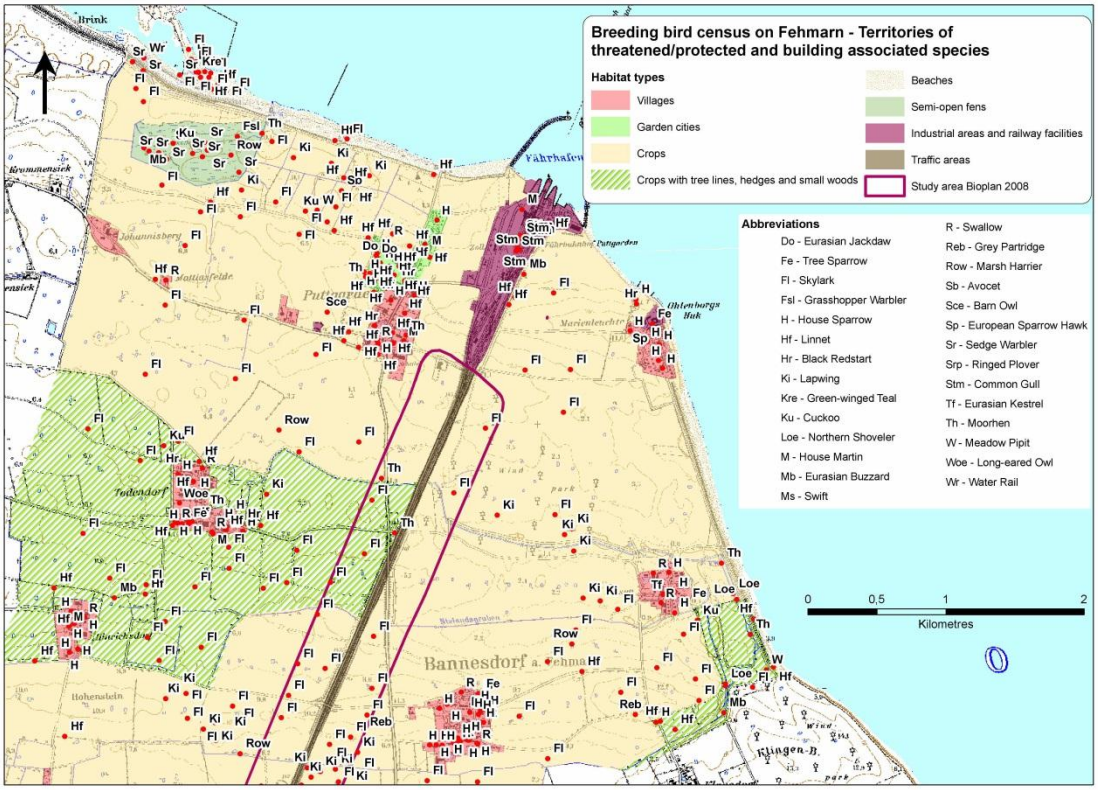

Figure 3.4 *Breeding bird census on Fehmarn (northern part of study area) – territories of threatened/protected and building-associated species.*

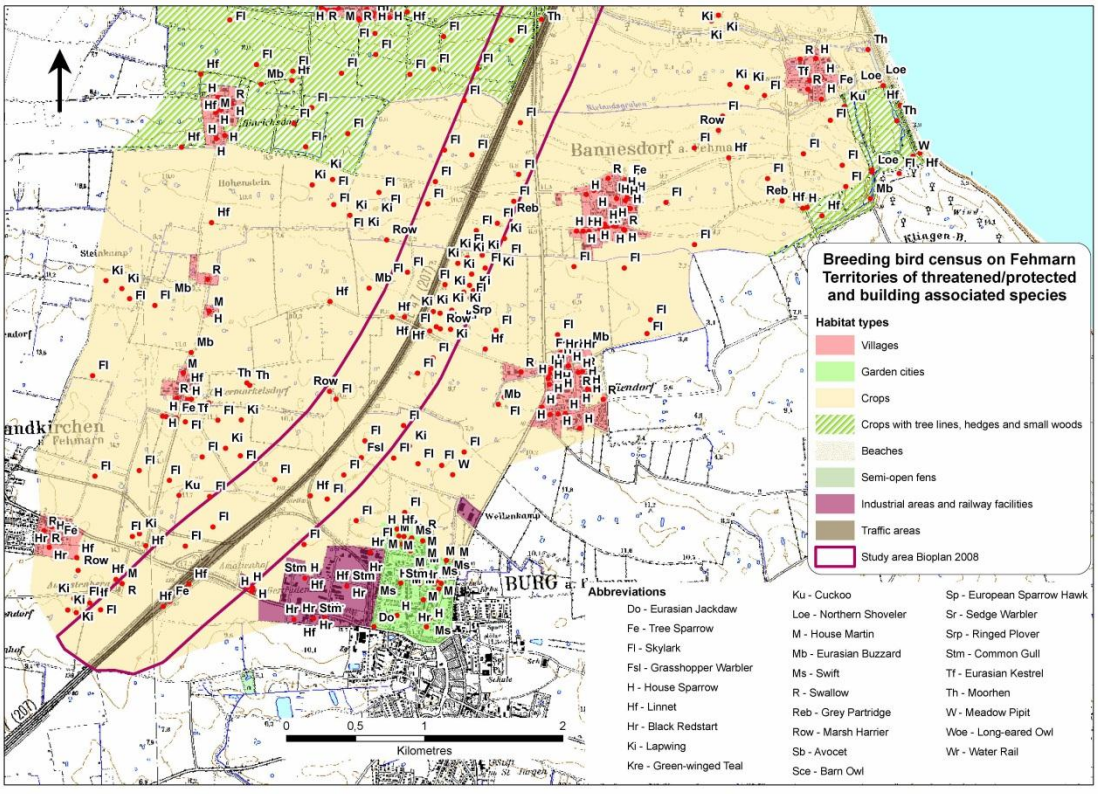

Figure 3.5 *Breeding bird census on Fehmarn (southern part of study area) – territories of threatened/protected and building-associated species.*

As the maps show, the highest densities were found in the north-western part of the study area within the semi-open fen (D 6) and the beach section (A 3) at the Grüner Brink nature reserve. In addition, villages (F 5), garden cities (F 6), as well as industrial areas and railway facilities (F 9) are densely populated. In contrast, only low densities were determined in the open agricultural landscape (D 4 and D 5), especially in the northern part of the study area.

Characterization of the breeding bird fauna in habitat types

Within this chapter, the breeding bird fauna in each of the occurring habitat types is characterized following the Indicator Species Model described by FLADE (1994).

The evaluation of the breeding bird fauna of each habitat type is given in chapter 3.3.1

D 4: Crops

This habitat type covers an area of 2,395 ha, some 75% of the study area. It is characterized by large, intensively used arable fields. The proportion of woods is less than 3%. A higher portion of tree lines and hedges is found in the vicinity of Ostermarkelsdorf and Landkirchen in the south-western part of the study area. A great number of small water bodies (ponds, marl pits, ditches) is characteristic of the agricultural landscape on Fehmarn.

An unusual patch within this habitat type was discovered by BIOPLAN in 2008 on an agricultural test field for cabbage cultivation. It was situated north-west of Niendorf in the direct vicinity of the B 207 road. Here, some parts of the area remained bare of vegetation for a long time and cultivation of this field took place at a later date compared to other fields. Therefore, a remarkable breeding bird community (see below) inhabited this area.

The species composition and the densities recorded within this habitat type are listed in Table 3.11. Altogether, 61 breeding bird species with a total of 804 territories have been found. Three species listed in the Red List of Schleswig-Holstein (KNIEF et al. 2010) and five nationally threatened species (SÜDBECK et al. 2009) were recorded. Twelve species are considered as Near Threatened (Category V) in the federal state and national Red Lists. Avocet and Marsh Harrier are listed in Annex I of the EU Birds Directive. Eight species are strictly protected according to § 7 (2) Nr. 14 BNatSchG.

Table 3.11 Habitat type D 4 – recorded species and number of territorial pairs (TPs) of breeding birds in 2008 and 2009 and their conservation status (sorted in alphabetic order).

Species	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	TPs/ 10 ha	Red List S-H 2010	Red List D 2007	EU Birds Direc-rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
Avocet		1	1	0.00			Ann. I	§§
Barn Owl		1	1	0.00	V			§§
Black Redstart		1	1	0.00				§
Black-billed Mag-pie		1	1	0.00				§
Blackbird	5	29	34	0.14				§
Blackcap		4	4	0.02				§
Blue Tit		4	4	0.02				§
Carrion Crow	3	12	15	0.06				§
Chaffinch	9	15	24	0.10				§
Chiffchaff	2	18	20	0.08				§
Collared Dove		2	2	0.01				§
Common Coot	3	20	23	0.10				§
Common Raven		1	1	0.00				§

Species	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	TPs/ 10 ha	Red List S-H 2010	Red List D 2007	EU Birds Direc-rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
Cuckoo		3	3	0.01	V	V		§
Dunnock		21	21	0.09				§
Eurasian Buzzard		5	5	0.02				§§
Eurasian Kestrel		1	1	0.00				§§
Gadwall		2	2	0.01				§
Garden Warbler	4	6	10	0.04				§
Goldfinch		3	3	0.01				§
Grasshopper Warbler	1		1	0.00		V		§
Great Tit	2	23	25	0.10				§
Greenfinch	2	17	19	0.08				§
Grey Partridge	1	1	2	0.01	V	2		§
Greylag Goose		3	3	0.01				§
Hawfinch		1	1	0.00				§
House Martin	1	0	1	0.00		V		§
House Sparrow		7	7	0.03		V		§
Icterine Warbler	3	7	10	0.04				§
Lapwing	14	26	40	0.17	3	2		§§
Lesser White-throat		13	13	0.05				§
Linnet	6	24	30	0.13		V		§
Mallard	2	17	19	0.08				§
Marsh Harrier	1	5	6	0.03			Ann. I	§§
Marsh Warbler		3	3	0.01				§
Meadow Pipit		2	2	0.01	V	V		§
Moorhen	1	3	4	0.02		V		§§
Northern Shoveler		2	2	0.01		3		§
Oystercatcher		4	4	0.02				§
Pheasant		10	10	0.04				§
Redstart		10	10	0.04				§
Reed Bunting		5	5	0.02				§
Reed Warbler		13	13	0.05				§
Ringed Plover	1	0	1	0.00	2	1		§§
Robin		1	1	0.00				§
Sedge Warbler		2	2	0.01		V		§
Shelduck		1	1	0.00				§
Skylark	25	72	97	0.40	3	3		§
Song Thrush		6	6	0.03				§
Spotted Flycatch-er	1		1	0.00				§
Stock Dove		2	2	0.01				§
Swallow	1	8	9	0.04		V		§
Tree Sparrow		2	2	0.01		V		§
Tufted Duck		3	3	0.01				§
White Wagtail	4	22	26	0.11				§
Whitethroat	5	69	74	0.31				§
Willow Warbler	1	2	3	0.01				§
Winter Wren		3	3	0.01				§
Woodpigeon	2	28	30	0.13				§
Yellow Wagtail	65	71	136	0.57				§
Yellowhammer		1	1	0.00				§
Totals	**165**	**639**	**804**	**3.4**				
Area size (ha)	**394.9**	**2,000.6**	**2,395.5**					

Of the recorded territories, 41.5% are related to bush and tree breeders (e.g. Whitethroat, Blackbird, Woodpigeon, Linnet) and 36.2% to ground breeders (e.g. Skylark, Lapwing, Yellow Wagtail). Another 10.7% of the territories belong to reed and sedge breeders (e.g. Common Coot, Tufted Duck, Marsh Warbler). The remain-

ing territories were represented by cavity and niche-nesting birds as well as building-associated species.

The most abundant species were Yellow Wagtail (16.9 % of all recorded territories), Skylark (12.1%) and Whitethroat (9.2 %), followed by Lapwing (5.0%), Blackbird (4.2%), Linnet (3.7%) and Woodpigeon (3.7%).

The number of 61 recorded species considerably exceeded the expected value of 25 species according to FLADE (1994) (species number-area curve). The higher value is due to habitat structures like partially existing fringe vegetation in the vicinity of the numerous small water bodies, solitary trees as well as tree lines and hedges along roads. In the fringe vegetation, 13 breeding bird species were found, in solitary trees, tree lines and hedges 29 species.

The overall density of 3.4 pairs/10 ha corresponds with the average value given by FLADE (1994) (3.2 pairs/10 ha for areas greater than 1,000 ha). Nevertheless, this density is mainly affected by the high number of species breeding in trees and bushes or in the fringe vegetation. They added up to 59 % of the territorial pairs.

According to FLADE (1994), habitat type D 4 is characterized by four indicator species: Quail, Great Bustard, Corn Bunting and Tawny Pipit. Of these, only the Quail occurs on Fehmarn as an irregular breeding bird (0 - 2 pairs; see BERNDT et al. 2005) while the others are extinct in Schleswig-Holstein or do not belong to the breeding bird fauna of Fehmarn. The Quail was not recorded in the study area during the study period.

The Grey Partridge, a species which reaches its maximum density in habitat type D 4 (FLADE 1994), was found with two territorial pairs in this investigation (0.01 pairs/10 ha). This density is below the average value given by FLADE (1994) (0.2 pairs/10 ha), whereby the rarity and the difficult detectability of that species must be taken into consideration. The Grey Partridge is a nationally endangered species (Red List D: 2). According to BERNDT et al. (2005), it occurs on Fehmarn only as an irregular breeding bird (5 - 15 pairs). In contrast, the current recordings of BIOPLAN (2009, 2011) on the island "were well above the stock that might have been expected for Fehmarn according to BERNDT et al. (2005)." Thus, the authors assume that the Grey Partridge occurs more frequently in the monotone arable fields of Fehmarn than is currently expected (BIOPLAN 2009, p. 70).

The Skylark is a species occurring in highest density and highest frequency (99 %) in this habitat type (FLADE 1994). In the study area, 97 pairs were recorded, representing 0.4 pairs/10 ha. This density falls considerably below the average value given by FLADE (1994) (3.12 pairs/10 ha). According to other investigations (SCHLÄPFER, PACCAUD; in: GLUTZ VON BLOTZHEIM & BAUER 1985), the density of the Skylark breeding on arable fields ranges from 1.1 to 4.0 pairs/10 ha. In the past 30 years, the densities in agricultural landscapes have declined further so that on intensively used arable fields, densities of less than 1 pair/10 ha can be expected in Schleswig-Holstein (see BERNDT et al. 2002). The recorded density of the Skylark in in habitat type D 4 corresponds with the value found by BIOPLAN (2009) on arable fields on Fehmarn (0.4 pairs/10 ha). The Skylark is a threatened species at federal state and national levels (Red List S-H: 3; Red List D: 3). It was estimated that 400 - 500 pairs breed on Fehmarn (see BERNDT et al. 2005).

According to FLADE (1994), the Yellow Wagtail occurs on fields with a frequency of 67 %. For habitat type D 4 the author indicates a density of 0.23 pairs/10 ha. In the study area, 136 pairs of the Yellow Wagtail were recorded, representing 0.57 pairs/10 ha. Thus, the species density recorded in this investigation was higher than the density given by FLADE (1994) for this habitat type. It was estimated that 220 - 270 pairs of Yellow Wagtail breed on Fehmarn (see BERNDT et al. 2005). Thus, between 50 % - 62% of this stock was recorded in the study area.

The Lapwing (Red List S-H: 3; Red List D: 2) occurred in 40 territorial pairs in habitat type D 4 and thus reaches a density of 0.17 pairs/10 ha. According to FLADE (1994) and BERNDT et al. (2002), the Lapwing is shifting its breeding habitats more and more from grassland onto arable fields for as long as cultivation of the fields permits. At the beginning of the breeding season this species needs as little ground covering vegetation as possible. Arable fields often fulfil these requirements. According to FLADE (1994), the Lapwing occurs in habitat type D 4 with a frequency of 44 % and reaches a density of 0.15 pairs/10 ha. Thus, the value determined in the study area corresponds with the overall density given for this habitat type. It was estimated that 250 pairs of Lapwing breed on Fehmarn (see BERNDT et al. 2005).

Worth mentioning is the Lapwing colony found by BIOPLAN in 2008 on an agricultural test field for cabbage cultivation north-west of Niendorf which consisted of some 14 territorial pairs. However, although this field was outside the 2009 study area, no breeding Lapwings were recorded here during surveys carried out in the adjacent areas. On this test field, one pair of Ringed Plover (Red List S-H: 2; Red List D: 1) was breeding in 2008. There were also four territorial pairs of Skylark.

Six territorial pairs of Marsh Harrier (Annex I of the EU Birds Directive) were recorded on grain fields and at or in the vicinity of small water bodies (ponds, marl pits, ditches) situated within the farmland. Species such as the Common Coot, Greylag Goose, Northern Shoveler, Mallard, Moorhen, Reed Bunting, Sedge Warbler and Reed Warbler were also breeding there.

There was one territorial pair of Avocet (Annex I of the EU Birds Directive) found north-west of Puttgarden in 2009. It was estimated that 60 - 100 pairs of Avocet breed on Fehmarn (see BERNDT et al. 2005).

The Barn Owl (Red List S-H: V) was observed flying over a field north-east of suburban Puttgarden during a night-time survey. As it is probably breeding on a farm nearby, this site represents the centre of a feeding territory of that species in the study area. It was estimated that 1 - 5 pairs of Barn Owl breed on Fehmarn (see BERNDT et al. 2005).

D 5: Crops with tree lines, hedges and small woods

This habitat type is found at two sub-areas in the western and eastern parts of the study area (see Figure 3.4 and Figure 3.5). It occupies an area of 419 ha and covers 13% of the study area. Like habitat type D 4 (Crops), it is characterized by intensively used arable fields. However, the proportion of woods is higher and the size of arable fields is lower than in habitat type D 4. Small water bodies are also found in habitat type D 5.

The species composition and the densities recorded within this habitat type are listed in Table 3.12. Altogether, 38 breeding bird species with a total of 208 territories have been found. Two species listed in the Red List of Schleswig-Holstein (KNIEF et al. 2010) as well as three nationally threatened species were recorded (SÜDBECK et al. 2009). Five species are considered as Near Threatened (Category V) in the federal state and national Red Lists. Three species are strictly protected according to § 7 (2) Nr. 14 BNatSchG.

Table 3.12 Habitat type D 5 – recorded species and number of territorial pairs (TPs) of breeding birds in 2008 and 2009 and their conservation status (sorted in alphabetic order).

Species	TPs - Bio-plan 2008	TPs - Biola 2009	TPs - total	TPs/ 10 ha	Red List S-H 2010	Red List D 2007	EU Birds Direc-rec-tive	Particularly (§) / strictly (§§) pro-tected (BNatSchG)
Black Redstart		1	1	0.02				§
Blackbird		11	11	0.26				§
Blue Tit		2	2	0.05				§
Carrion Crow	1	3	4	0.10				§
Chaffinch		2	2	0.05				§
Chiffchaff		3	3	0.07				§
Common Coot		2	2	0.05				§
Common Starling		4	4	0.10				§
Cuckoo		1	1	0.02	V	V		§
Dunnock	1	4	5	0.12				§
Eurasian Buzzard		2	2	0.05				§§
Gadwall		2	2	0.05				§
Goldfinch		2	2	0.05				§
Great Tit		8	8	0.19				§
Greenfinch		3	3	0.07				§
House Sparrow		1	1	0.02		V		§
Icterine Warbler		2	2	0.05				§
Lapwing		1	1	0.02	3	2		§§
Lesser White-throat		2	2	0.05				§
Linnet		10	10	0.24		V		§
Mallard		9	9	0.21				§
Marsh Warbler		2	2	0.05				§
Meadow Pipit		1	1	0.02	V	V		§
Moorhen	1	2	3	0.07		V		§§
Northern Shoveler		1	1	0.02		3		§
Pheasant		3	3	0.07				§
Reed Bunting		2	2	0.05				§
Reed Warbler		2	2	0.05				§
Shelduck		4	4	0.10				§
Skylark	2	18	20	0.48	3	3		§
Song Thrush		2	2	0.05				§
Tufted Duck		3	3	0.07				§
White Wagtail		9	9	0.21				§
Whitethroat		36	36	0.86				§
Willow Warbler	1	1	2	0.05				§
Winter Wren		1	1	0.02				§
Woodpigeon		17	17	0.41				§
Yellow Wagtail	8	15	23	0.55				§
Totals	**14**	**194**	**208**	**5.0**				
Area size (ha)	**30.4**	**389.0**	**419.4**					

Of the recorded territories, 50.5% are related to bush and tree breeders (e.g. Whitethroat, Blackbird, Woodpigeon, Linnet) and 23.1% to ground breeders, respectively (e.g. Skylark, Lapwing, Yellow Wagtail). Another 12.5% of the territories belong to reed and sedge breeders, such as Common Coot, Tufted Duck or Marsh Warbler. The remaining territories were represented by cavity and niche-nesting birds as well as building-associated species.

The most abundant species were Whitethroat (17.3% of all recorded territories), Yellow Wagtail (11.1%) and Skylark (9.6%), followed by Woodpigeon (8.2%), Blackbird (5.3%), Linnet (4.8%), White Wagtail (4.3%) and Mallard (4.3%).

The number of 38 species recorded here is below the expected value of 49 species according to FLADE (1994) (species number-area curve). The density of 5.0 pairs/10 ha is also below the value given by FLADE (1994) (10.0 pairs/10 ha for areas greater than 100 ha).

Habitat type D 5 is characterized by five indicator species (FLADE 1994). Of these, only the Quail (0 - 2 pairs) and the Red-backed Shrike (0 - 3 pairs) occur on Fehmarn as irregular breeding birds (see BERNDT et al. 2005). Corn Bunting, Little Owl and Ortolan Bunting are not part of the breeding bird fauna of Fehmarn. The Quail and the Red-backed Shrike were not recorded during this investigation.

The Grey Partridge, a species, which reaches its maximum density in habitat type D 5 (FLADE 1994), was not recorded within the investigated sub-areas. The Grey Partridge is a nationally endangered species (Red List D: 2). According to BERNDT et al. (2005), it only occurs on Fehmarn as an irregular breeding bird (5 - 15 pairs).

Four out of five species with a high frequency (80 - 100%) in this habitat type according to FLADE (1994) were recorded during this investigation (Blackbird, Whitethroat, Skylark and Chaffinch; the Yellowhammer was missing). The densities of all four species (see Table 3.12) were considerably below the average values given by FLADE (1994):

Blackbird: 0.26 pairs/10 ha (1.39 according to FLADE 1994)
Whitethroat: 0.86 pairs/10 ha (1.48 according to FLADE 1994)
Skylark: 0.48 pairs/10 ha (1.11 according to FLADE 1994)
Chaffinch: 0.05 pairs/10 ha (0.72 according to FLADE 1994)

All threatened or protected species listed in Table 3.12 were breeding only in low densities in this habitat type.

Reed and sedge breeders were recorded in low densities at or in the vicinity of the small water bodies.

D 6: Semi-open fens

This habitat type is a succession area situated in the north-western part of the study area (see Figure 3.4). It has a size of 34 ha and covers 1.1 % of the study area. About 30% of this habitat type is covered by a wet alder carr, dominated by a sapling stand of *Alnus glutinosa* (20 to 30 years of age). Reed formations occupy 25% of this habitat type. Typical wetland communities, such as tall sedge fens and wet grasslands, cover the remaining parts of the open area.

Due to the lack of a road network, access to this area is limited. The only evident source of disturbance for the avifauna is the tourism in summer on the periphery. A public car park for beach-goers is located in the northern part of the area.

The species composition and the densities recorded within this habitat type are listed in Table 3.13. Altogether, 15 breeding bird species with a total of 44 territories have been found. Four species are considered as Near Threatened (Category V) in the federal state and national Red Lists. Marsh Harrier is listed in Annex I of the EU Birds Directive. Four species are strictly protected according to § 7 (2) Nr. 14 BNatSchG.

Table 3.13 Habitat type D 6 – recorded species and number of territorial pairs (TPs) of breeding birds in 2009 and their conservation status (sorted in alphabetic order).

Species	TPs	TPs/10 ha	Red List S-H 2010	Red List D 2007	EU Birds Direc rec-tive	Particularly (§) / strict-ly (§§) pro-tected (BNatSchG)
Chaffinch	4	1.16				§
Chiffchaff	6	1.74				§
Cuckoo	1	0.29	V	V		§
Eurasian Buzzard	1	0.29				§§
Garden Warbler	1	0.29				§
Grasshopper Warbler	1	0.29		V		§
Icterine Warbler	1	0.29				§
Marsh Harrier	1	0.29			Ann. I	§§
Marsh Warbler	5	1.45				§
Moorhen	1	0.29		V		§§
Reed Bunting	7	2.03				§
Reed Warbler	3	0.87				§
Sedge Warbler	9	2.62		V		§§
Whitethroat	1	0.29				§
Woodpigeon	2	0.58				§
Totals	**44**	**12.8**				
Area size (ha)	**34.4**					

Of the recorded territories, 61.4% are related to reed- and sedge breeders (e.g. Marsh Harrier, Marsh Warbler, Reed Warbler, Sedge Warbler) and 36.4% to bush and tree breeders, respectively (e.g. Chiffchaff, Eurasian Buzzard, Icterine Warbler, Woodpigeon). The Cuckoo was not assigned to a breeding guild.

The most abundant species were Sedge Warbler (20.5% of all recorded territories), Reed Bunting (15.9%) and Chiffchaff (13.6%), followed by Marsh Warbler (11.4%), Chaffinch (9.1%) and Reed Warbler (6.8%).

The number of 15 recorded species is considerably below the expected value of 35 species according to FLADE (1994) (species number-area curve). The density of 12.8 pairs/10 ha is likewise well below the average value given by FLADE (1994) (30.9 pairs/10 ha for 33.4 - 100 ha areas). The minimum density in this size class is 22.7 pairs/10 ha (FLADE 1994). One reason for the low number of species and low density could be the young age of the alders, not providing adequate requisites for tree breeders and cavity-nesting species.

Habitat type D 6 is characterized by 11 indicator species (FLADE 1994). Of these, Grasshopper Warbler, Reed Warbler and Penduline Tit occur on Fehmarn as regular breeding birds; Red-backed Shrike (0 - 3 pairs), Thrush Nightingale (5 - 10 pairs) and Quail (0 - 2 pairs) as irregular breeding birds (see BERNDT et al. 2005). Penduline Tit (3 - 10 pairs) and Grasshopper Warbler (15 - 20 pairs) are quite rare breeding birds on Fehmarn. The indicator species Barred Warbler, Little Owl, River Warbler, Nightingale and Turtle Dove are not among the breeding bird fauna of Fehmarn.

The indicator species Reed Warbler and Grasshopper Warbler were recorded in this habitat type in 2009. However, compared to the values given by FLADE (1994), the densities of these species were low:

Reed Warbler: 0.9 pairs/10 ha (2.7 according to FLADE 1994)
Grasshopper Warbler: 0.3 pairs/10 ha (1.6 according to FLADE 1994)

Eight out of 16 species with a high frequency (80 - 100%) in this habitat type according to FLADE (1994) were recorded in the 2009 investigation. Of these, Chaffinch, Reed Bunting and Chiffchaff occurred in higher densities, while Whitethroat, Garden Warbler and Marsh Warbler occurred in lower densities compared to the values given by FLADE (1994). The densities of Cuckoo and Woodpigeon corresponded with the FLADE values.

A 3: Beaches

This habitat type is found at two sub-areas in the northern and north-eastern part of the study area (see Figure 3.4 and Figure 3.5). Altogether, it occupies 45.5 ha and covers 1.4% of the study area.

This habitat type consists at least partly of plain sand, gravel or shell areas with scarce or no vegetation. These mostly have a width of 10 to 30 m and account for less than 10% of the areas. Dunes or cliffs are not found or are poorly developed.

In the north of the study area (Grüner Brink up to ferry terminal) the sand and gravel beaches on the beach ridge are flanked by low heathland and grassland vegetation that takes up 70% of the habitat type. Here, a partly well developed shrub layer with Japanese Rose, Sea Buckthorn and Hawthorn bushes as well as a few trees can be found. In the centre of the habitat there is a 700 m long area of which a good part is used as a beach. The north-west is dominated by reed communities of the Grüner Brink nature reserve. The area is 31.5 ha in size.

In the north-east of the study area (Ferry terminal up to Presen), the small bare beach zones give way to a patchy up to dense inland shrub belt that is formed by *Rosa rugosa*. Low grassland vegetation is found next to it. The area is 13.8 ha in size.

The existing pressures of the avifauna by disturbances on the beaches outside of the Grüner Brink nature reserve must be considered as high. While the northern beaches outside of the protected area are openly accessible to people, the north-eastern part is primarily used by bicyclists on the paved beach promenade and by people going for a walk in the beach zone.

The species composition and the densities recorded within this habitat type are listed in Table 3.14. Altogether, 20 breeding bird species with a total of 55 territories have been found. Of these, 16 species with a total of 50 territories were recorded at the beach section Grüner Brink up to ferry terminal and five species with a total of five territories at the beach section Ferry terminal up to Presen.

One species listed as Vulnerable in the Red List of Schleswig-Holstein (KNIEF et al. 2010) as well as two nationally Vulnerable species were recorded (KNIEF et al. 2010; SÜDBECK et al. 2009). Four species are considered as Near Threatened (Category V) in the Red Lists.

Table 3.14 Habitat type A 3 – recorded species and number of territorial pairs (TPs) of breeding birds in 2009 and their conservation status (sorted in alphabetic order).

Species	Grüner Brink up to ferry terminal		Ferry terminal up to Presen		Red List S-H 2010	Red List D 2007	EU Birds Directive	Particularly (§) / strictly (§§) protected (BNatSchG)
	TPs	TPs/10 ha	TPs	TPs/10 ha				
Cuckoo	1	0.32			V	V		§
Gadwall	1	0.32						§
Garden Warbler			1	0.72				§
Great Tit			1	0.72				§
Green-winged Teal	1	0.32				3		§
Icterine Warbler			1	0.72				§
Lesser Whitethroat	1	0.32						§
Linnet	4	1.26				V		§
Mallard	1	0.32						§
Mute Swan	1	0.32						§
Oystercatcher			1	0.72				§
Reed Bunting	7	2.21						§
Reed Warbler	8	2.52						§
Sedge Warbler	1	0.32				V		§
Skylark	10	3.15			3	3		§
Stock Dove	1	0.32						§
Water Rail	1	0.32				V		§
White Wagtail	1	0.32						§
Whitethroat	10	3.15	1	0.72				§
Woodpigeon	1	0.32						§
Totals	**50**	**15.8**	**5**	**3.6**				
Area size (ha)	**31.7**		**13.8**					

Of the recorded territories, 38.2% are related to reed and sedge breeders (e.g. Reed Bunting, Reed Warbler, Sedge Warbler, Water Rail) and 34.5% to bush and tree breeders, respectively (e.g. Garden Warbler, Icterine Warbler, Whitethroat, Woodpigeon). Another 20% of the territories belong to the ground breeders Skylark and Oystercatcher. Three cavity and niche-nesting species were found (Great Tit, Stock Dove and White Wagtail).

The most abundant species were Whitethroat (20.0% of all recorded territories), Skylark (18.1%) and Reed Warbler (14.5 %), followed by Reed Bunting (12.7%) and Linnet (7.3%).

Habitat type A 3 is characterized by the indicator species Oystercatcher, Ringed Plover, Arctic Tern, Little Tern and Kentish Plover (FLADE 1994). While the Arctic Tern is an irregular breeding bird (0 - 5 pairs) and the Kentish Plover is a former breeding bird on Fehmarn (see BERNDT et al. 2005), 6 - 50 pairs of the other species are breeding on the island. Only one territorial pair of Oystercatcher was recorded at the north-eastern beach section (Ferry terminal up to Presen). There are no structural parameters of the breeding bird community such as number of species or density given by FLADE (1994) for this habitat type.

Table 3.14 and the distribution of territories (see Figure 3.3 and Figure 3.4) show that the most important section of this habitat type is found in the northern part of the study area (Grüner Brink up to ferry terminal). Here, the open heathland and grassland vegetation was populated by the Skylark in a relatively high density (3.2

pairs/10 ha). In the reed vegetation, eight breeding bird species were found, including Gadwall, Green-winged Teal (Red List D: 3), Mute Swan and Water Rail (Red List D: V). Reed Warbler and Reed Bunting were breeding here with densities of 2.5 and 2.2 pairs/10 ha, respectively. The Hawthorn and *Rosa rugosa* bushes provide nesting sites for species such as Whitethroat (3.2 pairs/10 ha) and Linnet (1.3 pairs/10 ha). Of note is the occurrence of the Stock Dove, probably breeding in a burrow at the Grüner Brink nature reserve.

In contrast, the north-eastern section of this habitat type (Ferry terminal up to Presen) is, with the exception of the Oystercatcher, of no particular importance to the breeding bird fauna.

F 5: Garden cities

This habitat type is related to parts of the settlements of Burg and Puttgarden (see Figure 3.4 and Figure 3.5). Altogether, it covers 55.8 ha and thus 1.7% of the study area.

Garden cities are characterized by a proportion of at least 40% of vegetation (FLADE 1994). Also characteristic are the one to three-storey houses of different ages with gardens. Those are divided by hedges and shrubs. In the gardens lawns, fruit and ornamental as well as forest trees in different proportions can be found. Hedges, fruit trees and nesting boxes are important requisites for the breeding bird fauna. The main differences to the villages are the lack of bigger barns or cattle sheds, the predominance of ornamental gardens over fruit and vegetable gardens and the occurrence of more conifers and less fruit trees (FLADE 1994).

The species composition and the densities recorded within this habitat type are listed in Table 3.15. Altogether, 36 breeding bird species with a total of 591 territories have been found. Out of these, 34 species with a total of 498 territories were recorded in Burg and 19 species with a total of 93 territories in Puttgarden.

Seven out of 36 species are considered as Near Threatened (Category V) in the federal state and national Red Lists. One species is strictly protected according to §7 (2) Nr. 14 BNatSchG.

Table 3.15 Habitat type F 5 – recorded species and number of territorial pairs (TPs) of breeding birds in 2009 and their conservation status (sorted in alphabetic order).

Species	Burg		Puttgarden		Red List S-H 2010	Red List D 2007	EU Birds Directive	Particularly (§) / strictly (§§) protected (BNatSchG)
	TPs	TPs/10 ha	TPs	TPs/10 ha				
Black Redstart	4	1.00	1	0.64				§
Black-billed Magpie	3	0.75						§
Blackbird	37	9.20	8	5.13				§
Blackcap	2	0.50						§
Blue Tit	5	1.24	1	0.64				§
Carrion Crow	1	0.25						§
Chaffinch	4	1.00	1	0.64				§
Chiffchaff	13	3.23	2	1.28				§
Collared Dove	9	2.24	7	4.49				§
Common Gull	2	0.50			V			§
Common Redpoll	1	0.25						§
Common Starling	5	1.24						§
Dunnock	7	1.74						§
Eurasian Jackdaw	2	0.50	2	1.28	V			§
Garden Warbler	1	0.25						§
Goldfinch	1	0.25						§
Great Tit	17	4.23	10	6.41				§
Greenfinch	20	4.98	6	3.85				§
Greylag Goose			1	0.64				§
House Martin	77	19.15	3	1.92		V		§
House Sparrow	71	17.66	28	17.95		V		§
Icterine Warbler	2	0.50	1	0.64				§
Lesser Whitethroat	6	1.49	5	3.21				§
Linnet	1	0.25	10	6.41		V		§
Moorhen			1	0.64		V		§§
Redstart	1	0.25						§
Robin	3	0.75						§
Rook	90	22.39						§
Song Thrush	1	0.25						§
Spotted Flycatcher	3	0.75						§
Swallow	1	0.25				V		§
Swift	41	10.20						§
White Wagtail	8	1.99	1	0.64				§
Willow Warbler	3	0.75						§
Winter Wren	11	2.74	1	0.64				§
Woodpigeon	45	11.19	4	2.56				§
Totals	**498**	**123.9**	**93**	**59.6**				
Area size (ha)	**40.2**		**15.6**					

Of the recorded territories, 51.2% are related to bush and tree breeders (e.g. Blackbird, Greenfinch, Rook, Woodpigeon, Collared Dove) and 39.3% to building-associated species, respectively (e.g. House Martin, House Sparrow, Swift, Eurasian Jackdaw). Another 6.6% of the territories belong to cavity and niche-nesting birds

(e.g. Great Tit, Common Starling, White Wagtail). The remaining territories were represented by reed and sedge breeders as well as ground breeders.

The most abundant species were House Sparrow (16.8% of all recorded territories), Rook (15.2%), and House Martin (13.5%), followed by Woodpigeon (8.3%), Blackbird (7.6%) and Swift (6.9%).

In Burg, the number of 38 recorded species exceeds the expected value of 28 species according to FLADE (1994) (species number-area curve). Likewise, the density of 123.9 pairs/10 ha is a little higher than the average value given by FLADE (1994) (112.5 pairs/10 ha for 33.4 - 100 ha areas). The maximum density in this size class is 159.6 pairs/10 ha (FLADE 1994). The high density recorded in Burg is due to the presence of colony breeders like Rook, House Martin and House Sparrow in Burg (altogether 238 pairs).

Habitat type F 5 is characterized by the indicator species House Sparrow, Redstart, European Serin, Collared Dove, Spotted Flycatcher, House Martin and Common Redpoll (FLADE 1994). The European Serin occurs on Fehmarn as an irregular breeding bird (0 - 1 pair; see BERNDT et al. 2005). Thus, all possible indicator species have been recorded in Burg (see Table 3.15). Of these, Collared Dove and House Martin occurred in higher densities, while House Sparrow, Redstart and Spotted Flycatcher occurred in lower densities compared to the values given by FLADE (1994) (no values indicated for the Common Redpoll). Of interest is the high density of the House Martin (19.2 pairs/10 ha compared to 4.1 pairs/10 ha according to FLADE 1994). On the other hand, the density of the House Sparrow is considerably lower (17.7 / 29.8 according to FLADE 1994).

All seven species with a high frequency (80-100 %) in this habitat type according to FLADE (1994) have been recorded in Burg. Their densities were generally lower than those indicated by FLADE (1994).

The Swift occurred in 41 territorial pairs in Burg (10.2 pairs/10 ha). It was estimated that 90 pairs of the Swift breed on Fehmarn and more than half of this stock can be found in Burg (see BERNDT et al. 2005).

In Puttgarden, the number of 19 recorded species corresponds with the value of 21 species according to FLADE (1994) (species number-area curve). In contrast, the density of 59.6 pairs/10 ha is well below the average value given by FLADE (1994) (108.7 pairs/10 ha for 10 - 33.3 ha areas). The minimum density in this size class is 93.3 pairs/10 ha (FLADE 1994).

Three out of six possible indicator species have been recorded in Puttgarden; they were breeding in low densities. Six out of seven species with a high frequency (80-100 %) in this habitat type according to FLADE (1994) have been found. Except for Lesser Whitethroat and Great Tit, densities of the other species were lower than those indicated by FLADE (1994).

F 6: Villages

This habitat type is found at 13 locations in the study area (see Figure 3.4 and Figure 3.5). Altogether, it occupies 131.4 ha and covers 4.1% of the study area.

Villages are characterized by a maximum area of 100 ha (FLADE 1994). Besides single, detached homes, which account for 50% of the habitat type, farms or agricultural production plants with cattle sheds, barns and paved or unsealed yards are essential components of villages. Fruit and vegetable gardens, small public car parks, ponds, hedges and an older deciduous tree stand are often found here (FLADE 1994). As a rule, villages are surrounded by open landscape. In the study area, the size of villages ranges from 0.5 (Mattiasfelde) to 23.9 ha (Niendorf).

The species composition recorded in this habitat type is listed in Table 3.16 (the results for each village are presented in Table B.2 in Appendix B).

Altogether, 42 breeding bird species with a total of 845 territories have been found. Six species are considered as Near Threatened (Category V) in the national Red List. Five species are strictly protected according to § 7 (2) Nr. 14 BNatSchG.

Table 3.16 Habitat type F 6 (villages) – recorded species and number of territorial pairs (TPs) of breeding birds in 2009 and their conservation status (sorted in alphabetic order).

Species	TPs	%	Red List S-H 2010	Red List D 2007	EU Birds Directive	Particularly (§) / strictly (§§) protected (BNatSchG)
Black Redstart	7	0.8				§
Black-billed Magpie	10	1.2				§
Blackbird	60	7.1				§
Blackcap	3	0.4				§
Blue Tit	17	2.0				§
Canada Goose	1	0.1				§
Carrion Crow	11	1.3				§
Chaffinch	28	3.3				§
Chiffchaff	21	2.5				§
Collared Dove	28	3.3				§
Common Coot	2	0.2				§
Common Redpoll	1	0.1				§
Common Starling	21	2.5				§
Dunnock	18	2.1				§
Eurasian Buzzard	1	0.1				§§
Eurasian Kestrel	1	0.1				§§
European Sparrow Hawk	1	0.1				§§
Garden Warbler	10	1.2				§
Goldfinch	8	0.9				§
Great Tit	23	2.7				§
Greenfinch	46	5.4				§
House Martin	51	6.0		V		§
House Sparrow	215	25.4		V		§
Icterine Warbler	7	0.8				§
Lesser Whitethroat	14	1.7				§
Linnet	16	1.9		V		§
Long-eared Owl	1	0.1				§§
Mallard	5	0.6				§
Moorhen	2	0.2		V		§§
Pheasant	3	0.4				§
Redstart	3	0.4				§
Reed Warbler	2	0.2				§
Song Thrush	1	0.1				§
Spotted Flycatcher	6	0.7				§
Stock Dove	2	0.2				§
Swallow	84	9.9		V		§
Tree Sparrow	6	0.7		V		§
White Wagtail	26	3.1				§
Whitethroat	5	0.6				§
Willow Warbler	4	0.5				§
Winter Wren	12	1.4				§
Woodpigeon	62	7.3				§
Sum	**845**					

Of the recorded territories, 43.6% are related to bush and tree breeders (e.g. Blackbird, Chaffinch, Greenfinch, Woodpigeon, Collared Dove) and 42.6% to build-

ing-associated species (e.g. Black Redstart, House Martin, House Sparrow, Swallow). Another 12.4% of the territories belong to cavity and niche-nesting birds (e.g. Great Tit, Common Starling, White Wagtail). The remaining territories were represented by reed and sedge breeders and ground breeders.

The most abundant species were House Sparrow (25.4% of all recorded territories), Swallow (9.9%) and Woodpigeon (7.3%), followed by Blackbird (7.1%), House Martin (6.0%) and Greenfinch (5.4%).

The number of recorded species ranges from one (Johannisberg) to 30 (Todendorf; see Table B.2 in Appendix B). Compared to the expected values according to FLADE (1994) (species number-area curve), the recorded numbers were higher in three villages, lower in six villages and corresponded in four villages.

The average density was 92.5 pairs/10 ha, fluctuating between 2.38 (Johannisberg) and 290.6 pairs/10 ha (Steinkamp). With the exception of Steinkamp, the densities of all other villages were lower than the values given by FLADE (1994) (149.6 pairs/10 ha for 10.0 - 33.3 ha areas and 235.9 pairs/10 ha for areas < 10 ha).

Habitat type F 6 is characterized by 14 indicator species (FLADE 1994). Of these, the Barn Owl occurs on Fehmarn as an irregular breeding bird (1 - 5 pairs), Corn Bunting, White Stork and Little Owl no longer belong to the breeding bird fauna of Fehmarn. All other indicator species (House Sparrow, Swallow, Linnet, Redstart, White Wagtail, House Martin, Black Redstart, Goldfinch, Tree Sparrow and Spotted Flycatcher) have been recorded in the villages on Fehmarn.

The highest number of indicator species (9) was recorded in Puttgarden and Todendorf, followed by Hinrichsdorf (7). Four to six indicator species were found in Niendorf, Bannesdorf, Presen, Landkirchen, Ostermarkelsdorf and Steinkamp, zero to three at Marienleuchte, Johannisberg, Mattiasfelde and Puttgarden (suburb).

All seven species with a high frequency (80-100 %) in this habitat type according to FLADE (1994) have been recorded in the villages on Fehmarn: six to seven at Todendorf, Hinrichsdorf, Landkirchen, Ostermarkelsdorf, Steinkamp, Marienleuchte, Presen and Puttgarden; four to five at Niendorf and Puttgarden (suburb); zero to three at Bannesdorf, Johannisberg and Mattiasfelde.

This analysis shows that Puttgarden, Todendorf and Hinrichsdorf support the highest number of habitat type-typical species.

F 9: Industrial areas and railway facilities

This habitat type is found at six sub-areas in the study area (see Figure 3.4 and Figure 3.5). Altogether, it occupies 84.8 ha and covers 2.6% of the study area.

The most important locations of this habitat type are found at Burg industrial area (38.1 ha) and at Puttgarden freight depot (40.9 ha).

Due to small area sizes (0.5 - 2.1 ha), the following locations related to this habitat type will not be considered here: Wellenkamp, Amalienhof at Burg, maintenance facility at Puttgarden, military depot at Marienleuchte. The species composition of these locations is documented in Table B.1 in Appendix B.

At the industrial area of Burg, typical structures of this habitat type can be found: large warehouses, factory buildings, storage yards, car parks. Besides sealed areas at the vicinity of the buildings, parts of the area are covered by ruderal communities, bushes and small woods.

The area south of the Puttgarden ferry terminal is covered by a freight depot yard. Nearly 90% of the area is occupied by car parks and railway facilities. Wood vegetation is mainly found as lines of poplars (*Populus spp.*) of varying age. In the extensively-used eastern part there are some old sheds with flat roofs as well as con-

crete pillars. Owing to the regular car and freight traffic, there are many disturbances of the avifauna in this area.

The species composition and the densities recorded within this habitat type are listed in Table 3.17. Altogether, 31 breeding bird species with a total of 362 territories have been found. Out of these, 28 species with a total of 158 territories were recorded at Burg industrial area, and nine species in 204 territories at Puttgarden freight depot.

Four out of 31 species are considered as Near Threatened (Category V) in the federal state and national Red Lists.

Table 3.17 Habitat type F 9 (Burg industrial area and Puttgarden freight depot) – recorded species and number of territorial pairs (TPs) of breeding birds in 2009 and their conservation status (sorted in alphabetic order).

	Burg industrial area		Puttgarden freight depot		Red List S-H 2010	Red List D 2007	EU Birds Directive	Particularly (§) / strictly (§§) protected (BNatSchG)
Species	**TPs**	**TPs/10 ha**	**TPs**	**TPs/10 ha**				
Black Redstart	7	1.84						§
Blackbird	7	1.84	1	0.24				§
Blackcap	1	0.26						§
Blue Tit	1	0.26						§
Carrion Crow	2	0.52						§
Chaffinch	1	0.26	1	0.24				§
Chiffchaff	2	0.52						§
Collared Dove	2	0.52						§
Common Gull	7	1.84	8	1.96	V			§
Common Starling	5	1.31						§
Dunnock	2	0.52						§
Goldfinch	1	0.26						§
Great Tit	6	1.57						§
Greenfinch	22	5.77						§
Herring Gull			7	1.71				§
House Martin			10	2.44		V		§
House Sparrow	49	12.86				V		§
Lesser Whitethroat	3	0.79	1	0.24				§
Linnet	11	2.89				V		§
Mallard	1	0.26						§
Oystercatcher	2	0.52						§
Robin	2	0.52						§
Rook			170	41.56				§
Song Thrush	1	0.26						§
Spotted Flycatcher	1	0.26						§
White Wagtail	4	1.05	1	0.24				§
Whitethroat	5	1.31						§
Willow Warbler	1	0.26						§
Winter Wren	2	0.52						§
Woodpigeon	9	2.36	5	1.22				§
Yellow Wagtail	1	0.26						§
Totals	**158**	**41.5**	**204**	**49.9**				
Area size (ha)	**38.1**		**40.9**					

Of the recorded territories, 68.8% are related to bush and tree breeders (e.g. Blackbird, Greenfinch, Linnet, Rook, Woodpigeon) and 18.2% to building-associated species, respectively (e.g. Black Redstart, House Martin, House Sparrow). Another 6.9% of the territories belong to ground breeders (e.g. Common Gull, Herring Gull, Oystercatcher). Cavity and niche-nesting birds (e.g. Great Tit, Common Starling, White Wagtail) occurred in 5.8% of the territories. The remaining territories were represented by reed and sedge-breeders.

The most abundant species were Rook (46.7% of all recorded territories), House Sparrow (13.5%) and Greenfinch (6.1%), followed by Common Gull (4.1%), Woodpigeon (3.9%) and Linnet (3.3%).

At Burg industrial area the number of 28 recorded species considerably exceeds the expected value of 13 species according to FLADE (1994) (species number-area curve). The higher value is due to habitat structures such as ruderal communities, bushes and small woods. Thus, 15 bush and tree-breeding species with a total of 71 territories have been found here. Likewise the density of 41.5 pairs/10 ha is higher than the average value given by FLADE (1994) (9.3 pairs/10 ha for 33.4 - 100 ha areas). The maximum density in this size class is 100.4 pairs/10 ha (FLADE 1994).

Habitat type F 9 is characterized by the indicator species House Sparrow, Black Redstart, Swift, Wheatear and House Martin (FLADE 1994). The Wheatear occurs on Fehmarn as an irregular breeding bird (0 - 5 pairs; see BERNDT et al. 2005). Two out of four possible indicator species have been recorded at Burg industrial area. Compared to the average values given by FLADE (1994), their determined densities were higher:

House Sparrow: 12.9 pairs/10 ha (4.6 according to FLADE 1994)
Black Redstart: 1.8 pairs/10 ha (1.0 according to FLADE 1994)

According to FLADE (1994) Blackbird and Common Starling occur in a high frequency (80 - 100 %) in this habitat type. Both species have been recorded at Burg industrial area. Their densities were higher than those indicated by FLADE (1994).

Of note is the occurrence of two pairs of Oystercatcher, probably breeding on flat roofs of buildings. BERNDT et al. (2005) also report an Oystercatcher brood on the roof of a sports hall in Burg.

At Puttgarden freight depot, the number of 9 recorded species is below the expected value of 13 species according to FLADE (1994) (species number-area curve). The density of 49.9 pairs/10 ha is higher than the average value given by FLADE (1994) (9.3 pairs/10 ha for 33.4 - 100 ha areas). The maximum density in this size class is 100.4 pairs/10 ha (FLADE 1994). The high density found at Puttgarden freight depot is due to the presence of the colony-breeding Rook, of which 170 territorial pairs have been recorded (41.6 pairs/10 ha). According to BERNDT et al. (2005), about 300 pairs of Rook in five colonies are breeding on Fehmarn.

The House Martin was the only recorded indicator species occurring in a density comparable to the value indicated by FLADE (1994). Only one territorial pair of Blackbird, which occurs in a high frequency in this habitat type, was found (0.24 pairs/10 ha).

Worthy of note are the occurrences of 8 pairs of Common Gull and 7 pairs of Herring Gull breeding on flat roofs of sheds and on concrete pillars.

Traffic areas

This habitat type is related to the embankment along the B 207 road and the railway lines, partly covered by wood vegetation. It has a size of 39.6 ha and covers 1.2% of the study area. Traffic areas were not considered in the investigation of FLADE (1994).

The species composition and the densities recorded within this habitat type are listed in Table 3.18. Altogether, 18 breeding bird species with a total of 64 territories have been found. Two species are considered as Near Threatened (Category V) in the national Red List.

Table 3.18 Habitat type Traffic areas – recorded species and number of territorial pairs (TPs) of breeding birds in 2008 and their conservation status (sorted in alphabetic order).

Species	TPs - Bioplan 2008	TPs/10 ha	Red List S-H 2010	Red List D 2007	EU Birds Direc rec-tive	Particularly (§) / strictly (§§) protected (BNatSchG)
Blackbird	6	1.52				§
Blackcap	2	0.51				§
Chaffinch	8	2.02				§
Chiffchaff	2	0.51				§
Dunnock	5	1.26				§
Garden Warbler	5	1.26				§
Great Spotted Wood-pecker	1	0.25				§
Great Tit	3	0.76				§
Greenfinch	1	0.25				§
Icterine Warbler	4	1.01				§
Lesser Whitethroat	1	0.25				§
Linnet	2	0.51		V		§
Tree Sparrow	1	0.25		V		§
White Wagtail	2	0.51				§
Whitethroat	15	3.79				§
Willow Warbler	2	0.51				§
Winter Wren	1	0.25				§
Woodpigeon	3	0.76				§
Totals	**64**	**16.2**				
Area size (ha)	**39.6**					

Of the recorded territories, 89.1% are related to bush and tree breeders (e.g. Blackbird, Garden Warbler, Woodpigeon) and 10.9% to cavity and niche-nesting birds (e.g. Great Spotted Woodpecker, Great Tit, White Wagtail).

The most abundant species were Whitethroat (23.4% of all recorded territories), Chaffinch (12.5%) and Blackbird (9.4%), followed by Garden Warbler (7.8%), Dunnock (7.8%) and Icterine Warbler (6.3%).

Thus, the breeding bird community of this habitat type was dominated by common and widespread songbirds. Threatened species have not been recorded in the wood vegetation.

3.2.2 Staging birds

During the 17 surveys of staging birds in the land approach area on Fehmarn, there have been 26 species recorded with a total of 8,541 individuals (see Table 3.19). Only the Golden Plover is listed in the EU Birds Directive Annex 1.

Over the year, the species with highest frequency of occurrence were Black-headed Gull (64.7%), Herring Gull, Greylag Goose and Mallard (58.8 % each), Common Gull (52.9%) and Tufted Duck (41.2%). The species with highest individual sums over the study period were Common Gull (2,355, 27.6%), Fieldfare (1,856, 21.7%), Black-headed Gull (1,294, 15.2%) and Herring Gull (1,147, 13.4%).

The species with highest yearly individual sums were also those with the highest daily sums in the study area (max Sum / day) and within sub-areas of the study area (max day sum by sub-area). Therefore, the staging bird species composition was dominated by gulls in terms of abundance and frequency.

Table 3.19 Total and daily sums, frequency and dominance of staging birds observed per species on Fehmarn from February 2009 to June 2010.

English name	Latin name	Sum	%	Max sum / day	Max day sum by sub-area	Frequency
Black-headed Gull	*Larus ridibundus*	1,294	15,15	969	900	64.71
Common Coot	*Fulica atra*	3	0,04	3	3	5.88
Common Gull	*Larus canus*	2,355	27,57	780	780	52.94
Curlew Sandpiper	*Calidris ferruginea*	13	0,15	13	13	5.88
Dunlin	*Calidris alpina*	136	1,59	121	121	11.76
Eurasian Jackdaw	*Corvus monedula*	18	0,21	18	18	5.88
Eurasian Wigeon	*Anas penelope*	167	1,96	120	120	17.65
Fieldfare	*Turdus pilaris*	1,856	21,73	1,856	890	5.88
Golden Plover	*Pluvialis apricaria*	343	4,02	223	223	11.76
Goosander	*Mergus merganser*	2	0,02	2	2	5.88
Great Black-backed Gull	*Larus marinus*	41	0,48	13	13	35.29
Green-winged Teal	*Anas crecca*	14	0,16	8	8	11.76
Greylag Goose	*Anser anser*	345	4,04	71	71	58.82
Herring Gull	*Larus argentatus*	1,147	13,43	241	241	58.82
Lapwing	*Vanellus vanellus*	12	0,14	12	12	5.88
Little Grebe	*Tachybaptus ruficollis*	1	0,01	1	1	5.88
Mallard	*Anas platyrhynchos*	198	2,32	60	53	58.82
Mute Swan	*Cygnus olor*	35	0,41	26	26	23.53
Northern Shoveler	*Anas clypeata*	41	0,48	21	17	11.76
Oystercatcher	*Haematopus ostralegus*	82	0,96	24	19	35.29
Red-breasted Merganser	*Mergus serrator*	4	0,05	4	4	5.88
Ringed Plover	*Charadrius hiaticula*	7	0,08	7	7	5.88
Rook	*Corvus frugilegus*	156	1,83	135	77	11.76
Shelduck	*Tadorna tadorna*	91	1,07	26	26	35.29
Tufted Duck	*Aythya fuligula*	108	1,26	57	57	41.18
Woodpigeon	*Columba palumbus*	72	0,84	72	72	5.88
	individual-sum	**8,541**				
	sum of species	**26**				

The composition of the staging bird community for every survey is given in Table 3.20. The number of species per survey varied from 0 (February 19th 2010) to 11 (April 22nd 2009), and the total number of individuals per survey varied from 0 (February 19th 2010) to 1,881 (January 14th 2010, primarily Fieldfares).

The results from winter 2009/2010 were influenced by heavy snow in the study area. Most of the staging birds left the area. Only on January 14th, high numbers of

Fieldfares were observed. Some large flocks were found in the fields south of Puttgarden and east of Todendorf.

Table 3.20 Daily sums of staging bird species observed per survey on Fehmarn from February 2009 to June 2010.

	2009											2010					
Species	**02 09**	**03 20**	**04 22**	**05 12**	**06 23**	**07 14**	**08 20**	**09 23**	**10 21**	**11 20**	**12 30**	**01 14**	**02 19**	**03 23**	**04 21**	**05 20**	**06 23**
Black-headed Gull		12	11		24	38	969	167		3				13	18	23	16
Common Coot	3																
Common Gull	73	780	49				142	648	538	18				21	86		
Curlew Sandpiper						13											
Dunlin						121		15									
Eurasian Jackdaw			18														
Eurasian Wigeon	120	38															9
Fieldfare												1,856					
Golden Plover							120	223									
Goosander	2																
Great Black-backed Gull								8		3	11	13			5	1	
Green-winged Teal	6																8
Greylag Goose	71	6	14			11		47	47	67					21	4	57
Herring Gull		3	84				229	203	241	187	91	10		56	43		
Lapwing							12										
Little Grebe	1																
Mallard	30	9	9	7	40		25			6				3	9		60
Mute Swan										5		2		26		2	
Northern Shoveler			20														21
Oystercatcher		11	15	19	8											24	5
Red-breasted Merganser		4															
Ringed Plover						7											
Rook			135								21						
Shelduck			19	5	21										7	13	26
Tufted Duck	57		6	5	15					12				5			8
Woodpigeon														72			
Daily sum	**363**	**863**	**380**	**36**	**108**	**190**	**1,497**	**1,311**	**826**	**301**	**123**	**1,881**	**0**	**196**	**189**	**67**	**210**
Daily no. of species	**9**	**8**	**11**	**4**	**5**	**5**	**6**	**7**	**3**	**8**	**3**	**4**	**0**	**7**	**7**	**6**	**9**

The distribution and abundance of all registered staging bird species during all survey-dates is illustrated in Figure 3.6 (this map is presented in a higher resolution in Figure B.4 in Appendix B). Note that dots illustrate centres of staging flocks.

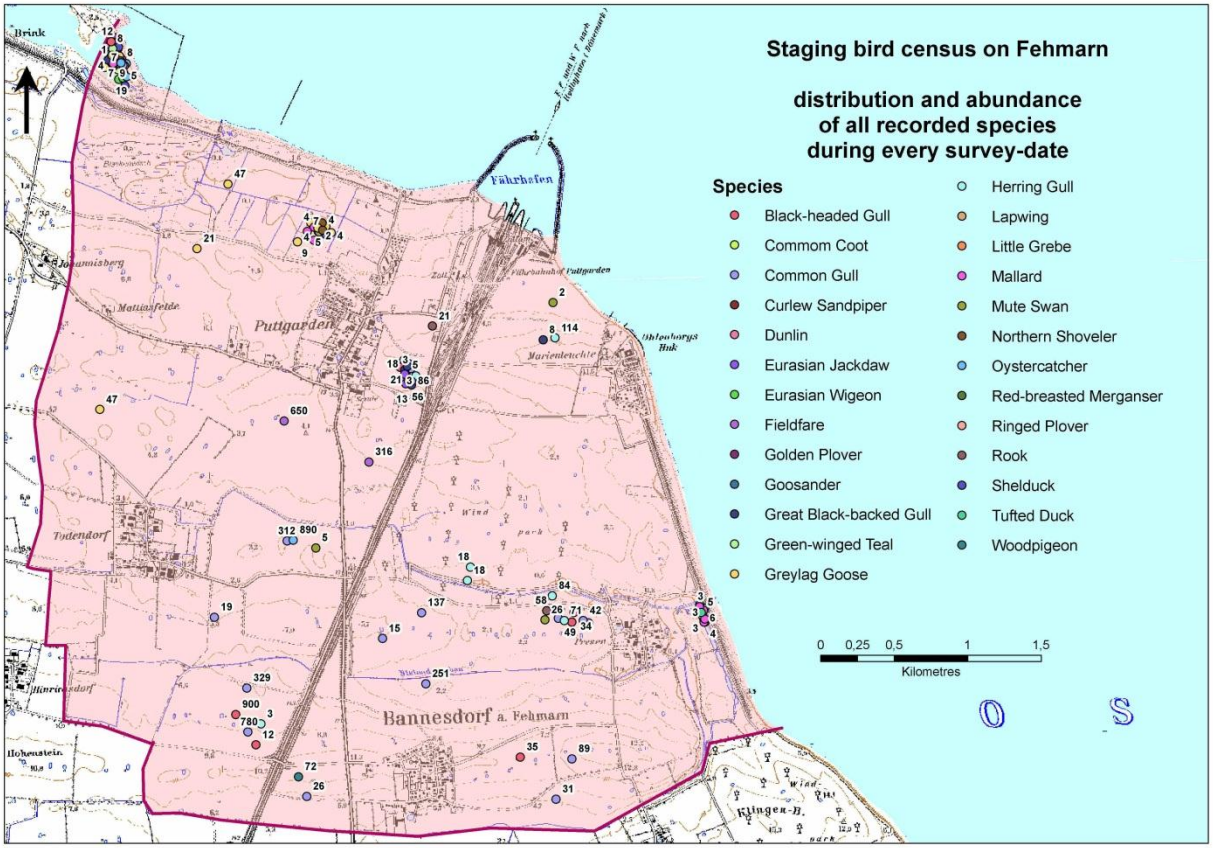

Figure 3.6 Staging bird census on Fehmarn – distribution and abundance of all recorded species during every survey-date (from February 2009 to June 2010).

The results of BIOPLAN (2009) within the area south of Bannesdorf cannot be specified for all species, only for those with importance to staging bird species. Within this area there is such a sub-area with 730 Black-headed Gulls and 150 Common Gulls.

3.3 Evaluation of importance

3.3.1 Breeding birds

Evaluation of breeding bird communities according to WILMS et al. (1997)

In the following tables, the results of the evaluation of breeding bird communities according to WILMS et al. (1997) – as part of the evaluation matrix (see chapter 3.1.1) are given for those habitat types in which threatened species were recorded.

In almost all habitat types of the study area, the minimum threshold values defined by WILMS et al. (1997) for local, regional, federal state and national importance were not exceeded. Only one section of habitat type A 3 (Beaches) can be classified as locally important for breeding birds.

D 4: Crops

Table 3.21 Importance of the breeding bird community of habitat type D 4 according to WILMS et al. (1997)

Species	No of territorial pairs	Germany		Schleswig-Holstein	
		Red List D 2007	scores	Red List S-H 2010	scores
Grey Partridge	2	2	3.5	V	0.0
Lapwing	40	2	26.0	3	8.0
Northern Shoveler	2	3	1.8		0.0
Ringed Plover	1	1	10.0	2	2.0
Skylark	97	3	13.7	3	13.7
Σ scores : area factor			55.0 : 24.0		23.7 : 24.0
Result			**2.3**		**1.0**
Importance		**not national**		**not local**	

D 5: Crops with tree lines, hedges and small woods

Table 3.22 Importance of the breeding bird community of habitat type D 5 according to Wilms et al. (1997)

Species	No of territorial pairs	Germany		Schleswig-Holstein	
		Red List D 2007	scores	Red List S-H 2010	scores
Lapwing	1	2	2.0	3	1.0
Northern Shoveler	1	3	1.0		0.0
Skylark	20	3	6.0	3	6.0
Σ scores : area factor			9.0 : 4.2		7.0 : 4.2
Result			**2.1**		**1.7**
Importance		**not national**		**not local**	

A 3: Beaches

Table 3.23 Importance of the breeding bird community of habitat type A 3 (section Grüner Brink up to ferry terminal) according to WILMS et al. (1997)

Species	No of territorial pairs	Germany		Schleswig-Holstein	
		Red List D 2007	scores	Red List S-H 2010	scores
Green-winged Teal	1	3	1.0		0.0
Skylark	10	3	5.0	3	5.0
Σ scores : area factor			6.0 : 1.0		5.0 : 1.0
Result			**6.0**		**5.0**
Importance		**not national**		**local**	

Evaluation of the breeding bird fauna in habitat types

The actual evaluation of the breeding bird fauna within the habitat types was carried out on the basis of the five level evaluation procedure described in chapter 3.1.1. In Table 3.24 to Table 3.35, the results of that evaluation procedure are pre-

sented for each habitat type. Figure 3.7 illustrates the evaluation of breeding bird habitats.

Summarizing it can be stated:

Evaluation level V (very high importance) was not assigned as none of the habitat types of the avifauna fulfilled the required criteria (see Table 3.4).

Due to the local importance according to WILMS et al. (1997) as well as the relatively species-rich breeding bird community, only the beach section A 3 (Grüner Brink up to ferry terminal) attained a high importance (IV) out of the habitat types in the study area.

Although habitat type D 4 (Crops) was preliminarily classified with high importance, it was downgraded to medium importance (III) due to the low density of the Skylark and only temporary occurrence of the Lapwing colony on the agricultural test field north-west of Niendorf.

Although this field was outside the 2009 study area, no breeding Lapwings have been recorded there during surveys carried out in the adjacent areas (see chapter 3.2.1). For this reason – different from BIOPLAN (2009) – this area was not singled out, but habitat type D 4 was ranked as being of medium importance all over. This results in a different evaluation of those agricultural areas compared to BIOPLAN. Although the test field was classified with high importance (IV) for the year 2008 by BIOPLAN, the authors emphasize at the same time that this importance depends on the type of agricultural use, which can vary from year to year ("presumably a one-year phenomenon"; see BIOPLAN 2009, p. 90).

Within the habitat type D 4 differences of densities in sub-areas were found. Higher densities of breeding birds were recorded for example north-west of Puttgarden or south-east of Hinrichsdorf. On the other hand sub-areas with lower densities or unpopulated sub-areas did occur (e.g. north-west of Presen). As land-use of the arable fields – and therefore the habitat-suitability for breeding birds – changes from year to year (see BERNDT et al. 2005), no further differentiation concerning lower or higher importance of sub-areas within this habitat type was made.

Likewise, the following habitat types of the avifauna have a medium importance (III) for the breeding bird communities:

- Semi-open fens (D 6),
- Garden cities (F 5 – Burg),
- Villages (F 6 – Puttgarden, Todendorf, Hinrichsdorf, Niendorf, Bannesdorf, Presen, Landkirchen, Ostermarkelsdorf, Steinkamp, Marienleuchte) and
- Industrial areas and railway facilities (F 9)

A moderate importance (II) was assigned to the following habitat types

- Crops with tree lines, hedges and small woods (D 5),
- Beach section A 3 (Ferry terminal up to Presen),
- Garden cities (F 5 – Puttgarden) and
- Villages (F 6 – Johannisberg, Mattiasfelde, Puttgarden, suburb)
- Traffic areas.

Evaluation level I (low importance) was not assigned.

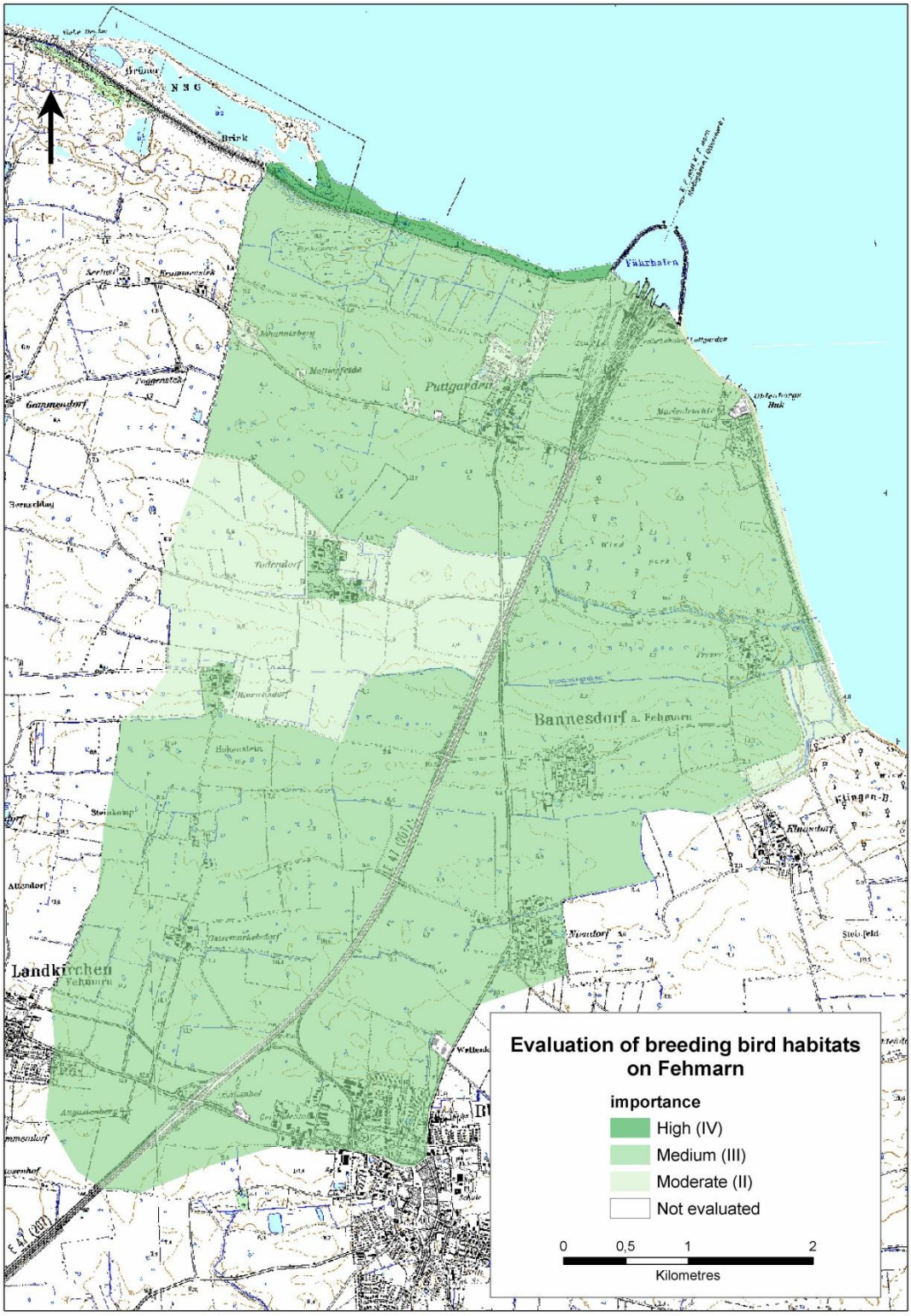

Figure 3.7 Evaluation of breeding bird habitats on Fehmarn.

D 4: Crops

Table 3.24 Evaluation of the breeding bird fauna of habitat type D 4.

Threatened/protected species	**Ringed Plover (Red List S-H: 2)** **Skylark (Red List S-H: 3)** **Lapwing (Red List S-H: 3)** **Marsh Harrier (Annex I of the EU Birds Directive)** **Avocet (Annex I of the EU Birds Directive)** Cuckoo (Red List S-H: V) Grey Partridge (Red List S-H: V) Barn Owl (Red List S-H: V) Eurasian Buzzard (strictly protected) Moorhen (strictly protected) Eurasian Kestrel (strictly protected)
Importance according to WILMS et al. (1997)	not local
Parameters of the breeding bird community	- species-rich breeding bird community due to additional habitat structures and requisites in this habitat type (marl pits, tree lines, hedges) - altogether low densities of species breeding on the farmland - low densities of species, which reach their maximum density in this habitat type (Grey Partridge) as well as those which occur in a high frequency in this habitat type (Skylark)
Existing pressures	- intensive agricultural use; partly affected by noise from the B 207 road
Evaluation criteria	- Occurrence of one Endangered species - Occurrence of two Vulnerable species
Preliminary evaluation level	high importance (IV)
Comment	The density of threatened species on the farmland of Fehmarn was low. Even the still abundant Skylark only occurred in a density of 0.4 pairs/10 ha. The occurrence of the Lapwing colony on the test field north-west of Niendorf depended on the type of agricultural use that can vary each year (temporary occurrence of the Lapwings). The occurrence of the Endangered and Vulnerable species was not being classified with high importance. For these reasons a downgrading was made.
Final evaluation level	**medium importance (III)**

D 5: Crops with tree lines, hedges and small woods

Table 3.25 Evaluation of the breeding bird fauna of habitat type D 5.

Threatened/protected species	**Skylark (Red List S-H: 3)** **Lapwing (Red List S-H: 3)** Cuckoo (Red List S-H: V) Meadow Pipit (Red List S-H: V) Eurasian Buzzard (strictly protected) Moorhen (strictly protected)
Importance according to WILMS et al. (1997)	not local
Parameters of the breeding bird community	- overall density was low - relatively species-poor breeding bird community - low densities of species which occur in a high frequency in this habitat type - density of threatened/protected species was low.
Existing pressures	- intensive agricultural use; partly affected by noise from the B 207 road
Evaluation criteria	- occurrence of Vulnerable species, which were not classified with high or very high importance
Preliminary evaluation level	medium importance (III)

Comment	Due to the relatively species-poor breeding bird community and the low densities a downgrading was made.
Final evaluation level	**moderate importance (II)**

D 6: Semi-open fens

Table 3.26 Evaluation of the breeding bird fauna of habitat type D 6.

Threatened/protected species	**Marsh Harrier (Annex I of the EU Birds Directive)** Cuckoo (Red List S-H: V) Eurasian Buzzard (strictly protected) Moorhen (strictly protected)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- overall density was low - species-poor breeding bird community - two out of three possible indicator species were recorded - 50 % of the species, which occur in a high frequency in this habitat type, were recorded - density of threatened/protected species was low.
Existing pressures	Due to the lack of a road network and the limited accessibility of the area, the existing pressures can be considered low. The only evident source of disturbance is the tourism in summer on the periphery. A public car park for beach-goers is located in the northern part of the area.
Evaluation criteria	- occurrence of a species listed in Annex I of the EU Birds Directive, which is not listed in the Red Lists of Schleswig-Holstein or Germany
Preliminary evaluation level	medium importance (III)
Comment	Despite the low number of species and the low density of the breeding bird community the preliminary evaluation level is retained due to the nature-related character of this habitat type.
Final evaluation level	**medium importance (III)**

A 3: Beaches

Table 3.27 Evaluation of the breeding bird fauna of habitat type A 3 – section Grüner Brink up to ferry terminal.

Threatened/protected species	**Skylark (Red List S-H: 3)** Cuckoo (Red List S-H: V)
Importance according to WILMS et al. (1997)	Local
Parameters of the breeding bird community	- none out of three possible indicator species was recorded - relatively species-rich breeding bird community due to additional habitat structures and requisites in this habitat type (heather and grassland vegetation, reed vegetation, bushes) - density of the Vulnerable species Skylark is relatively high
Existing pressures	- high frequency of disturbances at the sand beaches
Evaluation criteria	- habitat type with regional or local importance according to WILMS et al. (1997)
Evaluation level	**high importance (IV)**

Table 3.28 Evaluation of the breeding bird fauna of habitat type A 3 – section Ferry terminal up to Presen.

Threatened/protected species	- (no threatened/protected species were recorded)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- one out of three possible indicator species was recorded - extremely species-poor breeding bird community - density was extremely low
Existing pressures	- high frequency of disturbances at the sand beaches
Evaluation criteria	- very species-poor habitat type without occurrence of threatened species and those listed in category V (Near Threatened)
Preliminary evaluation level	low importance (I)
Comment	Due to the only occurrence of the Oystercatcher at the sand beaches of the study area an upgrading was made.
Final evaluation level	**moderate importance (II)**

F 5: Garden cities

Table 3.29 Evaluation of the breeding bird fauna of habitat type F 5 – Burg.

Threatened/protected species	Eurasian Jackdaw (Red List S-H: V) Common Gull (Red List S-H: V)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- overall density was high - number of species was higher than the expected value - all six possible indicator species were recorded - all seven species, which occur in a high frequency in this habitat type, were recorded - habitat type-typical breeding bird community
Existing pressures	- high level of use
Evaluation criteria	- species-rich habitat type without occurrence of threatened species
Evaluation level	**medium importance (III)**

Table 3.30 Evaluation of the breeding bird fauna of habitat type F 5 – Puttgarden.

Threatened/protected species	Eurasian Jackdaw (Red List S-H: V) Moorhen (strictly protected)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- overall density was low - number of species corresponded with the expected value - three out of six possible indicator species were recorded - six out of seven species, which occur in a high frequency in this habitat type, were recorded
Existing pressures	- high level of use
Evaluation criteria	- species-rich habitat type without occurrence of threatened species
Preliminary	medium importance (III)

evaluation level	
Comment	Due to the lack of further indicator species and the low population densities a downgrading was made.
Evaluation level	**medium importance (III)**

F 6: Villages

Table 3.31 Evaluation of the breeding bird fauna of habitat type F 6 – Puttgarden, Todendorf, Hinrichsdorf, Niendorf, Bannesdorf, Presen, Landkirchen, Ostermarkelsdorf, Steinkamp, Marienleuchte.

Threatened/protected species	Eurasian Buzzard (strictly protected): Niendorf Sparrow Hawk (strictly protected): Marienleuchte Moorhen (strictly protected): Puttgarden, Todendorf Eurasian Kestrel (strictly protected): Presen Long-eared Owl (strictly protected): Todendorf
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- breeding bird communities with medium to high number of species - in most cases habitat type-typical breeding bird communities - except for Steinkamp overall densities were low
Existing pressures	- high level of use
Evaluation criteria	- species-rich habitat types without occurrence of threatened species
Evaluation level	**medium importance (III)**

Table 3.32 Evaluation of the breeding bird fauna of habitat type F 6 - Johannisberg, Mattiasfelde, Puttgarden (suburb).

Threatened/protected species	- (no threatened/protected species were recorded)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- breeding bird communities with low to medium number of species - no habitat type-typical breeding bird communities (no or few indicator species) - except for Mattiasfelde overall densities were low
Existing pressures	- high level of use
Evaluation criteria	- species-poor habitat types without occurrence of threatened species
Evaluation level	**moderate importance (II)**

F 9: Industrial areas and railway facilities

Table 3.33 Evaluation of the breeding bird fauna of habitat type F 9 – Burg industrial area.

Threatened/protected species	Common Gull (Red List S-H: V)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- overall density was high - number of species was higher than the expected value - two out of four possible indicator species were recorded - both species, which occur in a high frequency in this habitat type, were

	recorded
Existing pressures	- high level of use; area partly sealed
Evaluation criteria	- species-rich habitat type without occurrence of threatened species
Evaluation level	**medium importance (III)**

Table 3.34 Evaluation of the breeding bird fauna of habitat type F 9 – Puttgarden freight depot.

Threatened/protected species	Common Gull (Red List S-H: V)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- overall density was high - number of species was lower than the expected value - one out of four possible indicator species was recorded - one out of two species, which occur in a high frequency in this habitat type, was recorded
Existing pressures	- high level of use; 90 % of the area is sealed
Evaluation criteria	- species-poor habitat type without occurrence of threatened species
Preliminary evaluation level	moderate importance (II)
Comment	Due to the high density of the Rook and the occurrence of the Common Gull (Near Threatened) an upgrading was made.
Final evaluation level	**medium importance (III)**

Traffic areas

Table 3.35 Evaluation of the breeding bird fauna of habitat type Traffic areas.

Threatened/protected species	- (no threatened/protected species were recorded)
Importance according to WILMS et al. (1997)	- (no threatened species were recorded)
Parameters of the breeding bird community	- Threatened species have not been recorded in the wood vegetation. The habitat type was dominated by common and widespread songbirds.
Existing pressures	- noise from the B 207 road
Evaluation criteria	- species-poor habitat type without occurrence of threatened species
Evaluation level	**moderate importance (II)**

3.3.2 Staging birds

Importance according to BURDORF et al. (1997), BIOPLAN (2009) and LLUR (2010)

In the following table the species specific maximum registered day sum in a sub-area is compared to the minimum threshold values for evaluation of staging bird importance according to BURDORF et al. (1997), BIOPLAN (2009) and LLUR (2010) (Table 3.36).

Table 3.36 Maximum registered day sum in a sub-area and threshold values of importance of staging birds on Fehmarn from February 2009 to June 2010.

Species	Max day sum by sub-area	Inter-national	National	Federal state BIOPLAN (2009)	Federal state LLUR (2010)	Regional LLUR (2010)	Local LLUR (2010)
Black-headed Gull	900	20,000	3,000	1,800	2,200	1,100	**550**
Common Coot	3	17,500	3,000	1,000	1,000	500	250
Common Gull	780	20,000	1,600	420	1,000	**500**	**250**
Curlew Sand-piper	13	20,000	n.d.	n.d.	n.d.	n.d.	n.d.
Dunlin	121	13,300	4,000	3,900	6,550	3,300	1.650
Eurasian Jackdaw	18	n.d.	n.d.	> 1,000	n.d.	n.d.	n.d.
Eurasian Wigeon	120	15,000	2,100	1,900	2,900	1,450	720
Fieldfare	890	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Golden Plover	223	7,500	2,200	1,600	2,000	1,000	500
Goosander	2	2,700	n.d.	n.d.	n.d.	n.d.	n.d.
Great Black-backed Gull	13	4,400	230	60	60	30	15
Green-winged Teal	8	5,000	400	180	500	250	120
Greylag Goose	71	5,000	1,250	480	540	270	140
Herring Gull	241	5,900	2,100	1,200	1,400	700	350
Lapwing	12	20,000	3,800	2,600	2,000	1,000	500
Little Grebe	1	4,000	625	55	80	40	20
Mallard	53	20,000	9,000	2,300	2,300	1,150	570
Mute Swan	26	2,500	750	110	110	60	30
Northern Shoveler	17	400	70	70	120	60	30
Oystercatcher	19	10,200	2,300	1,700	2,200	1,100	550
Red-breasted Merganser	4	1,700	110	30	30	15	7
Ringed Plover	7	730	180	170	320	160	80
Rook	77	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Shelduck	26	3,000	2,000	2,000	3,000	1,500	740
Tufted Duck	57	12,000	3,250	1,300	1,500	750	370
Woodpigeon	72	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

n.d.: no data available

For two of the recorded 26 staging bird species there is a high importance of sub-areas within the study area to be stated (Figure 3.8; this map is presented in a higher resolution in Figure B.5 in Appendix B).

Common Gull

The Common Gull, with a daily sub-area maximum of 780 individuals (March 20th 2009), exceeds the threshold value of 500 for regional importance of a staging area in an intensively used agricultural sub-area situated southeast of Todendorf, west of the road B 207. BIOPLAN (2009) showed a local importance (300 Common Gulls) of the same sub-area in 2008 (Plan 7, sheet 4). This area was larger then. In our study, this lower value was reached on September 23rd 2009 with 329 Common Gulls in the same sub-area. As this staging area was found to be of higher importance in 2008 (BIOPLAN) and in 2009, we assume the area to be a traditional staging area for the gull species, although there is no obvious reason which makes the area outstanding.

BIOPLAN (2009) showed a local importance (150 Common Gulls) in a sub-area in 2008 (Plan 7, sheet 4) which is located north-east of Landkirchen and north-west of Burg. Due to the changes of threshold values following LLUR (2010), there is no local importance of that sub-area anymore.

In accordance with BIOPLAN (2009), the transfer of evaluation levels defined by BURDORF et al. (1997) into importance levels defined by BRINKMANN (1998) shows the sub-area southeast of Todendorf, west of the road B 207 to be of high importance to Common Gulls.

Black-headed Gull

The threshold value of 550 individuals for **local importance** of a staging area for this species was exceeded in the following sub-areas:

- southeast of Todendorf, west of the road B 207 (900 individuals on August 20th 2009)
- north-east of Landkirchen (730 individuals, BIOPLAN 2009).

In accordance with BIOPLAN (2009), the transfer of evaluation levels defined by BURDORF et al. (1997) into importance levels defined by BRINKMANN (1998) shows both sub-areas being of **high importance** to Black-headed Gull.

In Figure 3.8 these sub-areas are illustrated (this map is presented in a higher resolution in Figure B.5 in Appendix B).

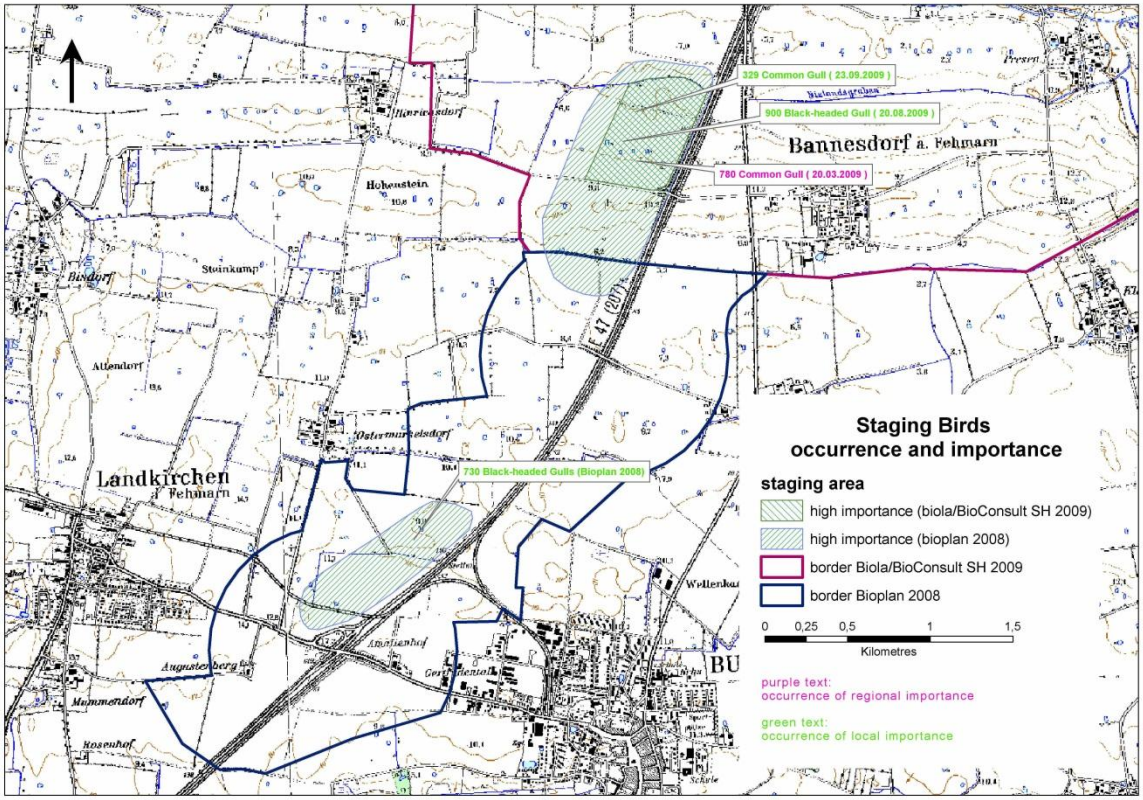

Figure 3.8 Staging birds, occurrence and importance.

None of the other registered species reached or exceeded 90 % of the threshold values sufficient to state an importance of any staging sub-area.

The evaluation matrix derived from BIOPLAN (2009) does not allow for a further differentiation of the remaining study area into sub-areas of medium, moderate or low importance according to BRINKMANN (1998).

3.4 Discussion

3.4.1 Breeding birds

Historical Data

An overview of the breeding bird fauna of the island of Fehmarn (area 18,500 ha) according to BERNDT et al. (2005) is given in Table B.3 in Appendix B. Overall, 88 species are mentioned as regularly breeding birds, and 50 species as irregularly occurring species or breeding in very low numbers; 22 further species are classified as former and/or insufficiently confirmed breeding birds (e.g. Little Bittern, White Stork, Ferrugineous Duck, Hen Harrier, Hobby).

According to BERNDT et al. (2005) the number of breeding bird species has to be assessed as average to below average in federal state comparison. The low number of species and densities is closely related to the fact, that the island is very sparsely wooded (proportion of forests 0.4%). In contrast, intensively used agricultural areas cover 83%. Here, breeding birds only occur in low densities. Approximately 95% of the agricultural areas on Fehmarn are used as arable fields and are predominantly cultivated with winter cereals (especially wheat and barley) as well as winter rape. The proportions of cereals and rape change considerably from year to year.

According to BERNDT et al. (2005), a rather peculiar composition of the breeding bird fauna is found due to the above-mentioned agricultural land use as well as the high amount of coastal and water habitats. For 21 breeding bird species, Fehmarn holds major shares of the federal state populations (BERNDT et al. 2005).

Since 1950, populations of 18 breeding bird species have strongly increased on Fehmarn, and 15 further species have been recorded for the first time (BERNDT et al. 2005). On the other hand, populations of 42 species have strongly decreased, and ten species do not breed on Fehmarn any longer. In this negative balance, the highest losses refer to fields and meadows.

Assessment of the breeding bird fauna in the study area

Within the 3,200 ha study area of the breeding bird census (comprising 17.3% of the area of Fehmarn), 85% of the species, which are currently regularly breeding on Fehmarn, were recorded. Regarding the irregular breeding birds too, the proportion was 54.3%.

Concerning the regular breeding bird species of Fehmarn, some waterbirds – like Great Crested Grebe, Red-necked Grebe, Great Cormorant, Common Pochard, Common Heron, Common Eider, Red-breasted Merganser, Common Tern, Snipe or Redshank – did not occur in the study area due to the lack of adequate habitat structures. For example, larger stagnant water bodies including margins, larger undisturbed beaches and beach ridges, islands just off the coast and wet meadows are missing in the study area. For the lack of extended reed beds, also species like Eurasian Bittern or Bearded Tit did not occur.

With a proportion 88%, agricultural fields and meadows dominate the study area. The recorded species Skylark, Lapwing, Yellow Wagtail, Whitethroat or Pheasant are typical breeding birds of the agricultural landscape of Fehmarn (BERNDT et al. 2005).

The reduced density of the Skylark recorded in the study area is due to the intensive agricultural use of this habitat type. Especially, the predominant cultivation of winter wheat and winter rape is the main limiting factor for colonisation and breeding success of the Skylark (see DAUNICHT 1998). Additionally, insect-rich feeding grounds are often missing in the breeding territories. The low density of the Skylark in the study area was confirmed by the investigation of BIOPLAN (2009), who found a comparable value on the arable fields on the island of Fehmarn. The authors indicated on Fehmarn a considerably lower density of that species than on the mainland, which was caused by "the lack of adequate structures in the spacious arable fields" (BIOPLAN 2009, p. 73).

According to BERNDT et al. (2005), higher densities of the Skylark on Fehmarn are mainly due to the inhabitation of special areas (e.g. extensification sites, fallow lands), while "on arable fields and on the remaining grassland you are often looking in vain for territorial pairs." In our study area, for example, this was the case on the fields north-west of Presen, on which the Skylark occurred in a very low density or which were not populated by that species. In contrast, an impressive example for (temporary) special areas was the agricultural test field for cabbage cultivation north-west of Niendorf. Besides the Lapwing colony, several pairs of the Skylark were breeding on this field.

Conspicuous is that the Yellowhammer shows up only with a single breeding pair in the study area. According to BERNDT et al. (2005), 150 pairs of this species breed on Fehmarn especially on fields and meadows with hedges and small woods. These structures are found in the south-western part of the study area.

The species composition of villages and towns in the study area is typical for this habitat type. Building-associated species as well as bush and tree breeders are

dominant. According to BERNDT et al. (2005), on Fehmarn several species are breeding predominantly in villages due to the lack of forests and hedges.

Summarizing it can be stated, that the coverage of this study is sufficient to provide an accurate description of the breeding bird fauna in the study area.

3.4.2 Staging birds

Historical Data

An overview of the staging bird fauna of the island of Fehmarn according to BERNDT et al. (2005) is given in Table B.3 in Appendix B. The number of regular and irregular staging bird species (207 and 104) is high. Outside of the study area, there are some hot spots for staging birds (Wallnau, Grüner Brink, Baltic Sea) which have been observed intensively by ornithologists for years.

Maximum numbers of staging waders are also given. High numbers of Golden Plover and Lapwings (each up to 10,000 individuals) have been registered, especially in the Northwest of Fehmarn, outside of our study area.

For landbirds and gulls, there are no maximum population estimates of staging birds either in time (spring and autumn migration for gulls), or in space (only small parts of Fehmarn are covered, especially the coastline). For gulls, only the maximum counts in winter are given, which are below the spring- and autumn values.

Among landbirds, the Fieldfare is shown by BERNDT et al. (2005) as being common in winter. The regular midwinter counts produce large numbers in some years (s. Figure 3.9). In the winter 2010 (January 15th to 17th) 11,501 Fieldfares were recorded along the coastline of Fehmarn. Yet the more inland population was not included in this count. Only in three out of 38 years (1996, 2003 und 2010) massive invasions were recorded, with sums of approximately 10,000.

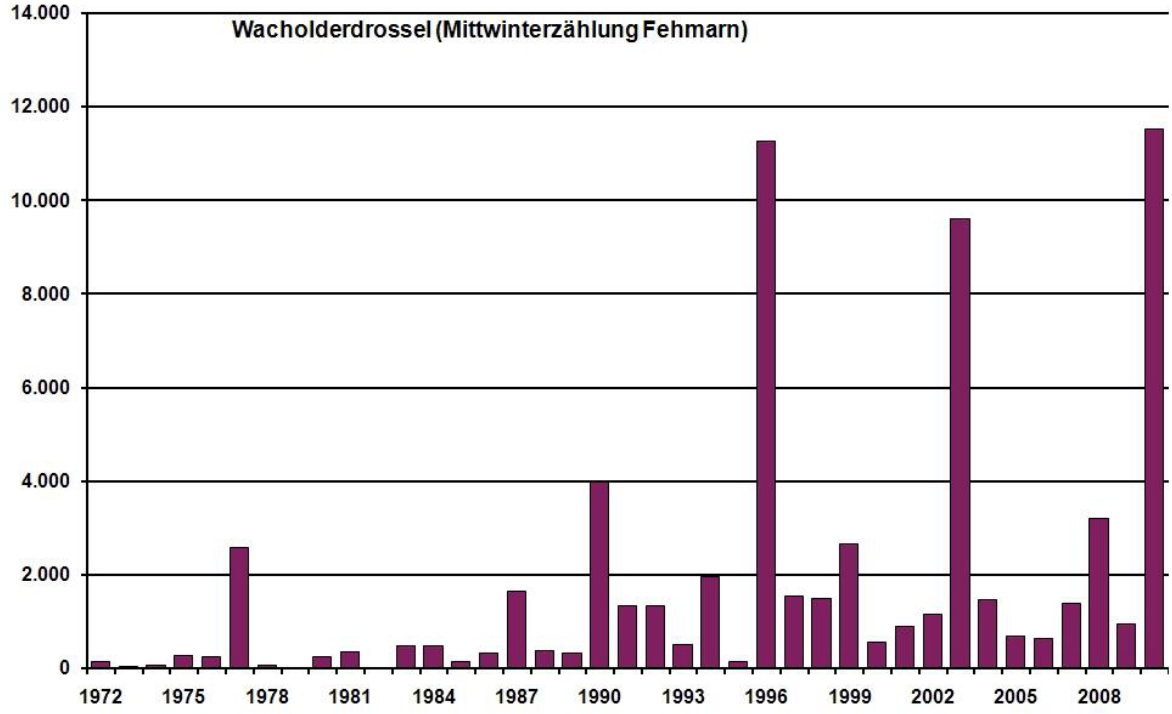

Figure 3.9 Midwinter counts of Fieldfares on the coastline of Fehmarn 1972 to 2010 (NABU HH / AK-VSW 2010).

The results of the study on birds and wind farms on Fehmarn by BIOCONSULT SH/ARSU (2010) show that the valuable staging birds areas are to be found west and northwest of our study area. Further potentially valuable staging bird flocks appear temporarily in our study area, without repeated use of specific areas. The kind of actual agricultural use, changes in the availability of food and the actual disturbance situation determine the selection and use of staging areas on a short term basis.

Assessment of the staging bird fauna in the study area

The staging bird fauna of the study area comprises only a small fraction of the staging bird fauna of Fehmarn. Throughout the course of the year, gulls dominate in both number and frequency. Their occurrence is strongly influenced by agricultural activities – changing in space and time – and food availability. Several factors influence numbers and distribution of staging birds in the study area. Besides agricultural activity, windfarms, roads, railways and human settlements also have an effect. Therefore, several of the more frequent staging birds on Fehmarn (e.g. swans, geese, waders) only occur in small numbers in the study area.

The coverage of this study is sufficient to provide an accurate description of the staging bird fauna throughout the year.

4 SUMMARY

Femern A/S plans to construct a fixed link between the islands of Lolland, Denmark and Fehmarn, Germany, which might be realized as either a bridge or a tunnel. The land-approaches of either bridge or tunnel solution would lead to direct and indirect effects on birds and their habitats on the two islands, as this will lead to road construction, habitat loss and habitat change including direct and indirect effects. According to German and Danish Environmental Laws, the environmental impacts of the project shall thus be described and assessed in an Environmental Impact Study (EIS). For the two land approach areas on Lolland and Fehmarn, separate Environmental Impact Studies will be submitted with the planning documents as required by the national authorities of Denmark and Germany.

The overall aim of this study was to understand and quantify the importance of land habitats in the vicinity of the land approach for breeding and staging birds. The surveys were intended to provide quantitative estimates of breeding bird species in the areas, following national standards of Denmark and Germany. It should be borne in mind that the national standards for baseline surveys associated with road EIAs differ between the two countries.

Breeding bird census on Lolland

During breeding bird censuses in 29 selected sub-areas of natural vegetation or wetlands on southern Lolland a total of 72 species were recorded, holding 963 territories. Generally, the species composition and density of birds seems to be typical for the selected types of habitats in southern Lolland. Unfortunately, no historical data exist for these sub-areas (www.dofbasen.dk). The majority of the recorded breeding territories were held by passerines (78%), while waterbirds (swans, geese, ducks, grebes, coots) constituted 11% and shorebirds (waders, gulls) 5%.

The censuses recorded three breeding bird species which are prioritised by EU and Danish legislation. The Garganey is listed as 'near threatened' on the Danish Red List, while Marsh Harrier and Red-backed Shrike are listed under Annex I to the EC Birds Directive. The occurrence of breeding Garganey is surprising, as only 1-3 pairs were found on Lolland in 2008 (www.Dofbasen.dk), while the Marsh Harrier with 28-30 pairs and Red-backed Shrike with 9-14 pairs in 2008 (www.Dofbasen.dk) were to be expected. Accordingly, three wetland localities have been given status as of Very High Value, one as of Medium Value and the remaining areas as of Low Value.

Staging birds on Lolland land-approach-areas

The above-mentioned localities are part of the band of small lakes, ponds and meadows stretching along the south coast of Lolland. The same localities constitute the prime habitats used by birds during the non-breeding season. During the 19 censuses of staging birds, a total of 12,602 birds of 107 species were recorded. This number and diversity is judged as typical for smaller wetlands on Lolland. Larger numbers of birds and a higher diversity of birds would be expected in larger and less-disturbed wetland habitats like the ones further east of the study area in Saxfjed Inddæmning and Hyllekrog (www.Dofbasen.dk). The majority of the recorded birds were waterbirds (58%) and passerines (34%). Numbers of waterbirds were high throughout August – February, while the numbers of passerines peaked in August-September and were lowest in February. Among the waterbirds, four species constituted 75% of the observed individuals – Bean Goose, Wigeon, Mallard and Tufted Duck. The vast majority of Bean Goose and Wigeons were recorded on two wet meadows, while Mallards and Tufted Ducks were mainly recorded in two smaller lakes. Despite the relatively sizable occurrence of waterbirds all of the local-

ities were classified as of Low Value, as none of the localities seemed to regularly contain species listed in Annex 1 of the EC Birds Directive or concentrations of waterbirds of international, national or local importance. Having said that, single large observations of especially Bean Geese and Tufted Ducks were recorded indicating that occurrences of significant numbers of waterbirds may take place in the coastal wetlands. However, neither the baseline observations nor historic data provide information on the regularity of such concentrations (www.Dofbasen.dk).

In the same coastal band of wetlands a number of uncommon birds were recorded irregularly, including Annex 1 species Bittern, Common Kingfisher and Ortulan Bunting. In addition, the Common Rosefinch which is listed on the Danish Red List as vulnerable, was recorded during late spring/early summer. Two localities had relatively more observations of uncommon birds; a damp wood with small lakes and reed beds, partly with dense undergrowth and old trees, and a larger lake for angling with small reed beds and bushy vegetation along the edges.

Breeding bird census on Fehmarn

The study area of the breeding bird census on Fehmarn comprises ca. 3,200 ha in the north-eastern part of the island. In this area, open landscapes with fields, grassland and some small woods dominate. Larger forests are absent. Intensive farming is characteristic for most of the agricultural habitats which cover 88 % of the area. The northern and eastern borders of the study area are formed by the beaches of the Baltic Sea. The remaining parts are covered by towns and villages, roads, railway lines and agricultural roads.

The census followed the German ornithological standards described by SÜDBECK et al. (2005) and was conducted from the beginning of April to the mid of June 2009. A 300 m strip on both sides of the B 207 road was not investigated in 2009 because data from a 2008 study by BIOPLAN concerning the expansion of the B 207 road was available (BIOPLAN 2009 and written notification 2011). These data were adopted by this report.

The breeding bird fauna was characterized following the Indicator Species Model described by FLADE (1994). FLADE (1994) analysed the breeding bird communities of central and northern Germany to provide foundations for the use of ornithological data in landscape planning processes. Based on 1,600 census plots investigated between 1950 and 1990, the ecological profiles of 210 breeding bird species were calculated, showing their frequencies and densities in 68 different habitat types. According to FLADE (1994), Indicator species (in German: Leitarten) are specialized species, whose presence or absence at a site give more information about habitat quality than the presence/absence of others.

FLADE (1994) defined indicator species to be species, which have a significantly higher frequency (and normally a much higher density) in one or more (max. 6) habitat types than in all others. Indicator species find the habitat structures and requisites needed more frequently and more regularly in their significantly preferred habitat types than in all other habitats types.

According to the recommendations of FLADE (1994), the study area was divided into eight habitat types, such as crops, crops with tree lines, hedges and small woods, beaches or villages. Most of the study area (74.7%) is covered by the habitat type crops, which is in intensive agricultural use.

To ensure the comparability of the evaluation method with the BIOPLAN-study, the evaluation matrix for the breeding bird fauna developed by BIOPLAN (2009) was adopted with minor modification. All habitat types of the avifauna in the study area were evaluated on a five level evaluation scale.

During the breeding bird census carried on Fehmarn, 75 breeding bird species with a total of 2,993 territories have been recorded. The number of recorded species in-

cludes approximately 85 % of the species regularly breeding on Fehmarn. Three species listed in the Red List of Schleswig-Holstein and five nationally threatened species were recorded. Two species (Avocet, Marsh Harrier) are listed in Annex I of the EU Birds Directive.

The breeding bird fauna in each of the occurring habitat types was characterized using parameters such as composition of breeding guilds, number of species, densities or occurrence of indicator species.

In the intensively used agricultural areas, breeding birds only occurred in low densities. The recorded low density of the Skylark (e.g. 0.4 pairs/10 ha in habitat type crops) was confirmed by the investigation of BIOPLAN (2009), who found a comparable value on the arable fields on Fehmarn.

The evaluation of the breeding bird fauna in the habitat types yielded the following results: evaluation level V (very high importance) was not assigned because none of the habitat types of the avifauna fulfilled the required criteria. Only the beach section Grüner Brink up to ferry terminal attained a high importance (IV). All other habitat types of the avifauna were classified with medium (III) to moderate importance (II).

Staging birds in Fehmarn land-approach-areas

The study area of the staging bird census on Fehmarn comprises 1,858 ha. The study considered only birds on land areas. For an area south of Bannesdorf, data of the BIOPLAN-study in 2008 (BIOPLAN 2009) were integrated. This area comprises additional 471 ha, the resulting study area size is 2,329 ha.

The staging birds have been counted once a month from February 2009 to June 2010. The surveys were conducted in the entire study area, even when the area was covered by snow.

To ensure the comparability of the evaluation method with the BIOPLAN study, the evaluation matrix for the staging bird fauna developed by BIOPLAN was used in this study (BIOPLAN 2009). The evaluation method of BURDORF et al. (1997; and thereby KRÜGER et al. 2010) was adapted by BIOPLAN (2009) to take account of more recent flyway population estimates and a reference to staging bird population estimates in Schleswig-Holstein. The threshold values for the evaluation were newly defined by BIOPLAN (2009). Since 2010 there are new staging bird population estimates and 2% threshold values for waterbirds in Schleswig-Holstein (LLUR 2010). Those values were used for federal state to local importance.

In this study, staging bird areas of high and very high importance according to BRINKMANN (1998) are such of international, national, federal state, regional or local importance. As the importance levels from the method of BURDORF et al. (1997) and BIOPLAN (2009) were developed to define areas of high and very high importance for staging birds, there is no definition for areas of lower importance (evaluation levels I to III according to BRINKMANN 1998).

During the 17 staging-bird-surveys in the land approach area on Fehmarn, there have been 26 species recorded with a total of 8,541 individuals. Only the Golden Plover is listed in the EU Birds Directive Annex 1.

Over the year, the species with highest frequency of occurrence were Black-headed Gull (64.7%), Herring Gull, Greylag Goose and Mallard (58.8 % each), Common Gull (52.9%) and Tufted Duck (41.2%). The species with highest individual sums over the study period were Common Gull (2,355, 27.6%), Fieldfare (1,856, 21.7%), Black-headed Gull (1,294, 15.2%) and Herring Gull (1,147, 13.4%).

The species with highest yearly individual sums were also those with the highest daily sums in the study area (max Sum / day) and within sub-areas of the study

area (max day sum by sub-area). Therefore, the staging bird species composition was dominated by gulls in terms of abundance and frequency.

For two of the recorded 26 staging bird species there is a high importance of sub-areas within the study area to be stated. Both areas are depicted in a map.

The Common Gull exceeded the threshold value for regional importance of a staging area in an intensively used agricultural sub-area situated southeast of Todendorf, west of the road B 207. In accordance with BIOPLAN (2009), the transfer of evaluation levels defined by BURDORF et al. (1997) into importance levels defined by BRINKMANN (1998) shows this sub-area to be of high importance to Common Gulls.

The threshold value for local importance of a staging area for Black-headed Gull was exceeded in the sub-areas southeast of Todendorf, west of the road B 207 and north-east of Landkirchen. In accordance with BIOPLAN (2009), the transfer of evaluation levels defined by BURDORF et al. (1997) into importance levels defined by BRINKMANN (1998) shows both sub-areas to be of high importance to Black-headed Gull.

5 ACKNOWLEDGEMENTS

We would like to thank Dr. Marion Schumann for the permission to use the evaluation matrices for breeding and staging birds developed by BIOPLAN in this report.

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Table B.3 Overview of the bird species observed on Fehmarn according to BERNDT et al. (2005). 27

APPENDIX A – LOLLAND

Table A.1 Fehmarn Belt land approach study – breeding bird surveys carried out on the Danish site (Rødby, Lolland) from April - July 2009 and March - April 2010. Birds per area T2p = number of territories recorded according to the criteria listed in chapter 2.1.1. T1 = number of possible territories for birds only recorded at one visit.

Area 1			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	1	
Common/Rock Kestrel	*Falco tinnunculus*		1
Grey Partridge	*Perdix perdix*	1	
Moorhen	*Gallinula chloropus*		1
Lapwing	*Vanellus vanellus*		1
Common Gull	*Larus canus*	2	
Wood Pigeon	*Columba palumbus*	3	
Great Spotted Woodpecker	*Dendrocopos major*		1
Sky Lark	*Alauda arvensis*		1
Meadow Pipit	*Anthus pratensis*	1	
Pied Wagtail	*Motacilla alba*	1	
Hedge Accentor	*Prunella modularis*	3	
European Robin	*Erithacus rubecula*		2
Black Redstart	*Phoenicurus ochruros*	1	
Common Redstart	*Phoenicurus phoenicurus*		1
Whinchat	*Saxicola rubetra*		1
Blackbird	*Turdus merula*	3	
Song Thrush	*Turdus philomelos*	2	
Lesser Whitethroat	*Sylvia curruca*	7	
Whitethroat	*Sylvia communis*	7	
Garden Warbler	*Sylvia borin*	2	
Blackcap	*Sylvia atricapilla*	6	
Chiff-chaff	*Phylloscopus collybita*	7	
Willow Warbler	*Phylloscopus trochilus*	5	
Spotted Flycatcher	*Muscicapa striata*		2
Long-tailed Tit	*Aegithalos caudatus*		1
Blue Tit	*Parus caeruleus*	3	
Great Tit	*Parus major*	4	
Carrion Crow	*Corvus corone*		1
Tree Sparrow	*Passer montanus*		1
Chaffinch	*Fringilla coelebs*	7	
Greenfinch	*Carduelis chloris*	2	
Goldfinch	*Carduelis carduelis*		1
Linnet	*Carduelis cannabina*	5	
Scarlet Rosefinch	*Carpodacus erythrinus*		1
Yellow Hammer	*Emberiza citrinella*	4	
Area 3			
English name	**Latin name**	**T2p**	**T1**
Grey Partridge	*Perdix perdix*		1
Moorhen	*Gallinula chloropus*	1	
Common Coot	*Fulica atra*	1	
Sky Lark	*Alauda arvensis*	1	
Meadow Pipit	*Anthus pratensis*	2	

European Reed Warbler	*Acrocephalus scirpaceus*	2	
Whitethroat	*Sylvia communis*	1	
Area 5			
English name	**Latin name**	**T2p**	**T1**
Greylag Goose	*Anser anser*		1
Moorhen	*Gallinula chloropus*		1
Common Coot	*Fulica atra*	1	
Wood Pigeon	*Columba palumbus*	4	
Great Spotted Woodpecker	*Dendrocopos major*	1	
Winter Wren	*Troglodytes troglodytes*	2	
Hedge Accentor	*Prunella modularis*	2	
European Robin	*Erithacus rubecula*		1
Blackbird	*Turdus merula*	6	
Song Thrush	*Turdus philomelos*	1	
European Marsh Warbler	*Acrocephalus palustris*	1	
Icterine Warbler	*Hippolais icterina*	2	
Lesser Whitethroat	*Sylvia curruca*	1	
Whitethroat	*Sylvia communis*	1	
Garden Warbler	*Sylvia borin*	5	
Blackcap	*Sylvia atricapilla*	5	
Chiff-chaff	*Phylloscopus collybita*	5	
Willow Warbler	*Phylloscopus trochilus*	3	
Goldcrest	*Regulus regulus*	2	
Spotted Flycatcher	*Muscicapa striata*	1	
Long-tailed Tit	*Aegithalos caudatus*	1	
Marsh Tit	*Parus palustris*		2
Blue Tit	*Parus caeruleus*	1	
Great Tit	*Parus major*	3	
Carrion Crow	*Corvus corone*	1	
Chaffinch	*Fringilla coelebs*	3	
Greenfinch	*Carduelis chloris*	1	
Yellow Hammer	*Emberiza citrinella*		1
Reed Bunting	*Emberiza schoeniclus*	3	
Area 6			
English name	**Latin name**	**T2p**	**T1**
Red-necked Grebe	*Podiceps griseigena*		1
Greylag Goose	*Anser anser*	3	
Common Coot	*Fulica atra*	1	
European Marsh Warbler	*Acrocephalus palustris*	2	
European Reed Warbler	*Acrocephalus scirpaceus*	1	
Reed Bunting	*Emberiza schoeniclus*	2	
Area 7			
English name	**Latin name**	**T2p**	**T1**
Little Grebe	*Tachybaptus ruficollis*		1
Great Crested Grebe	*Podiceps cristatus*	1	
Red-necked Grebe	*Podiceps griseigena*		1
Mute Swan	*Cygnus olor*	1	
Greylag Goose	*Anser anser*	1	
Moorhen	*Gallinula chloropus*	1	

Common Coot	*Fulica atra*	3	
European Cuckoo	*Cuculus canorus*	1	
European Robin	*Erithacus rubecula*		1
Thrush Nightingale	*Luscinia luscinia*	1	
European Marsh Warbler	*Acrocephalus palustris*	2	
European Reed Warbler	*Acrocephalus scirpaceus*	4	
Lesser Whitethroat	*Sylvia curruca*	4	
Whitethroat	*Sylvia communis*	2	
Willow Warbler	*Phylloscopus trochilus*		1
Chaffinch	*Fringilla coelebs*	1	
Greenfinch	*Carduelis chloris*	2	
Yellow Hammer	*Emberiza citrinella*		2
Reed Bunting	*Emberiza schoeniclus*	2	
Area 8			
English name	**Latin name**	**T2p**	**T1**
Red-necked Grebe	*Podiceps griseigena*	1	
Greylag Goose	*Anser anser*	1	
Common Shelduck	*Tadorna tadorna*	2	
Common Coot	*Fulica atra*	4	
Oystercatcher	*Haematopus ostralegus*	1	
Little Ringed Plover	*Charadrius dubius*	1	
Ringed Plover	*Charadrius hiaticula*	1	
Lapwing	*Vanellus vanellus*	4	
Redshank	*Tringa totanus*	4	
Common Gull	*Larus canus*	2	
Meadow Pipit	*Anthus pratensis*		1
Black Redstart	*Phoenicurus ochruros*		1
Area 9			
English name	**Latin name**	**T2p**	**T1**
Ring-necked Pheasant	*Phasianus colchicus*	1	
Sky Lark	*Alauda arvensis*		1
Meadow Pipit	*Anthus pratensis*	2	
Pied Wagtail	*Motacilla alba*	2	
Hedge Accentor	*Prunella modularis*	1	
Northern Wheatear	*Oenanthe oenanthe*		1
Blackbird	*Turdus merula*	1	
European Marsh Warbler	*Acrocephalus palustris*	2	
Lesser Whitethroat	*Sylvia curruca*		1
Whitethroat	*Sylvia communis*	2	
Blackcap	*Sylvia atricapilla*	1	
Great Tit	*Parus major*	1	
European Starling	*Sturnus vulgaris*		1
Chaffinch	*Fringilla coelebs*		1
Greenfinch	*Carduelis chloris*	2	
Linnet	*Carduelis cannabina*	1	
Yellow Hammer	*Emberiza citrinella*		1
Reed Bunting	*Emberiza schoeniclus*	2	
Area 10			
English name	**Latin name**	**T2p**	**T1**

Red-necked Grebe	*Podiceps griseigena*	3	
Mute Swan	*Cygnus olor*	1	
Greylag Goose	*Anser anser*	2	
Common Shelduck	*Tadorna tadorna*	2	
Mallard	*Anas platyrhynchos*	3	
Northern Shoveler	*Anas clypeata*	1	
European Pochard	*Aythya ferina*	1	
Tufted Duck	*Aythya fuligula*	1	
Grey Partridge	*Perdix perdix*	1	
Common Coot	*Fulica atra*	3	
European Cuckoo	*Cuculus canorus*	1	
Sky Lark	*Alauda arvensis*	1	
Meadow Pipit	*Anthus pratensis*	2	
Hedge Accentor	*Prunella modularis*	2	
Blackbird	*Turdus merula*	1	
European Marsh Warbler	*Acrocephalus palustris*	3	
European Reed Warbler	*Acrocephalus scirpaceus*	2	
Icterine Warbler	*Hippolais icterina*	2	
Lesser Whitethroat	*Sylvia curruca*	4	
Whitethroat	*Sylvia communis*	10	
Garden Warbler	*Sylvia borin*	1	
Blackcap	*Sylvia atricapilla*	2	
Chiff-chaff	*Phylloscopus collybita*	2	
Willow Warbler	*Phylloscopus trochilus*	2	
Great Tit	*Parus major*	2	
Red-backed Shrike	*Lanius collurio*	1	
Carrion Crow	*Corvus corone*	1	
Chaffinch	*Fringilla coelebs*	3	
Greenfinch	*Carduelis chloris*	3	
Goldfinch	*Carduelis carduelis*		1
Linnet	*Carduelis cannabina*		1
Redpoll	*Carduelis flammea*		1
Yellow Hammer	*Emberiza citrinella*	5	
Reed Bunting	*Emberiza schoeniclus*	6	
Area 11			
English name	**Latin name**	**T2p**	**T1**
Lapwing	*Vanellus vanellus*		1
Sky Lark	*Alauda arvensis*	4	
Meadow Pipit	*Anthus pratensis*	1	
Pied Wagtail	*Motacilla alba*		1
Whitethroat	*Sylvia communis*	1	
Chaffinch	*Fringilla coelebs*	1	
Greenfinch	*Carduelis chloris*	1	
Area 12			
English name	**Latin name**	**T2p**	**T1**
Sky Lark	*Alauda arvensis*	3	
Meadow Pipit	*Anthus pratensis*	1	
Pied Wagtail	*Motacilla alba*	1	
Blackbird	*Turdus merula*		1
Whitethroat	*Sylvia communis*	3	
Greenfinch	*Carduelis chloris*	1	

Scarlet Rosefinch	*Carpodacus erythrinus*		1
Yellow Hammer	*Emberiza citrinella*	1	
Reed Bunting	*Emberiza schoeniclus*	1	
Area 13			
English name	**Latin name**	**T2p**	**T1**
Greylag Goose	*Anser anser*	1	
Mallard	*Anas platyrhynchos*	1	
Tufted Duck	*Aythya fuligula*	1	
Common Coot	*Fulica atra*	2	
Wood Pigeon	*Columba palumbus*	2	
Sky Lark	*Alauda arvensis*	1	
Meadow Pipit	*Anthus pratensis*	1	
Hedge Accentor	*Prunella modularis*	1	
Blackbird	*Turdus merula*	2	
European Marsh Warbler	*Acrocephalus palustris*		1
European Reed Warbler	*Acrocephalus scirpaceus*	3	
Icterine Warbler	*Hippolais icterina*	1	
Lesser Whitethroat	*Sylvia curruca*	2	
Whitethroat	*Sylvia communis*	5	
Blackcap	*Sylvia atricapilla*	1	
Chiff-chaff	*Phylloscopus collybita*	2	
Willow Warbler	*Phylloscopus trochilus*	4	
Carrion Crow	*Corvus corone*	2	
Chaffinch	*Fringilla coelebs*	3	
Greenfinch	*Carduelis chloris*	4	
Goldfinch	*Carduelis carduelis*		1
Scarlet Rosefinch	*Carpodacus erythrinus*		1
Yellow Hammer	*Emberiza citrinella*	3	
Reed Bunting	*Emberiza schoeniclus*	2	
Area 14			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	1	
Tufted Duck	*Aythya fuligula*	1	
Common Coot	*Fulica atra*	1	
Blackbird	*Turdus merula*	3	
Song Thrush	*Turdus philomelos*	1	
European Reed Warbler	*Acrocephalus scirpaceus*	4	
Icterine Warbler	*Hippolais icterina*	2	
Lesser Whitethroat	*Sylvia curruca*	1	
Blackcap	*Sylvia atricapilla*	1	
Chiff-chaff	*Phylloscopus collybita*	1	
Willow Warbler	*Phylloscopus trochilus*	2	
Pied Flycatcher	*Ficedula hypoleuca*		1
Great Tit	*Parus major*	1	
Chaffinch	*Fringilla coelebs*	1	
Greenfinch	*Carduelis chloris*	2	
Yellow Hammer	*Emberiza citrinella*	2	
Reed Bunting	*Emberiza schoeniclus*	1	
Area 15			

English name	Latin name	T2p	T1
Mallard	*Anas platyrhynchos*		1
Moorhen	*Gallinula chloropus*		1
Common Coot	*Fulica atra*	5	
European Marsh Warbler	*Acrocephalus palustris*		1
European Reed Warbler	*Acrocephalus scirpaceus*	1	
Whitethroat	*Sylvia communis*	2	
Reed Bunting	*Emberiza schoeniclus*	1	
Area 17			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	1	
Tufted Duck	*Aythya fuligula*	1	
Meadow Pipit	*Anthus pratensis*		1
Pied Wagtail	*Motacilla alba*	1	
Blackbird	*Turdus merula*	1	
Lesser Whitethroat	*Sylvia curruca*	1	
Whitethroat	*Sylvia communis*	1	
Red-backed Shrike	*Lanius collurio*	1	
Chaffinch	*Fringilla coelebs*	1	
Greenfinch	*Carduelis chloris*		1
Linnet	*Carduelis cannabina*		1
Area 18			
English name	**Latin name**	**T2p**	**T1**
Sky Lark	*Alauda arvensis*	7	
Meadow Pipit	*Anthus pratensis*	1	
Pied Wagtail	*Motacilla alba*	3	
Northern Wheatear	*Oenanthe oenanthe*		1
Whitethroat	*Sylvia communis*		1
Area 19			
English name	**Latin name**	**T2p**	**T1**
Wood Pigeon	*Columba palumbus*	2	
European Cuckoo	*Cuculus canorus*	1	
Meadow Pipit	*Anthus pratensis*		1
Hedge Accentor	*Prunella modularis*	1	
European Robin	*Erithacus rubecula*		1
Icterine Warbler	*Hippolais icterina*	2	
Lesser Whitethroat	*Sylvia curruca*	2	
Whitethroat	*Sylvia communis*	4	
Chiff-chaff	*Phylloscopus collybita*	2	
Willow Warbler	*Phylloscopus trochilus*	9	
Goldcrest	*Regulus regulus*		1
Marsh Tit	*Parus palustris*		1
Coal Tit	*Parus ater*	3	
Blue Tit	*Parus caeruleus*		1
Great Tit	*Parus major*	1	
Red-backed Shrike	*Lanius collurio*	1	
Carrion Crow	*Corvus corone corone*	1	
Carrion Crow	*Corvus corone*		1
Chaffinch	*Fringilla coelebs*	9	

Greenfinch	*Carduelis chloris*	1	
Linnet	*Carduelis cannabina*	1	
Scarlet Rosefinch	*Carpodacus erythrinus*		1
Yellow Hammer	*Emberiza citrinella*	6	
Reed Bunting	*Emberiza schoeniclus*		1
Area 26			
English name	**Latin name**	**T2p**	**T1**
Little Grebe	*Tachybaptus ruficollis*	1	
Mallard	*Anas platyrhynchos*	2	
Garganey	*Anas querquedula*	1	
Northern Shoveler	*Anas clypeata*	1	
Ringed Plover	*Charadrius hiaticula*		1
Lapwing	*Vanellus vanellus*	10	
Common Snipe	*Gallinago gallinago*	1	
Redshank	*Tringa totanus*	2	
Sky Lark	*Alauda arvensis*		1
Meadow Pipit	*Anthus pratensis*	2	
Yellow Wagtail	*Motacilla flava*	1	
Blackbird	*Turdus merula*	1	
European Reed Warbler	*Acrocephalus scirpaceus*		2
Yellow Hammer	*Emberiza citrinella*		1
Reed Bunting	*Emberiza schoeniclus*	3	
Area 27			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	1	
Tufted Duck	*Aythya fuligula*	6	
Common Coot	*Fulica atra*	1	
Hedge Accentor	*Prunella modularis*	3	
Icterine Warbler	*Hippolais icterina*	1	
Lesser Whitethroat	*Sylvia curruca*	1	
Whitethroat	*Sylvia communis*	2	
Chaffinch	*Fringilla coelebs*	2	
Greenfinch	*Carduelis chloris*	3	
Goldfinch	*Carduelis carduelis*		1
Area 28			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	2	
Common/Rock Kestrel	*Falco tinnunculus*	1	
Lapwing	*Vanellus vanellus*	10	
Common Snipe	*Gallinago gallinago*		1
Redshank	*Tringa totanus*		1
European Cuckoo	*Cuculus canorus*	1	
Sky Lark	*Alauda arvensis*	11	
Meadow Pipit	*Anthus pratensis*	16	
European Robin	*Erithacus rubecula*		1
Whinchat	*Saxicola rubetra*	1	
Whitethroat	*Sylvia communis*	1	
Carrion Crow	*Corvus corone*		2
Greenfinch	*Carduelis chloris*		1

Linnet	*Carduelis cannabina*		1
Reed Bunting	*Emberiza schoeniclus*	10	
Area 29			
English name	**Latin name**	**T2p**	**T1**
Common Quail	*Coturnix coturnix*		1
Common Coot	*Fulica atra*	1	
Wood Pigeon	*Columba palumbus*	4	
European Cuckoo	*Cuculus canorus*	2	
Tree Pipit	*Anthus trivialis*		2
Winter Wren	*Troglodytes troglodytes*		1
Hedge Accentor	*Prunella modularis*	1	
Thrush Nightingale	*Luscinia luscinia*	1	
Black Redstart	*Phoenicurus ochruros*		1
Blackbird	*Turdus merula*	3	
European Marsh Warbler	*Acrocephalus palustris*	3	
European Reed Warbler	*Acrocephalus scirpaceus*	1	
Icterine Warbler	*Hippolais icterina*	3	
Lesser Whitethroat	*Sylvia curruca*	4	
Whitethroat	*Sylvia communis*	11	
Garden Warbler	*Sylvia borin*	3	
Blackcap	*Sylvia atricapilla*	2	
Chiff-chaff	*Phylloscopus collybita*		2
Willow Warbler	*Phylloscopus trochilus*	8	
Goldcrest	*Regulus regulus*		1
Blue Tit	*Parus caeruleus*	1	
Great Tit	*Parus major*	3	
Treecreeper	*Certhia familiaris*		1
Carrion Crow	*Corvus corone*	1	
Chaffinch	*Fringilla coelebs*	2	
Greenfinch	*Carduelis chloris*	3	
Goldfinch	*Carduelis carduelis*	1	
Linnet	*Carduelis cannabina*	1	
Redpoll	*Carduelis flammea*		1
Yellow Hammer	*Emberiza citrinella*	1	
Reed Bunting	*Emberiza schoeniclus*	2	
Area 30			
English name	**Latin name**	**T2p**	**T1**
Wood Pigeon	*Columba palumbus*	3	
Pied Wagtail	*Motacilla alba*		1
Winter Wren	*Troglodytes troglodytes*		1
Common Redstart	*Phoenicurus phoenicurus*	1	
Blackbird	*Turdus merula*	2	
Song Thrush	*Turdus philomelos*		1
Icterine Warbler	*Hippolais icterina*	2	
Lesser Whitethroat	*Sylvia curruca*	2	
Whitethroat	*Sylvia communis*	2	
Garden Warbler	*Sylvia borin*	1	
Blackcap	*Sylvia atricapilla*	2	
Chiff-chaff	*Phylloscopus collybita*	4	
Willow Warbler	*Phylloscopus trochilus*	5	
Blue Tit	*Parus caeruleus*	2	

Great Tit	*Parus major*	2	
European Starling	*Sturnus vulgaris*	1	
Chaffinch	*Fringilla coelebs*	4	
Greenfinch	*Carduelis chloris*	3	
Siskin	*Carduelis spinus*	2	
Linnet	*Carduelis cannabina*		1
Scarlet Rosefinch	*Carpodacus erythrinus*		1
Yellow Hammer	*Emberiza citrinella*	2	
Area 64			
English name	**Latin name**	**T2p**	**T1**
Red-necked Grebe	*Podiceps griseigena*	1	
Mallard	*Anas platyrhynchos*	1	
Moorhen	*Gallinula chloropus*	1	
Common Coot	*Fulica atra*	3	
Wood Pigeon	*Columba palumbus*	2	
Pied Wagtail	*Motacilla alba*	1	
European Robin	*Erithacus rubecula*		1
Blackbird	*Turdus merula*		1
Song Thrush	*Turdus philomelos*		1
Icterine Warbler	*Hippolais icterina*	1	
Lesser Whitethroat	*Sylvia curruca*		1
Whitethroat	*Sylvia communis*		1
Garden Warbler	*Sylvia borin*		2
Chiff-chaff	*Phylloscopus collybita*	2	
Willow Warbler	*Phylloscopus trochilus*	1	
Blue Tit	*Parus caeruleus*	1	
Carrion Crow	*Corvus corone*	1	
Chaffinch	*Fringilla coelebs*	1	
Greenfinch	*Carduelis chloris*	2	
Yellow Hammer	*Emberiza citrinella*	1	
Area 117			
English name	**Latin name**	**T2p**	**T1**
Red-necked Grebe	*Podiceps griseigena*	1	
Mute swan	*Cygnus olor*	1	
Greylag goose	*Anser anser*	3	
Mallard	*Anas platyrhynchos*	2	
European Pochard	*Aythya ferina*	1	
Grey Partridge	*Perdix perdix*	1	
Moorhen	*Gallinula chloropus*	1	
Common Coot	*Fulica atra*	5	
Wood Pigeon	*Columba palumbus*	3	
European Cuckoo	*Cuculus canorus*	3	
Great Spotted Woodpecker	*Dendrocopos major*		1
Sky Lark	*Alauda arvensis*	1	
Winter Wren	*Troglodytes troglodytes*	3	
Hedge Accentor	*Prunella modularis*	2	
European Robin	*Erithacus rubecula*	2	
Thrush Nightingale	*Luscinia luscinia*	3	
Blackbird	*Turdus merula*	3	
Song Thrush	*Turdus philomelos*	1	
European Marsh Warbler	*Acrocephalus palustris*	2	

European Reed Warbler	*Acrocephalus scirpaceus*	4	
Icterine Warbler	*Hippolais icterina*		1
Lesser Whitethroat	*Sylvia curruca*	1	
Whitethroat	*Sylvia communis*	1	
Garden Warbler	*Sylvia borin*	3	
Blackcap	*Sylvia atricapilla*	6	
Chiff-chaff	*Phylloscopus collybita*	6	
Willow Warbler	*Phylloscopus trochilus*	5	
Marsh Tit	*Parus palustris*	1	
Coal Tit	*Parus ater*		1
Blue Tit	*Parus caeruleus*	2	
Great Tit	*Parus major*	4	
Jay	*Garrulus glandarius*	1	
Carrion Crow	*Corvus corone*		1
Chaffinch	*Fringilla coelebs*	5	
Greenfinch	*Carduelis chloris*	2	
Yellow Hammer	*Emberiza citrinella*		1
Reed Bunting	*Emberiza schoeniclus*	3	
Area 118			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	1	
Grey Partridge	*Perdix perdix*	1	
Lapwing	*Vanellus vanellus*	7	
Redshank	*Tringa totanus*	1	
Sky Lark	*Alauda arvensis*	2	
Pied Wagtail	*Motacilla alba*	1	
Area 131			
English name	**Latin name**	**T2p**	**T1**
Red-necked Grebe	*Podiceps griseigena*	1	
Mute swan	*Cygnus olor*	1	
Mallard	*Anas platyrhynchos*	1	
Shoveler	*Anas clypeata*	5	
European Pochard	*Aythya ferina*	4	
Common Coot	*Fulica atra*	2	
Wood Pigeon	*Columba palumbus*	1	
European Cuckoo	*Cuculus canorus*	1	
Pied Wagtail	*Motacilla alba*	1	
Blackbird	*Turdus merula*	1	
European Reed Warbler	*Acrocephalus scirpaceus*	2	
Icterine Warbler	*Hippolais icterina*		1
Whitethroat	*Sylvia communis*	1	
Garden Warbler	*Sylvia borin*	1	
European Starling	*Sturnus vulgaris*	1	
Yellow Hammer	*Emberiza citrinella*		1
Reed Bunting	*Emberiza schoeniclus*	1	
Area 133			
English name	**Latin name**	**T2p**	**T1**
Mallard	*Anas platyrhynchos*	2	
Common Buzzard	*Buteo buteo*	1	

Stock Dove	*Columba oenas*	1	
Wood Pigeon	*Columba palumbus*	1	
European Cuckoo	*Cuculus canorus*		2
Tawny Owl	*Strix aluco*	1	
Great Spotted Woodpecker	*Dendrocopos major*	2	
Winter Wren	*Troglodytes troglodytes*	2	
Hedge Accentor	*Prunella modularis*		1
European Robin	*Erithacus rubecula*	5	
Blackbird	*Turdus merula*	5	
Song Thrush	*Turdus philomelos*	4	
Whitethroat	*Sylvia communis*	3	
Garden Warbler	*Sylvia borin*	5	
Blackcap	*Sylvia atricapilla*	8	
Chiff-chaff	*Phylloscopus collybita*	9	
Willow Warbler	*Phylloscopus trochilus*	2	
Goldcrest	*Regulus regulus*		1
Spotted Flycatcher	*Muscicapa striata*	1	
Long-tailed Tit	*Aegithalos caudatus*	2	
Marsh Tit	*Parus palustris*	4	
Blue Tit	*Parus caeruleus*	6	
Great Tit	*Parus major*	6	
European Nuthatch	*Sitta europaea*	1	
Treecreeper	*Certhia familiaris*		1
Jay	*Garrulus glandarius*		1
Carrion crow hybrid	*Corvus corone/cornix*	2	
Carrion Crow	*Corvus corone*	1	
Raven	*Corvus corax*		1
European Starling	*Sturnus vulgaris*		1
Chaffinch	*Fringilla coelebs*	7	
Greenfinch	*Carduelis chloris*	2	
Goldfinch	*Carduelis carduelis*		1
Yellow Hammer	*Emberiza citrinella*	4	
Area 134			
English name	**Latin name**	**T2p**	**T1**
Marsh Harrier	*Circus aeroginosus*	1	
European Marsh Warbler	*Acrocephalus palustris*	1	
European Reed Warbler	*Acrocephalus scirpaceus*	1	
Garden Warbler	*Sylvia borin*		1
Blackcap	*Sylvia atricapilla*		1
Reed Bunting	*Emberiza schoeniclus*		1
Area 136			
English name	**Latin name**	**T2p**	**T1**
Common buzzard	*Buteo buteo*		1
Kestrel	*Falco tinnunculus*	2	
Grey Partridge	*Perdix perdix*	1	
Wood Pigeon	*Columba palumbus*	4	
Meadow Pipit	*Anthus pratensis*	1	
Hedge Accentor	*Prunella modularis*	1	
Thrush Nightingale	*Luscinia luscinia*	1	
Blackbird	*Turdus merula*	5	

European Marsh Warbler	*Acrocephalus palustris*	1	
Icterine Warbler	*Hippolais icterina*	5	
Lesser Whitethroat	*Sylvia curruca*	5	
Whitethroat	*Sylvia communis*	12	
Garden Warbler	*Sylvia borin*	3	
Blackcap	*Sylvia atricapilla*	2	
Chiff-chaff	*Phylloscopus collybita*	1	
Willow Warbler	*Phylloscopus trochilus*	2	
Blue Tit	*Parus caeruleus*	2	
Great Tit	*Parus major*	4	
Carrion Crow	*Corvus corone*		1
Chaffinch	*Fringilla coelebs*	6	
Greenfinch	*Carduelis chloris*	5	
Goldfinch	*Carduelis carduelis*	4	
Linnet	*Carduelis cannabina*	4	
Yellow Hammer	*Emberiza citrinella*	5	

Table A.2 Fehmarn Belt land approach study – staging bird surveys carried out on the Danish site (Rødby,Lolland) from August 2009 to February 2010. Maximum number of staging birds per locality.

English name	Latin name	1	3	5	6	7	8	9
Little Grebe	*Tachybaptus ruficollis*				1	3		
Great Crested Grebe	*Podiceps cristatus*					1		
Common Cormorant	*Phalacrocorax carbo*			1		4		
Eurasian Bittern	*Botaurus stellaris*			1		1		
Grey Heron	*Ardea cinerea*			1		3	1	
Mute Swan	*Cygnus olor*			1		1		
Whooper Swan	*Cygnus cygnus*							
Bean Goose	*Anser fabalis*							
Greylag Goose	*Anser anser*					400		
Canada Goose	Branta canadensis							
European Wigeon	*Anas penelope*					1		
Gadwall	*Anas strepera*							
Green-winged Teal	*Anas crecca*					4		
Mallard	*Anas platyrhynchos*			1		270		
Northern Shoveler	*Anas clypeata*							
European Pochard	*Aythya ferina*	6				290		
Tufted Duck	*Aythya fuligula*				25	1840		
Goosander	*Mergus merganser*					7		
Marsh Harrier	*Circus aeruginosus*	1						
Hen Harrier	*Circus cyaneus*							1
European Sparrow Hawk	*Accipiter nisus*	2						
Common Buzzard	*Buteo buteo*	2		3		1		
Rough-legged Buzzard	*Buteo lagopus*							
Osprey	*Pandion haliaetus*							
Common/Rock Kestrel	*Falco tinnunculus*	1		1				
Grey Partridge	*Perdix perdix*							
Water Rail	*Rallus aquaticus*							
Moorhen	*Gallinula chloropus*		1		1			
Common Coot	*Fulica atra*			1		10		
Lapwing	*Vanellus vanellus*	25						
Purple Sandpiper	*Calidris maritima*							
Common Snipe	*Gallinago gallinago*							
Woodcock	*Scolopax rusticola*							
Redshank	*Tringa totanus*							
Common Sandpiper	*Actitis hypoleucos*							
Black-headed Gull	*Larus ridibundus*					15	21	
Common Gull	*Larus canus*					120	3	
Herring Gull	*Larus argentatus*					7	7	
Stock Dove	*Columba oenas*							
Wood Pigeon	*Columba palumbus*	25		10				
Collared Dove	*Streptopelia decaocto*							
Short-eared Owl	*Asio flammeus*							
Common Kingfisher	*Alcedo atthis*					1		
Wryneck	*Jynx torquilla*							
Great Spotted Woodpecker	*Dendrocopos major*	1		1				
Sky Lark	*Alauda arvensis*							
Sand Martin	*Riparia riparia*							
Barn Swallow	*Hirundo rustica*							
Tree Pipit	*Anthus trivialis*	1						
Meadow Pipit	*Anthus pratensis*	2	1				20	
Water Pipit	*Anthus spinoletta*							1
Yellow Wagtail	*Motacilla flava*						2	
Grey Wagtail	*Motacilla cinerea*						1	
Pied Wagtail	*Motacilla alba*	1					5	
Winter Wren	*Troglodytes troglodytes*	2		2		1		1

English name	Latin name	1	3	5	6	7	8	9
Hedge Accentor	*Prunella modularis*			1		4		
European Robin	*Erithacus rubecula*	11		2		10		1
Black Redstart	*Phoenicurus ochruros*	1						
Common Redstart	*Phoenicurus phoenicurus*	10		1		1		
Whinchat	*Saxicola rubetra*							
Blackbird	*Turdus merula*	22		2				1
Fieldfare	*Turdus pilaris*			1				
Song Thrush	*Turdus philomelos*	9		1				
Redwing	*Turdus iliacus*	15		27				
Mistle Thrush	*Turdus viscivorus*							
European Marsh Warbler	*Acrocephalus palustris*							
Reed/Marsh warbler	*Acro. palus-tris/scirpaceus*							1
European Reed Warbler	*Acrocephalus scirpaceus*	1						
Icterine Warbler	*Hippolais icterina*			1				
Lesser Whitethroat	*Sylvia curruca*			1				
Whitethroat	*Sylvia communis*	10		3				
Garden Warbler	*Sylvia borin*							
Blackcap	*Sylvia atricapilla*	1						
Chiff-chaff	*Phylloscopus collybita*	9		7		6		1
Willow Warbler	*Phylloscopus trochilus*	7		32		3		
Goldcrest	*Regulus regulus*	4		2				
Firecrest	*Regulus ignicapillus*	2		1		2		
Pied Flycatcher	*Ficedula hypoleuca*	3		1				
Bearded Tit	*Panurus biarmicus*							
Long-tailed Tit	*Aegithalos caudatus*	17		8				
Marsh Tit	*Parus palustris*							
Coal Tit	*Parus ater*							
Blue Tit	*Parus caeruleus*	12		12				2
Great Tit	*Parus major*	3		4				
European Nuthatch	*Sitta europaea*							
Treecreeper	*Certhia familiaris*	3		2				
Penduline Tit	*Remiz pendulinus*							
Red-backed Shrike	*Lanius collurio*							
Great Grey Shrike	*Lanius excubitor*							
Jay	*Garrulus glandarius*							
Magpie	*Pica pica*							
Rook	*Corvus frugilegus*	40						
Carrion Crow - black	*Corvus corone*							
Carrion/Black crow hybrid	*Corvus corone/cornix*			1				
Carrion Crow	*Corvus corone*	10		4				
European Starling	*Sturnus vulgaris*						1	
Tree Sparrow	*Passer montanus*							
Chaffinch	*Fringilla coelebs*	16	2					
Brambling	*Fringilla montifringilla*							
Greenfinch	*Carduelis chloris*	4		1		1		2
Goldfinch	*Carduelis carduelis*	3						
Siskin	*Carduelis spinus*	50		2				
Linnet	*Carduelis cannabina*							
Twite	*Carduelis flavirostris*							
Redpoll	*Carduelis flammea*							
Red Crossbill	*Loxia curvirostra*							
Yellow Hammer	*Emberiza citrinella*	2						15
Ortolan Bunting	*Emberiza hortulana*							
Reed Bunting	*Emberiza schoeniclus*			1			1	1
Sum		**334**	**4**	**141**	**27**	**3007**	**62**	**27**

Table A.3 Rødby, localities 10-17. Maximum numbers of staging birds, August 2009 –February 2010

English name	*Latin name*	10	11	12	13	14	15	17
Little Grebe	*Tachybaptus ruficollis*	23						
Great Crested Grebe	*Podiceps cristatus*							
Common Cormorant	*Phalacrocorax carbo*							
Eurasian Bittern	*Botaurus stellaris*							
Grey Heron	*Ardea cinerea*	4						
Mute Swan	*Cygnus olor*	101		1				
Whooper Swan	*Cygnus cygnus*			3				
Bean Goose	*Anser fabalis*			500				
Greylag Goose	*Anser anser*			200				
Canada Goose	*Branta canadensis*			100				
European Wigeon	*Anas penelope*	550		1				
Gadwall	*Anas strepera*	2						
Green-winged Teal	*Anas crecca*							
Mallard	*Anas platyrhynchos*	9		200		1		
Northern Shoveler	*Anas clypeata*							
European Pochard	*Aythya ferina*	10						
Tufted Duck	*Aythya fuligula*	130						
Goosander	*Mergus merganser*	5						
Marsh Harrier	*Circus aeruginosus*							
Hen Harrier	*Circus cyaneus*							
European Sparrow Hawk	*Accipiter nisus*	1						
Common Buzzard	*Buteo buteo*				1	1		1
Rough-legged Buzzard	*Buteo lagopus*							
Osprey	*Pandion haliaetus*							
Common/Rock Kestrel	*Falco tinnunculus*			1				1
Grey Partridge	*Perdix perdix*							
Water Rail	*Rallus aquaticus*					1		
Moorhen	*Gallinula chloropus*				1			
Common Coot	*Fulica atra*	60			4	5		
Lapwing	*Vanellus vanellus*							
Purple Sandpiper	*Calidris maritima*							
Common Snipe	*Gallinago gallinago*							
Woodcock	*Scolopax rusticola*							
Redshank	*Tringa totanus*							
Common Sandpiper	*Actitis hypoleucos*							
Black-headed Gull	*Larus ridibundus*		3					
Common Gull	*Larus canus*							
Herring Gull	*Larus argentatus*							
Stock Dove	*Columba oenas*							
Wood Pigeon	*Columba palumbus*			2				
Collared Dove	*Streptopelia decaocto*							
Short-eared Owl	*Asio flammeus*							
Common Kingfisher	*Alcedo atthis*							
Wryneck	*Jynx torquilla*							
Great Spotted Woodpecker	*Dendrocopos major*							
Sky Lark	*Alauda arvensis*			16				
Sand Martin	*Riparia riparia*							
Barn Swallow	*Hirundo rustica*							
Tree Pipit	*Anthus trivialis*			2	1			
Meadow Pipit	*Anthus pratensis*		3	200	10		1	1
Water Pipit	*Anthus spinoletta*							
Yellow Wagtail	*Motacilla flava*							
Grey Wagtail	*Motacilla cinerea*							
Pied Wagtail	*Motacilla alba*			20				
Winter Wren	*Troglodytes troglodytes*	2		1	3	5		
Hedge Accentor	*Prunella modularis*							
European Robin	*Erithacus rubecula*	4		1	1	1	1	
Black Redstart	*Phoenicurus ochruros*							
Common Redstart	*Phoenicurus phoenicurus*							
Whinchat	*Saxicola rubetra*			1				
Blackbird	*Turdus merula*	3			2	1		
Fieldfare	*Turdus pilaris*							31
Song Thrush	*Turdus philomelos*	4		1	5			
Redwing	*Turdus iliacus*							
Mistle Thrush	*Turdus viscivorus*			2				

English name	*Latin name*	10	11	12	13	14	15	17
European Marsh Warbler	*Acrocephalus palustris*							
Reed/Marsh warbler	*Acro. palustris/scirpaceus*					1		
European Reed Warbler	*Acrocephalus scirpaceus*				2	4	2	
Icterine Warbler	*Hippolais icterina*	1						
Lesser Whitethroat	*Sylvia curruca*							
Whitethroat	*Sylvia communis*	10		1	7	5	1	16
Garden Warbler	*Sylvia borin*							
Blackcap	*Sylvia atricapilla*	2						1
Chiff-chaff	*Phylloscopus collybita*	7	3		6	2	1	
Willow Warbler	*Phylloscopus trochilus*	10			8	11	5	2
Goldcrest	*Regulus regulus*							
Firecrest	*Regulus ignicapillus*							
Pied Flycatcher	*Ficedula hypoleuca*					1		
Bearded Tit	*Panurus biarmicus*					12		
Long-tailed Tit	*Aegithalos caudatus*							
Marsh Tit	*Parus palustris*							
Coal Tit	*Parus ater*							
Blue Tit	*Parus caeruleus*	5			5		2	
Great Tit	*Parus major*	1						
European Nuthatch	*Sitta europaea*							
Treecreeper	*Certhia familiaris*							
Penduline Tit	*Remiz pendulinus*				1			
Red-backed Shrike	*Lanius collurio*				1			
Great Grey Shrike	*Lanius excubitor*							
Jay	*Garrulus glandarius*							
Magpie	*Pica pica*				1			
Rook	*Corvus frugilegus*							
Carrion Crow - black	*Corvus corone*							
Carrion/Black crow hybrid	*Corvus corone/cornix*	1						
Carrion Crow	*Corvus corone*	1		1				
European Starling	*Sturnus vulgaris*							
Tree Sparrow	*Passer montanus*							
Chaffinch	*Fringilla coelebs*				1			
Brambling	*Fringilla montifringilla*							
Greenfinch	*Carduelis chloris*	2			3	2		
Goldfinch	*Carduelis carduelis*				1			
Siskin	*Carduelis spinus*							
Linnet	*Carduelis cannabina*			25				
Twite	*Carduelis flavirostris*							
Redpoll	*Carduelis flammea*							
Red Crossbill	*Loxia curvirostra*			2				
Yellow Hammer	*Emberiza citrinella*			1		1		
Ortolan Bunting	*Emberiza hortulana*							
Reed Bunting	*Emberiza schoeniclus*	2		2	1	1	1	1
Sum		950	9	1284	65	55	14	54

Table A.4 Rødby, localities 64-136. Maximum numbers of staging birds, August 2009 – February 2010

English name	*Latin name*	64	117	131	132	133	134	136
Little Grebe	*Tachybaptus ruficollis*							
Great Crested Grebe	*Podiceps cristatus*							
Common Cormorant	*Phalacrocorax carbo*							
Eurasian Bittern	*Botaurus stellaris*							
Grey Heron	*Ardea cinerea*		1					
Mute Swan	*Cygnus olor*							
Whooper Swan	*Cygnus cygnus*							
Bean Goose	*Anser fabalis*							
Greylag Goose	*Anser anser*							
Canada Goose	*Branta canadensis*							
European Wigeon	*Anas penelope*							
Gadwall	*Anas strepera*							
Green-winged Teal	*Anas crecca*							
Mallard	*Anas platyrhynchos*	25	40	125		2	2	
Northern Shoveler	*Anas clypeata*			4				
European Pochard	*Aythya ferina*			20				
Tufted Duck	*Aythya fuligula*			10				
Goosander	*Mergus merganser*							
Marsh Harrier	*Circus aeruginosus*							
Hen Harrier	*Circus cyaneus*							
European Sparrow Hawk	*Accipiter nisus*							
Common Buzzard	*Buteo buteo*		2			1		1
Rough-legged Buzzard	*Buteo lagopus*							1
Osprey	*Pandion haliaetus*		1					
Common/Rock Kestrel	*Falco tinnunculus*							1
Grey Partridge	*Perdix perdix*			10				9
Water Rail	*Rallus aquaticus*							
Moorhen	*Gallinula chloropus*							
Common Coot	*Fulica atra*			3				
Lapwing	*Vanellus vanellus*							
Purple Sandpiper	*Calidris maritima*							
Common Snipe	*Gallinago gallinago*							
Woodcock	*Scolopax rusticola*	2						
Redshank	*Tringa totanus*							
Common Sandpiper	*Actitis hypoleucos*							
Black-headed Gull	*Larus ridibundus*							
Common Gull	*Larus canus*							
Herring Gull	*Larus argentatus*							
Stock Dove	*Columba oenas*					70		
Wood Pigeon	*Columba palumbus*	10	10	55		151		2
Collared Dove	*Streptopelia decaocto*						30	
Short-eared Owl	*Asio flammeus*							
Common Kingfisher	*Alcedo atthis*							
Wryneck	*Jynx torquilla*	1						
Great Spotted Woodpecker	*Dendrocopos major*					2		
Sky Lark	*Alauda arvensis*							
Sand Martin	*Riparia riparia*							
Barn Swallow	*Hirundo rustica*							
Tree Pipit	*Anthus trivialis*		5					
Meadow Pipit	*Anthus pratensis*		1					2
Water Pipit	*Anthus spinoletta*							
Yellow Wagtail	*Motacilla flava*							
Grey Wagtail	*Motacilla cinerea*							
Pied Wagtail	*Motacilla alba*							
Winter Wren	*Troglodytes troglodytes*	2	4			4		
Hedge Accentor	*Prunella modularis*					3		
European Robin	*Erithacus rubecula*		1					3
Black Redstart	*Phoenicurus ochruros*							
Common Redstart	*Phoenicurus phoenicurus*	1				1		2
Whinchat	*Saxicola rubetra*							
Blackbird	*Turdus merula*		3			6	1	32
Fieldfare	*Turdus pilaris*		7			1		5

English name	*Latin name*	64	117	131	132	133	134	136
Song Thrush	*Turdus philomelos*	5	1			2		
Redwing	*Turdus iliacus*		10			1		40
Mistle Thrush	*Turdus viscivorus*							
European Marsh Warbler	*Acrocephalus palustris*							1
Reed/Marsh warbler	*Acro. palus-tris/scirpaceus*							
European Reed Warbler	*Acrocephalus scirpaceus*		1					
Icterine Warbler	*Hippolais icterina*		1					
Lesser Whitethroat	*Sylvia curruca*	1						
Whitethroat	*Sylvia communis*	6						6
Garden Warbler	*Sylvia borin*		7					
Blackcap	*Sylvia atricapilla*		6			2		1
Chiff-chaff	*Phylloscopus collybita*	3	8	1		3		1
Willow Warbler	*Phylloscopus trochilus*	1	7			3		1
Goldcrest	*Regulus regulus*					1		
Firecrest	*Regulus ignicapillus*							
Pied Flycatcher	*Ficedula hypoleuca*							
Bearded Tit	*Panurus biarmicus*							
Long-tailed Tit	*Aegithalos caudatus*					1		
Marsh Tit	*Parus palustris*		2			6		
Coal Tit	*Parus ater*		1					2
Blue Tit	*Parus caeruleus*		6			6		
Great Tit	*Parus major*	1	3			9		5
European Nuthatch	*Sitta europaea*					2		
Treecreeper	*Certhia familiaris*		1			2		
Penduline Tit	*Remiz pendulinus*							
Red-backed Shrike	*Lanius collurio*							
Great Grey Shrike	*Lanius excubitor*							1
Jay	*Garrulus glandarius*					1		
Magpie	*Pica pica*	1						
Rook	*Corvus frugilegus*							
Carrion Crow - black	*Corvus corone corone*							
Carrion/Black crow hybrid	*Corvus corone/cornix*					2		
Carrion Crow	*Corvus corone*	1	2			9		1
European Starling	*Sturnus vulgaris*							1
Tree Sparrow	*Passer montanus*	13						20
Chaffinch	*Fringilla coelebs*	2	12			20		6
Brambling	*Fringilla montifringilla*					1035		
Greenfinch	*Carduelis chloris*	6	2			1		4
Goldfinch	*Carduelis carduelis*		15					2
Siskin	*Carduelis spinus*		50			5		
Linnet	*Carduelis cannabina*							
Twite	*Carduelis flavirostris*							
Redpoll	*Carduelis flammea*							
Red Crossbill	*Loxia curvirostra*							
Yellow Hammer	*Emberiza citrinella*			2	4	38		2
Ortolan Bunting	*Emberiza hortulana*		2					
Reed Bunting	*Emberiza schoeniclus*		1	1				
Sum		81	213	231	4	1390	33	152

APPENDIX B – FEHMARN

Table B.1 Recorded species and number of territorial pairs of breeding birds in further locations of habitat type F 9 (Industrial areas and railway facilities).

Species	Wellenkamp	Amalienhof at Burg	Maintenance facility at Puttgarden	Military depot at Marien-leuchte
Blackbird	1			1
Chaffinch				2
Chiffchaff	1			
Common Starling				1
Dunnock	1			
Great Tit	1		1	1
Greenfinch	1			
House Sparrow		3		
Lesser White-throat	1			
Tree Sparrow				1
White Wagtail			1	
Winter Wren	1			
Woodpigeon			1	1
Sum	**7**	**3**	**3**	**7**

Table B.2 Recorded species and number of territorial pairs of breeding birds in the Villages (F 6) on Fehmarn.

Species	Niendorf	Bannes-dorf	Putt-garden	Toden-dorf	Presen	Hin-richs-dorf	Land-kirchen	Marien-leuchte	Johan-nisberg	Oster-mar-kelsdorf	Stein-kamp	Putt-garden (sub-urb)	Mattias-felde
Black Redstart	2		1	1			3						
Black-billed Mag-pie				2			1	3		1	3		
Blackbird	1	1	5	11	6	9	4	8		4	8	2	1
Blackcap							1				2		
Blue Tit			4	2		2	2	5		1	1		
Canada Goose						1							
Carrion Crow				4		2	1	1			3		
Chaffinch	1	1	1	3	4	2	1	5		6	2	1	1
Chiffchaff	1		4	3		1	2	3		5	2		
Collared Dove	3	9	3	5	1			6			1		
Common Coot			1	1									
Common Redpoll					1								
Common Starling				5	1	3	3	4		1	4		
Dunnock	1	1		2	7		1	2		1	2	1	
Eurasian Buzzard	1												
Eurasian Kestrel					1								
European Sparrow Hawk								1					
Garden Warbler				1	3	1	1			1	2	1	
Goldfinch	1		1	2		1				1		1	1
Great Tit	1		3	4	1	3	2	3		2	3	1	
Greenfinch	1		8	4	8	12	5	1		4	2	1	
House Martin			4	6		1				15	25		
House Sparrow	21	20	28	47	6	48	10	15		5	15		
Icterine Warbler			2		1			1	1			1	1
Lesser Whitethroat			4	1	3	1	2			1	1		1
Linnet			6	3		2	3			2			
Long-eared Owl				1									
Mallard			1	1		1					2		
Moorhen			1	1									
Pheasant						1				2			
Redstart			2	1									

Species	Niendorf	Bannes-dorf	Putt-garden	Toden-dorf	Presen	Hin-richs-dorf	Land-kirchen	Marien-leuchte	Johan-nisberg	Oster-mar-kelsdorf	Stein-kamp	Putt-garden (sub-urb)	Mattias-felde
Reed Warbler			1			1							
Song Thrush				1									
Spotted Flycatcher			1		1	2		2					
Stock Dove								1				1	
Swallow	7	15	10	10	7	15	9			4	3		4
Tree Sparrow	1	1		2			2						
White Wagtail	2	3	1	2	3	3	1	4		3	3		1
Whitethroat			2	1		1					1		
Willow Warbler						2					2		
Winter Wren	1			6		2	1			1	1		
Woodpigeon			12	16		10	3	7		6	5	2	1
Territories	**45**	**51**	**106**	**149**	**54**	**127**	**58**	**72**	**1**	**66**	**93**	**12**	**11**
Number of species	15	8	24	30	16	25	21	18	1	20	23	10	8
Area size	23.9	20.5	18.9	16.9	10.0	9.4	8.9	8.9	4.2	4.2	3.2	1.9	0.5
Pairs/10 ha	**18.83**	**24.88**	**56.08**	**88.17**	**54.00**	**135.11**	**65.17**	**80.90**	**2.38**	**157.14**	**290.63**	**63.16**	**220.00**

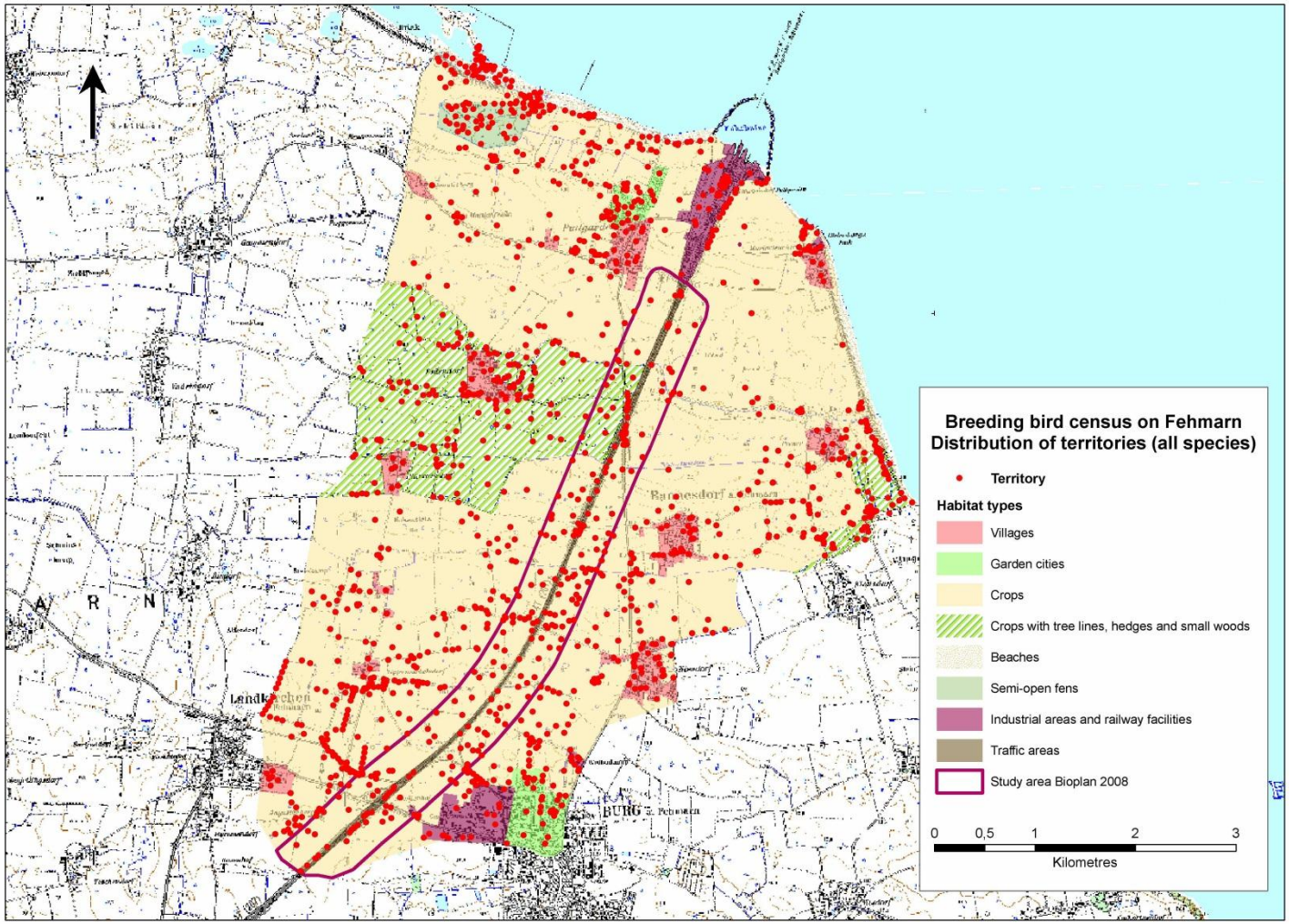

Figure B.1 *Breeding bird census on Fehmarn – distribution of territories of all recorded species (in villages, only territories of threatened/protected and building associated species are shown).*

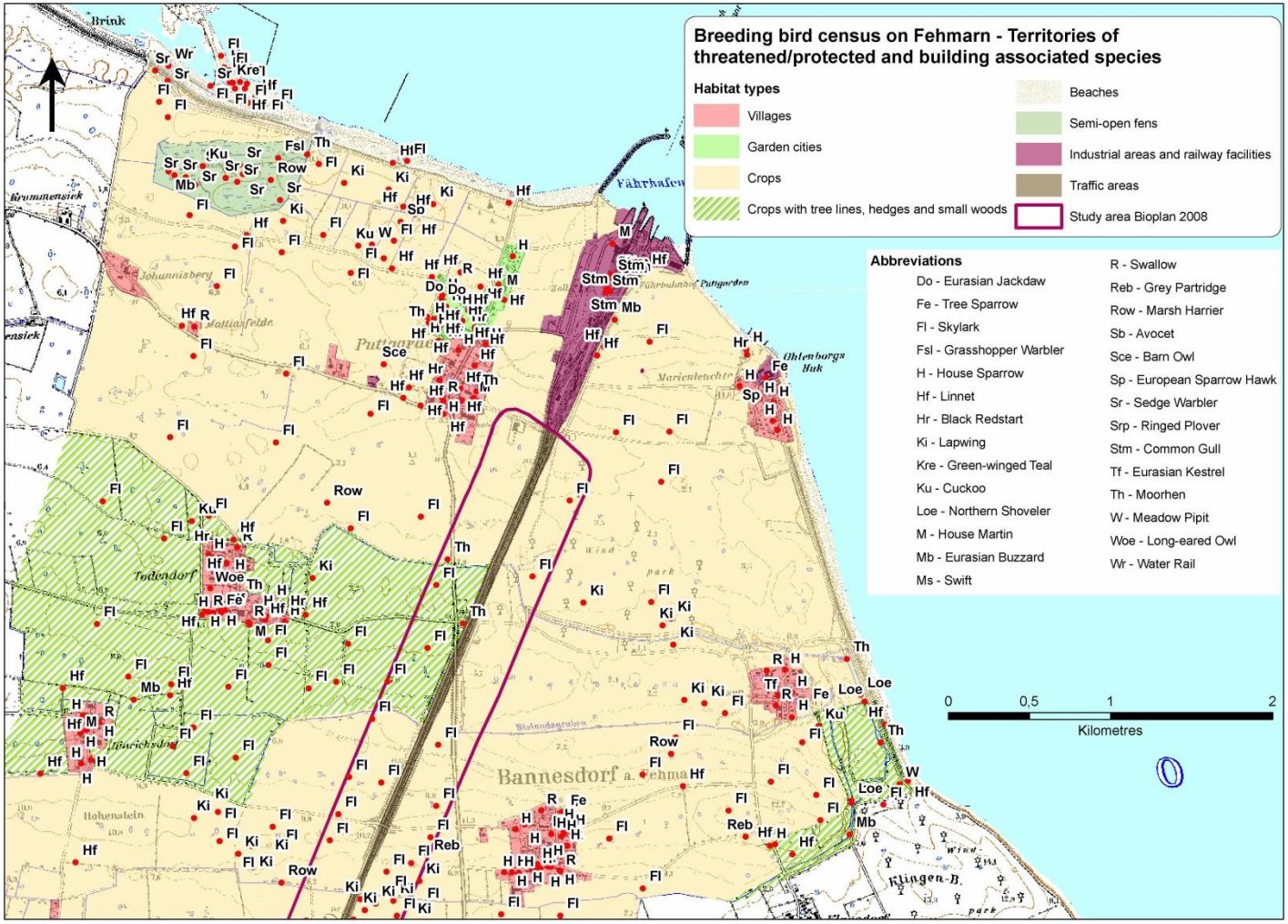

Figure B.2 Breeding bird census on Fehmarn (northern part of study area) – territories of threatened/protected and building associated species.

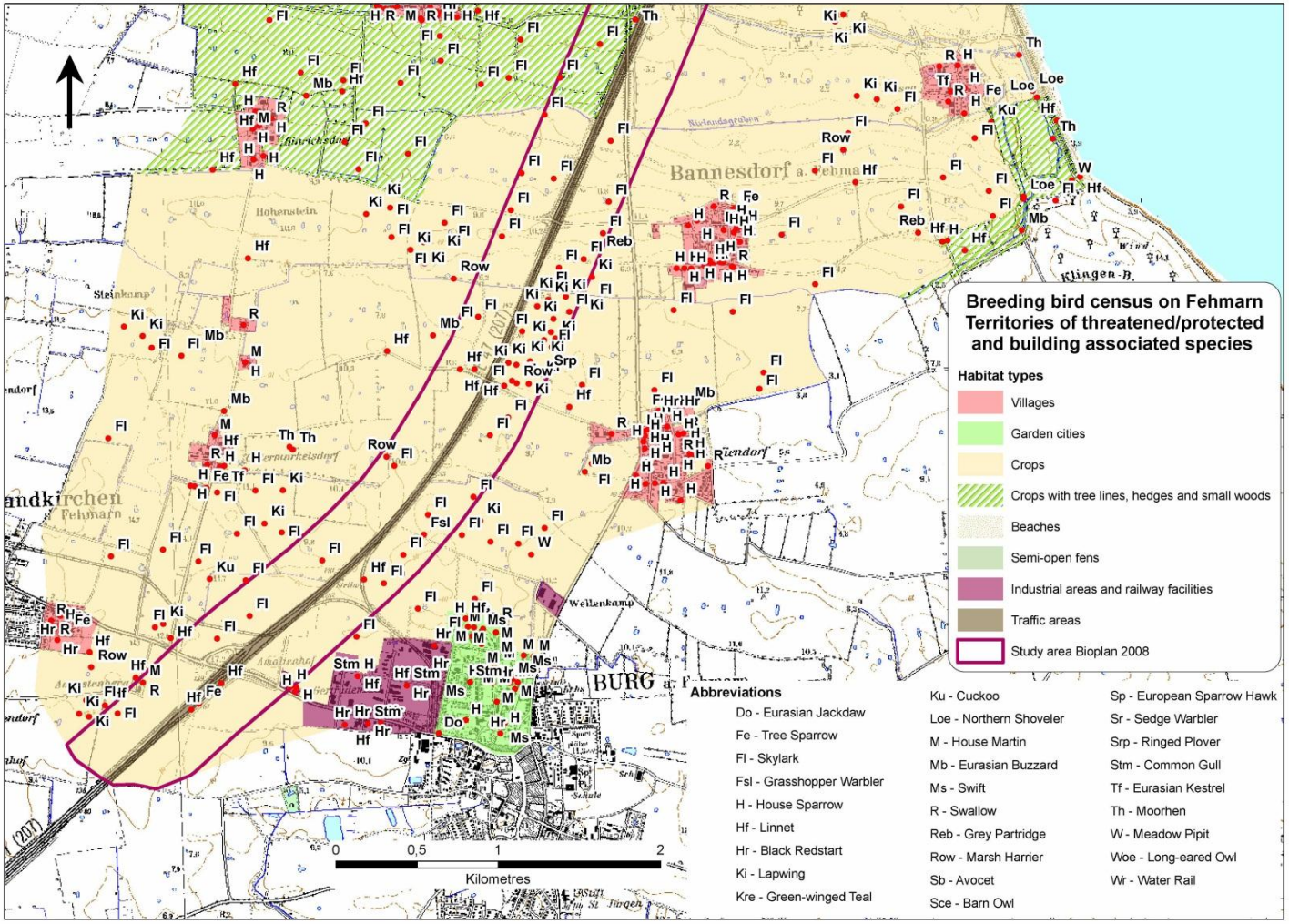

Figure B.3 Breeding bird census on Fehmarn (southern part of study area) – territories of threatened/protected and building associated species.

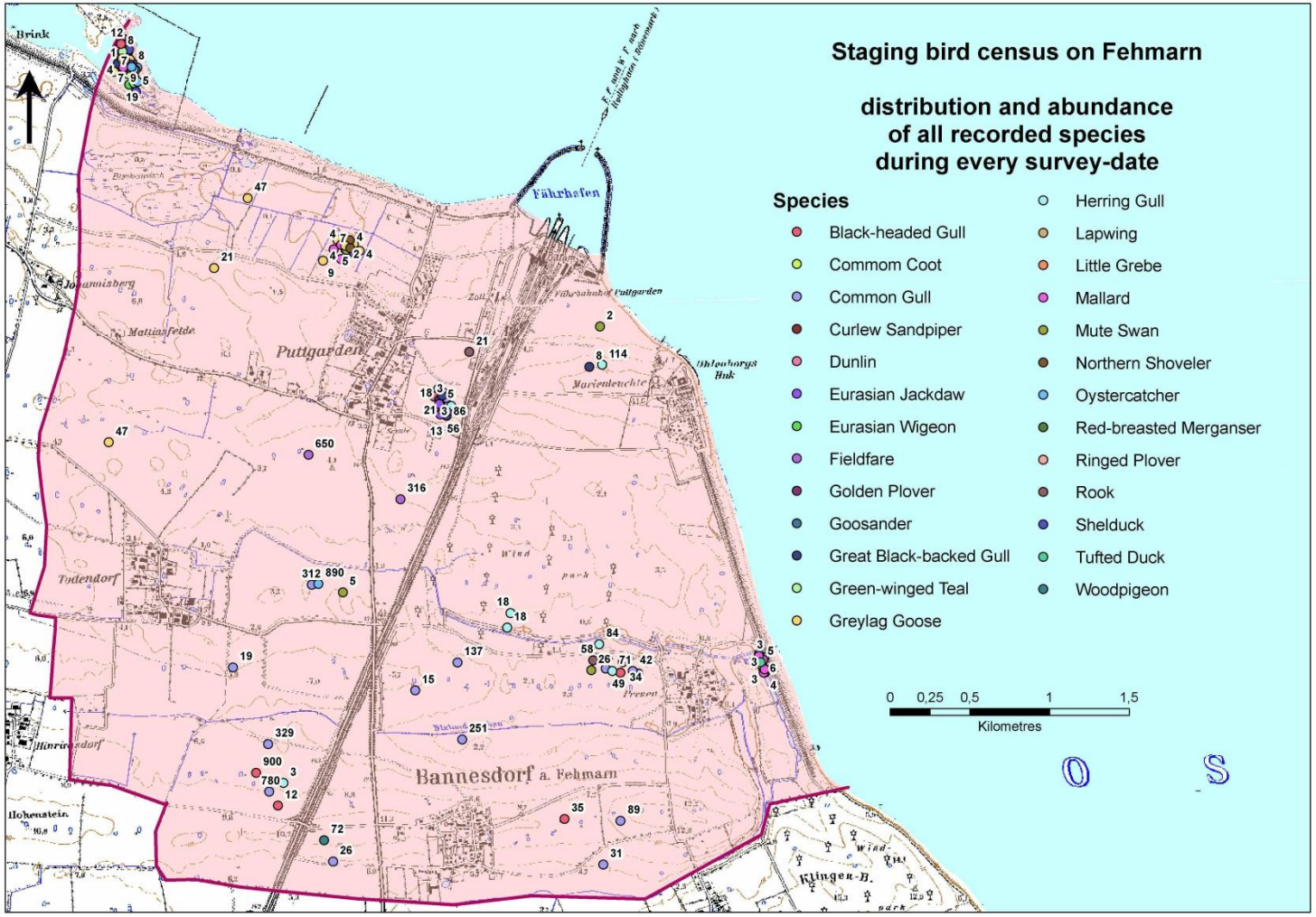

Figure B.4 Staging bird census on Fehmarn – distribution and abundance of all recorded species during every survey-date (from February 2009 to June 2010).

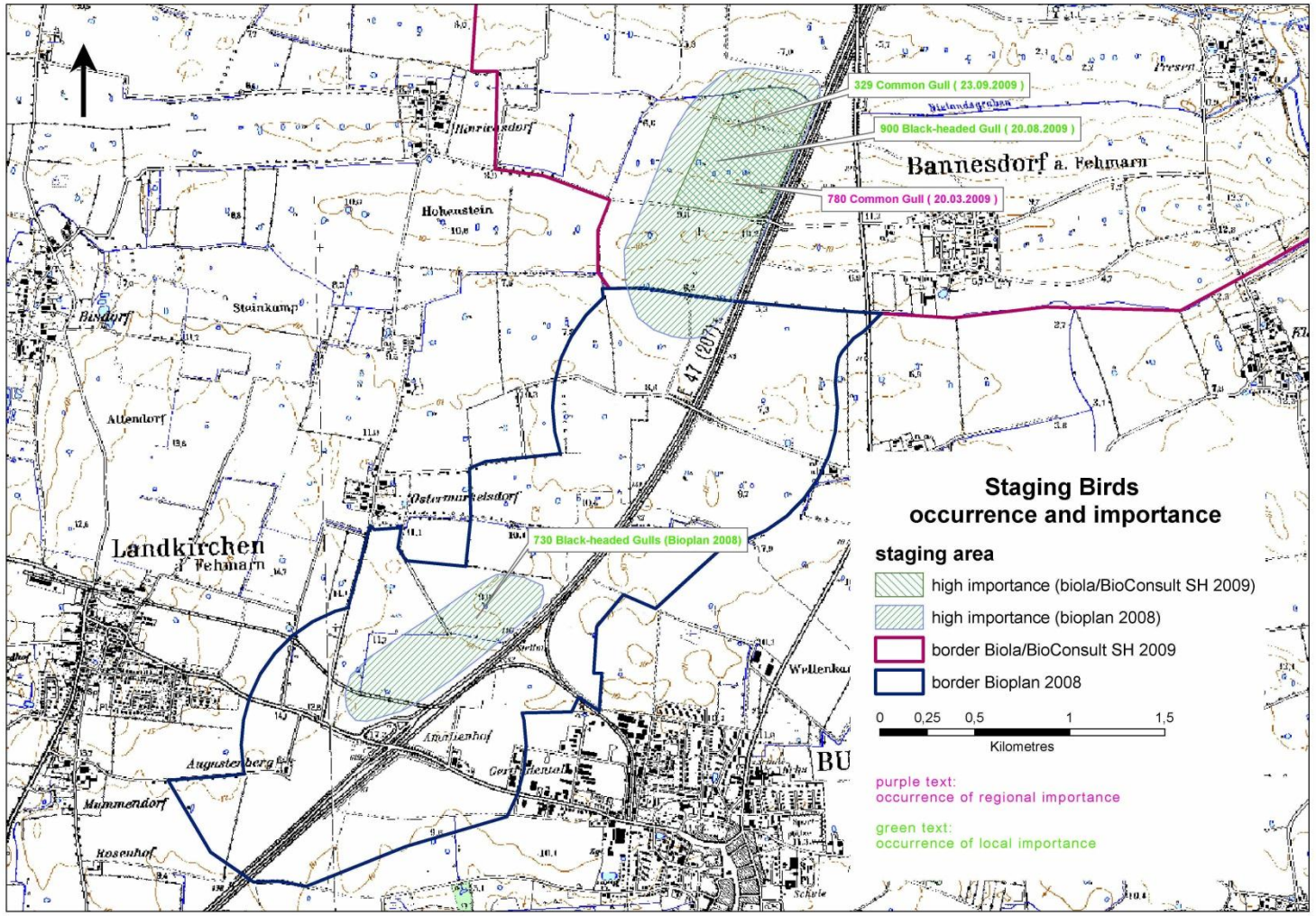

Figure B.5 Staging birds, occurrence and importance.

Table B.3 Overview of the bird species observed on Fehmarn according to BERNDT et al. (2005).

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Gavia stellata	Red-throated Diver			X	
Gavia arctica	Black-throated Diver			X	
Gavia immer	Great Northern Diver				X
Gavia adamsii	White-billed Diver				X
Tachybaptus ruficollis	Little Grebe	X		X	
Podiceps cristatus	Great Crested Grebe	X		X	
Podiceps grisegena	Red-necked Grebe	X		X	
Podiceps auritus	Slavonian Grebe			X	
Podiceps nigricollis	Black-necked Grebe		X	X	
Fulmarus glacialis	Northern Fulmar				X
Puffinus griseus	Sooty Shearwater				X
Hydrobates pelagicus	European Storm Petrel				X
Oceanodroma leucorhoa	Leach's Storm-Petrel				X
Sula bassana	Northern Gannet				X
Phalacrocorax carbo	Great Cormorant	X		X	
Botaurus stellaris	Eurasian Bittern	X		X	
Ixobrychus minutus	Little Bittern				X
Nycticorax nycticorax	Black-crowned Night Heron				X
Ardeola ralloides	Squacco Heron				X
Egretta garzetta	Little Egret				X
Egretta alba	Great White Egret				X
Ardea cinerea	Common Heron	X		X	
Ardea purpurea	Purple Heron				X
Ciconia nigra	Black Stork				X
Ciconia ciconia	White Stork			X	
Platalea leucorodia	Common Spoonbill				X
Phoenicopterus ruber	Greater Flamingo				X
Phoenicopterus chilensis	Chilean flamingo				X
Cygnus olor	Mute Swan	X		X	
Cygnus atratus	Black Swan				X
Cygnus columbianus bewickii	Bewick's Swan			X	
Cygnus cygnus	Whooper Swan			X	
Anser fabalis	Bean Goose			X	
Anser brachyrhynchus	Pink-footed Goose				X
Anser albifrons	Greater White-fronted Goose			X	
Anser erythropus	Lesser White-fronted Goose				X
Anser anser	Greylag Goose	X		X	
Anser indicus	Bar-headed Goose				X
Anser caerulescens	Snow Goose				X
Branta canadensis	Canada Goose		X	X	
Branta leucopsis	Barnacle Goose			X	
Branta bernicla	Brent Goose			X	
Branta ruficollis	Red-breasted Goose				X
Tadorna ferruginea	Ruddy Shelduck				X
Tadorna tadorna	Shelduck	X		X	
Anas penelope	Eurasian Wigeon			X	
Anas strepera	Gadwall	X		X	
Anas crecca	Green-winged Teal	X		X	

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Anas platyrhynchos	Mallard	X		X	
Anas acuta	Northern Pintail		X	X	
Anas querquedula	Garganey	X		X	
Anas discors	Blue-winged Teal				X
Anas clypeata	Northern Shoveler	X		X	
Netta rufina	Red-crested Pochard		X	X	
Aythya ferina	Common Pochard	X		X	
Aythya nyroca	Ferrugineous Duck				X
Aythya fuligula	Tufted Duck	X		X	
Aythya marila	Greater Scaup			X	
Somateria mollissima	Common Eider	X		X	
Somateria spectabilis	King Eider				X
Polysticta stelleri	Steller's Eider				X
Clangula hyemalis	Long-tailed Duck			X	
Melanitta nigra	Common Scoter			X	
Melanitta fusca	Velvet Scoter			X	
Bucephala clangula	Common Goldeneye		X	X	
Mergus albellus	Smew			X	
Mergus serrator	Red-breasted Merganser	X		X	
Mergus merganser	Goosander		X	X	
Oxyura jamaicensis	Ruddy Duck				X
Pernis apivorus	Honey-Buzzard			X	
Milvus migrans	Black Kite			X	
Milvus milvus	Red Kite			X	
Haliaeetus albicilla	White-tailed Eagle**	X			
Gyps fulvus	Griffon Vulture				X
Circaetus gallicus	Short-toed Eagle				X
Circus aeruginosus	Marsh Harrier	X		X	
Circus cyaneus	Hen Harrier			X	
Circus pygargus	Montagu's Harrier				X
Accipiter gentilis	Northern Goshawk		X	X	
Accipiter nisus	European Sparrow Hawk		X	X	
Buteo buteo	Eurasian Buzzard	X		X	
Buteo lagopus	Rough-legged Buzzard			X	
Aquila pomarina	Lesser Spotted Eagle				X
Aquila chrysaetos	Golden Eagle				X
Pandion haliaetus	Osprey			X	
Falco tinnunculus	Eurasian Kestrel	X		X	
Falco vespertinus	Red-footed Falcon				X
Falco columbarius	Merlin			X	
Falco subbuteo	Hobby			X	
Falco rusticolus	Gyrfalcon				X
Falco peregrinus	Peregrine Falcon			X	
Tetrao tetrix	Black Grouse				X
Perdix perdix	Grey Partridge		X	X	
Coturnix coturnix	Quail		X		X
Phasianus colchicus	Pheasant	X		X	
Rallus aquaticus	Water Rail	X		X	
Porzana porzana	Spotted Crake		X		X
Porzana parva	Little Crake				X
Crex crex	Corncrake		X		X
Gallinula chloropus	Moorhen	X		X	
Fulica atra	Common Coot	X		X	
Grus grus	Crane			X	
Tetrax tetrax	Little Bustard				X

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Haematopus ostralegus	Oystercatcher	X		X	
Himantopus himantopus	Black-winged Stilt				X
Recurvirostra avosetta	Avocet	X		X	
Burhinus oedicnemus	Stone Curlew				X
Glareola nordmanni	Black-winged Pratincole				X
Charadrius dubius	Little Ringed Plover		X	X	
Charadrius hiaticula	Ringed Plover	X		X	
Charadrius alexandrinus	Kentish Plover				X
Charadrius morinellus	Dotterel			X	
Pluvialis apricaria	Golden Plover			X	
Pluvialis squatarola	Grey Plover			X	
Vanellus vanellus	Lapwing	X		X	
Calidris canutus	Knot			X	
Calidris alba	Sanderling			X	
Calidris minuta	Little Stint			X	
Calidris temminckii	Temminck's Stint			X	
Calidris fuscicollis	White-rumped Sandpiper				X
Calidris melanotos	Pectoral Sandpiper				X
Calidris ferruginea	Curlew Sandpiper			X	
Calidris maritima	Purple Sandpiper			X	
Calidris alpina	Dunlin			X	
Limicola falcinellus	Broad-billed Sandpiper			X	
Philomachus pugnax	Ruff		X	X	
Lymnocryptes minimus	Jack Snipe			X	
Gallinago gallinago	Snipe	X		X	
Gallinago media	Great Snipe				X
Limnodromus scolopaceus	Long-billed Dowitcher				X
Scolopax rusticola	Woodcock			X	
Limosa limosa	Black-tailed Godwit		X	X	
Limosa lapponica	Bar-tailed Godwit			X	
Numenius phaeopus	Whimbrel			X	
Numenius arquata	Curlew		X	X	
Tringa erythropus	Spotted Redshank			X	
Tringa totanus	Redshank	X		X	
Tringa stagnatilis	Marsh Sandpiper			X	
Tringa nebularia	Greenshank			X	
Tringa ochropus	Green Sandpiper			X	
Tringa glareola	Wood Sandpiper			X	
Xenus cinereus	Terek Sandpiper				X
Actitis hypoleucos	Common Sandpiper			X	
Actitis macularia	Spotted Sandpiper				X
Arenaria interpres	Turnstone			X	
Phalaropus lobatus	Red-necked Phalarope			X	
Phalaropus fulicaria	Grey Phalarope				X
Stercorarius pomarinus	Pomarine Skua				X
Stercorarius parasiticus	Arctic Skua			X	

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Stercorarius longicaudus	Long-tailed Skua				X
Stercorarius skua	Skua				X
Larus melanocephalus	Mediterranean Gull		X	X	
Larus minutus	Little Gull			X	
Larus ridibundus	Black-headed Gull	X		X	
Larus canus	Common Gull	X		X	
Larus fuscus	Lesser Black-backed Gull			X	
Larus argentatus	Herring Gull	X		X	
Larus cachinnans michahellis	Yellow-legged Gull		X		X
Larus cachinnans cachinnans	Caspian Gull				X
Larus hyperboreus	Glaucous Gull				X
Larus marinus	Great Black-backed Gull	X		X	
Rissa tridactyla	Kittiwake			X	
Pagophila eburnea	Ivory Gull				X
Gelochelidon nilotica	Gull-billed Tern				X
Sterna caspia	Caspian Tern			X	
Sterna sandvicensis	Sandwich Tern		X	X	
Sterna hirundo	Common Tern	X		X	
Sterna paradisaea	Arctic Tern		X	X	
Sterna albifrons	Little Tern	X		X	
Chlidonias hybridus	Whiskered Tern				X
Chlidonias niger	Black Tern		X	X	
Chlidonias leucopterus	White-winged Tern				X
Uria aalge	Guillemot			X	
Alca torda	Razorbill			X	
Cepphus grylle	Black Guillemot			X	
Alle alle	Little Auk				X
Fratercula arctica	Puffin				X
Syrrhaptes paradoxus	Palla's Sandgrouse				X
Columba livia domestica	Feral Pigeon	X		X	
Columba oenas	Stock Dove		X	X	
Columba palumbus	Woodpigeon	X		X	
Streptopelia decaocto	Collared Dove	X		X	
Streptopelia turtur	Turtle Dove				X
Clamator glandarius	Great Spotted Cuckoo				X
Cuculus canorus	Cuckoo	X		X	
Tyto alba	Barn Owl		X	X	
Bubo bubo	Eagle Owl				X
Nyctea scandiaca	Snowy Owl				X
Athene noctua	Little Owl				X
Strix aluco	Tawny Owl				X
Asio otus	Long-eared Owl	X		X	
Asio flammeus	Short-eared Owl		X	X	
Aegolius funereus	Tengmalm’s Owl				X
Caprimulgus europaeus	Nightjar				X
Apus apus	Swift	X		X	
Alcedo atthis	Kingfisher			X	
Merops apiaster	Bee-eater				X
Coracias garrulus	Roller				X
Upupa epops	Hoopoe				X

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Jynx torquilla	Wryneck			X	
Picus viridis	Green Woodpecker				X
Dryocopus martius	Black Woodpecker				X
Picoides major	Great Spotted Woodpecker		X	X	
Picoides minor	Lesser Spotted Woodpecker				X
Galerida cristata	Crested Lark				X
Lullula arborea	Woodlark			X	
Alauda arvensis	Skylark	X		X	
Eremophila alpestris	Shore Lark			X	
Riparia riparia	Sand Martin	X		X	
Hirundo rustica	Swallow	X		X	
Delichon urbica	House Martin	X		X	
Anthus campestris	Tawny Pipit				X
Anthus trivialis	Tree Pipit	X		X	
Anthus pratensis	Meadow Pipit	X		X	
Anthus cervinus	Red-throated Pipit			X	
Anthus spinoletta spinoletta	Water Pipit			X	
Anthus spinoletta littoralis	Scandinavian Rock Pipit			X	
Motacilla flava	Yellow Wagtail	X		X	
Motacilla citreola	Citrine Wagtail				X
Motacilla cinerea	Grey Wagtail		X	X	
Motacilla alba	White Wagtail	X		X	
Bombycilla garrulus	Waxwing			X	
Cinclus cinclus	Dipper				X
Troglodytes troglodytes	Winter Wren	X		X	
Prunella modularis	Dunnock	X		X	
Erithacus rubecula	Robin	X		X	
Luscinia luscinia	Thrush Nightingale		X	X	
Luscinia megarhynchos	Nightingale				X
Luscinia svecica	Bluethroat				X
Phoenicurus ochruros	Black Redstart	X		X	
Phoenicurus phoenicurus	Redstart	X		X	
Saxicola rubetra	Whinchat		X	X	
Saxicola torquata	Stonechat				X
Oenanthe oenanthe	Wheatear		X	X	
Turdus torquatus	Ring Ouzel			X	
Turdus merula	Blackbird	X		X	
Turdus pilaris	Fieldfare			X	
Turdus philomelos	Song Thrush	X		X	
Turdus iliacus	Redwing			X	
Turdus viscivorus	Mistle Thrush		X	X	
Locustella naevia	Grasshopper Warbler	X		X	
Locustella fluviatilis	River Warbler				X
Locustella luscinioides	Savi's Warbler		X		
Acrocephalus schoenobaenus	Sedge Warbler	X		X	
Acrocephalus palustris	Marsh Warbler	X		X	
Acrocephalus scirpaceus	Reed Warbler	X		X	
Acrocephalus arundinaceus	Great Reed Warbler				X

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Hippolais icterina	Icterine Warbler	X		X	
Sylvia nisoria	Barred Warbler				X
Sylvia curruca	Lesser Whitethroat	X		X	
Sylvia communis	Whitethroat	X		X	
Sylvia borin	Garden Warbler	X		X	
Sylvia atricapilla	Blackcap	X		X	
Phylloscopus trochi-loides	Greenish Warbler				X
Phylloscopus proregu-lus	Pallas's Warbler				X
Phylloscopus sibilatrix	Wood Warbler		X	X	
Phylloscopus collybita	Chiffchaff	X		X	
Phylloscopus trochilus	Willow Warbler	X		X	
Regulus regulus	Goldcrest	X		X	
Regulus ignicapillus	Firecrest			X	
Muscicapa striata	Spotted Flycatcher	X		X	
Ficedula parva	Red-breasted Fly-catcher				X
Ficedula hypoleuca	Pied Flycatcher		X	X	
Panurus biarmicus	Bearded Tit	X		X	
Aegithalos caudatus	Long-tailed Tit		X	X	
Parus palustris	Marsh Tit		X		X
Parus montanus	Willow Tit		X		X
Parus cristatus	Crested Tit		X	X	
Parus ater	Coal Tit		X	X	
Parus caeruleus	Blue Tit	X		X	
Parus major	Great Tit	X		X	
Sitta europaea	Nuthatch				X
Certhia familiaris	Treecreeper		X	X	
Certhia brachydactyla	Short-toed Treecreeper		X	X	
Remiz pendulinus	Penduline Tit	X		X	
Oriolus oriolus	Golden Oriole		X	X	
Lanius collurio	Red-backed Shrike		X	X	
Lanius excubitor	Great Grey Shrike			X	
Lanius senator	Woodchat Shrike				X
Garrulus garrulus	Eurasian Jay			X	
Pica pica	Magpie	X		X	
Nucifraga caryocat-actes	Spotted Nutcracker				X
Corvus monedula	Eurasian Jackdaw	X		X	
Corvus frugilegus	Rook	X		X	
Corvus corone corone	Carrion Crow	X		X	
Corvus corone cornix	Hooded Crow		X	X	
Corvus corax	Common Raven		X	X	
Sturnus vulgaris	Common Starling	X		X	
Sturnus roseus	Rose-coloured Star-ling				X
Passer domesticus	House Sparrow	X		X	
Passer montanus	Tree Sparrow	X		X	
Fringilla coelebs	Chaffinch	X		X	
Fringilla montifringilla	Brambling			X	
Serinus serinus	European Serin		X	X	
Carduelis chloris	Greenfinch	X		X	
Carduelis carduelis	Goldfinch	X		X	
Carduelis spinus	Siskin		X	X	
Carduelis cannabina	Linnet	X		X	
Carduelis flavirostris	Twite			X	

Latin name	English name	Breeding bird regular	Breeding bird irregular	Staging bird* regular	Staging bird* irregular
Carduelis flammea	Common Redpoll		X	X	
Carduelis hornemanni	Arctic Redpoll				X
Loxia leucoptera	Two-barred Crossbill				X
Loxia curvirostra	Common Crossbill		X	X	
Loxia pytyopsittacus	Parrot Crossbill				X
Carpodacus erythrinus	Common Rosefinch		X		X
Pyrrhula pyrrhula	Bullfinch			X	
Coccothraustes coc-cothraustes	Hawfinch		X	X	
Calcarius lapponicus	Lapland Longspur			X	
Plectrophenax nivalis	Snow Bunting			X	
Emberiza citrinella	Yellowhammer	X		X	
Emberiza hortulana	Ortolan Bunting				X
Emberiza schoeniclus	Reed Bunting	X		X	
	Sum	**88**	**50**	**207**	**104**

Staging bird* = migrants and winter visitors

** = one pair of the White-tailed Eagle is regularly breeding northeast of Wenkendorf since 2006; in 2011 another pair tried breeding east of Teschendorf, but was not successful.