Securing Biodiversity in Breckland

Guidance for conservation and research

APPENDICES to the
First Report of the Breckland Biodiversity Audit

Securing Biodiversity in Breckland:
Guidance for Conservation and Research

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First Report of the Breckland Biodiversity Audit

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Appendix 1. SSSIs full or partially excluded from the NA or ESA

Table A1. Sites of Breckland Special Scientific Interest (SSSI's) that are fully or partially excluded from either the Breckland Natural Area (NA) and or the Environmentally Sensitive Area (ESA), showing the habitats or species for which they are designated

SSSI	OS reference	Features of interest	ESA	NA
Not included, or incompletely included, in Breckland Environmentally Sensitive Area				
East Harling Common	TL998879	Pingos, fen, species	-	+
Castle Acre Common*	TF802151	Wetland	-	+
Thompson Water, Carr and Common	TL934956	Grassland, pingos, woodland, species	+†	+
Not included, or incompletely included, in Natural Area				
Wilde Street Meadow	TL710791	Grassland	+	-
Bangrove Wood	TL930722	Ancient woodland	+	+†
Not included or incompletely included, in both the NA or ESA				
Breckland Farmland	N/A	Species (Stone Curlew)	+†	+†
Boughton Fen	TF718012	Wetland	+†	-
River Nar	N/A	Flowing water	-	+†
Lakenheath Poors Fen	TL701826	Breckland grass-heath, species	-	-

Detailed methodology of weather and climate analysis

Rainfall data

Daily precipitation (total mm) data were obtained for three weather stations located in the core of Breckland (Figure 7); Elveden Hall 1930-1971, Santon Downham 1962-2009 and Thetford Water Works 1905-1990. Combining data from these stations, a composite time series was compiled spanning the period from 02/01/1905 to 01/02/2009, totalling 104 years. Elveden Hall station provided 28,338 days of the 38,017 days of this composite timeline.

To obtain a single continuous time series, and to fill in missing data for the short periods when a station was out of use, Elveden Hall was taken as a reference station. Despite the shorter time period for Elveden Hall station compared to Thetford Water Works, the data available within the period was much more complete; 95 days of missing data from Elveden Hall (99.7%) compared to 3069 days from Thetford Water Works (90.2%) The relationship between rainfall at Elveden Hall and that recorded at Thetford Hall and Santon Downham stations was modelled by univariate linear regression (with Elveden Hall as the dependent and the other stations as predictors). Data were square-root transformed prior to modelling and converted back prior to subsequent analysis. The equations for the relationships were:

Thetford: $y = 0.941 * x + 0$, $r^2 = 0.880$, df=19180

Santon Downham: $y = 0.931 * x + 0$, $r^2 = 0.869$, df=15736

Daily rainfall data were highly skewed, with many low values and therefore daily values were square rooted before modelling; the resulting modelled values were squared. These models provided an additional 9,161 days predicted from Thetford and 487 days predicted from Santon Downham. Rainfall data from 2008 and 2009 remained incomplete and were excluded from further analysis.

Total rainfall per season per year (mm) and number of extreme rainfall events per season per year were calculated. Extreme rainfall events were defined as ≥ 11.5 mm per day (11.5 mm was the 95th percentile of all rainfall events, after excluding days with zero precipitation). The number of drought events per season per year were calculated. A drought event was defined as ≥9 days (95th percentile of dataset) without precipitation.

Temperature data

Temperature data were available as a minimum and maximum temperature (°C) within a 24hr period, which began at 09:00 hrs. Some stations also record a minimum grass temperature along with minimum air temperature, however due to the incompleteness of this data these values could not be used. Data were available from Santon Downham/Grimes Grave for the period 1959-1988. The station was then moved in 1988 from Grimes Graves (located on the plateau) to Santon Downham (located in the valley of the Little Ouse River) which provided records from 1988-2008 (Figure 7). There was no overlap in the recording period of the two locations of this station so that data could not be re-calibrated with modelling. The movement of this recording station therefore, leads to the possibility that temperature recorded in the river valley at the new Santon Downham location may result in a bias towards a higher frequency of air frosts and colder minima during the last twenty years. Values for daily temperature minimum and maximum do not exhibit large variation and therefore values were not transformed before modelling

The combined Santon Downham dataset provided minimum air temperature data for 18,049 and maximum air temperature data for 18,057, of the 18,262 days from 01/01/1959 to 30/12/2008..

Appendix 2. Climate and weather anayalsis methodology

To fill the short gaps in the Santon Downham data, temperature data recorded during 1969-2003 at Honington were used to model the combined Santon Downham (dependent) data using linear regressions:

maximum air temperature $y = 0.991 * x + 0.496$, $r^2=0.989$, df=10854;
minimum air temperature $y = 1.017 * x - 1.596$, $r^2=0.885$, df=10835).

Two points should be made. First, the high coefficient of determination shows that the relationship between temperature at Honington and Santon Downham is consistent (particularly for maximum temperature) and therefore the predicted values are reliable. Second, the regression equations show that temperatures at Santon Downham, located in the heart of Breckland, are more extreme than at Honington (locate to the south-east of Breckland), with colder minima and hotter maxima.

To extend the time series over an earlier ten years, temperature data for Mildenhall from 1949-1969 were obtained and Santon Downham air temperature was modelled from Mildenhall data:

maximum air temperature $y = 0.996 * x + 0.060$, $r^2=0.984$, df=3924;
minimum air temperature $y = 1.004 * x - 2.012$, $r^2=0.878$, df=3924).

The mean of daily minimum and maximum temperatures (°C) was calculated for each season for each year. The number of days of air frosts (i.e. days where the minimum temperature was ≤0°C), per season per year was also calculated.

Appendix 3.Breckland specialists

Table A2. List of all Breckland specialists detailing species, taxonomic group and designations status, assigned guild and the number of 1 km grid squares in Breckland in which the species has been recorded in.The number of 1km squares is not given for birds as more detailed information exists than that available to the BBA. Other blanks are those which have only been recorded as 10 km records

	Recommended Taxa	ALL RDB	Rare and scarce	UK BAP	Number of 1km squares	Guild
		Entirely Restricted				
Araneae	Walckenaeria stylifrons	EN			3	OPEN/NDIST-NGRAZ
Coleoptera	Caenocara affinis	INDE			-	OPEN/GRAZ-NDIST
Coleoptera	Cryptocephalus exiguus	EN		X	3	W-NW
Coleoptera	Cymindis (Cymindis) macularis	EN			4	OPEN/GRAZ-NDIST
Coleoptera	Diastictus vulneratus	VU			10	OPEN/DIST-GRAZ
Coleoptera	Gyrophaena pseudonana	INDE			1	WOODLAND
Coleoptera	Lycoperdina succincta	VU			11	OPEN/GRAZ-NDIST
Coleoptera	Philonthus lepidus	INSU			3	OPEN/DIST-?GRAZ
Crustacean	Cypris bispinosa				4	SW
Crustacean	Dunhevedia crassa				3	SW
Diptera	Anticheta atriseta				1	SW
Diptera	Meromyza curvinervis	INSU			3	OPEN/GRAZ-NDIST
Diptera	Oxycera leonina	EN			2	LITT
Flowering plant	Artemisia campestris	VU	S:NR	X	60	OPEN/DIST-NGRAZ
Flowering plant	Scleranthus perennis	EN	S:NR	X	39	OPEN/DIST-NGRAZ
Flowering plant	Silene otites	EN	S:NR	X	129	OPEN/DIST-NGRAZ
Flowering plant	Thymus serpyllum		S:NR		84	OPEN/DIST-NGRAZ
Flowering plant	Veronica spicata		S:NR		40	OPEN/DIST-GRAZ
Flowering plant	Veronica triphyllos	EN	S:NR	X	34	OPEN/DIST-NGRAZ
Flowering plant	Veronica verna	EN	S:NR	X	60	OPEN/DIST-GRAZ
Hymenopteran	Earinus transversus				-	UNASSIGNED
		Largely Restricted				
Araneae	Meioneta fuscipalpa				1	OPEN/DIST-NGRAZ
Coleoptera	Hololepta plana				1	DEADWOOD
Diptera	Dolichopus migrans	NT			17	SW/ECOTONE
Flowering plant	Herniaria glabra		S:NR		108	OPEN/DIST-NGRAZ
Flowering plant	Phleum phleoides		S:NR		135	OPEN/DIST-GRAZ
Lichen	Buellia asterella	CR	S:NR	X	11	OPEN/DIST-GRAZ
Lichen	Squamarina lentigera	CR	S:NR	X	14	OPEN/DIST-?GRAZ
Moth	Coleophora tricolor			X	32	OPEN/DIST-GRAZ
		Primary Stronghold				
Araneae	Neon valentulus	VU			8	W-NW/GRAZ
Bird	Burhinus oedicnemus			X	-	BIRD
Coleoptera	Amara (Celia) fusca	EN		X	5	OPEN/GRAZ-NDIST
Coleoptera	Aphodius (Chilothorax) distinctus		N:B		33	OPEN/GRAZ-NDIST
Coleoptera	Bradycellus csikii	INDE			8	VARIETY
Coleoptera	Ceutorhynchus pulvinatus		N:A		18	OPEN/DIST-NGRAZ

Appendix 3.Breckland specialists

Coleoptera	Cionus longicollis		N:A		24	OPEN/DIST-?GRAZ
Coleoptera	Colon (Myloechus) appendiculatum	INSU			3	O-W
Coleoptera	Cymindis (Cymindis) axillaris		N:A		11	OPEN/GRAZ-NDIST
Coleoptera	Harpalus (Harpalus) froelichii	VU		X	15	OPEN/DIST-NGRAZ
Coleoptera	Harpalus (Harpalus) pumilus		N:A		29	OPEN/DIST-NGRAZ
Coleoptera	Harpalus (Harpalus) smaragdinus		N:B		25	OPEN/DIST-?GRAZ
Coleoptera	Leiodes flavescens	INDE			1	OPEN/GRAZ-NDIST
Coleoptera	Ocypus (Ocypus) ophthalmicus		N:A		21	OPEN/DIST-GRAZ
Coleoptera	Ocypus (Pseudocypus) fortunatarum		N:B		3	OPEN/DIST-?GRAZ
Coleoptera	Olibrus millefolii		N:B		16	OPEN/NDIST-NGRAZ
Coleoptera	Omophron limbatum	EN			3	LITT/DIST
Coleoptera	Onthophilus punctatus	INSU			10	WOODLAND
Coleoptera	Psylliodes sophiae	R			11	OPEN/DIST-NGRAZ
Coleoptera	Ptinella britannica	INSU			1	W-NW
Coleoptera	Tychius parallelus		N:A		8	O-S/NDIST-NGRAZ
Diptera	Cryptonevra consimilis	VU			2	W-NW/NGRAZ
Diptera	Dolichopus plumitarsis	EN			1	W-NW
Diptera	Fannia ringdahlana		N		3	WOODLAND
Diptera	Hilara hirtella	NT			5	LITT
Diptera	Machimus arthriticus				2	OPEN/DIST-GRAZ
Diptera	Meromyza mosquensis		N		3	OPEN/SWARDM
Diptera	Oedalea oriunda	DD			1	DEADWOOD
Diptera	Trachysiphonella carinfacies				1	OPEN/GRAZ-NDIST
Diptera	Trixoscelis marginella		N		10	O-S/DIST-GRAZ
Flowering plant	Medicago sativa		S:NS		307	OPEN/DIST-NGRAZ
Flowering plant	Muscari neglectum	VU	S:NR	X	90	OPEN/DIST-NGRAZ
Flowering plant	Petrorhagia prolifera		S:NR		7	OPEN/DIST-NGRAZ
Hemiptera	Arenocoris waltlii	VU			4	OPEN/DIST-GRAZ
Hemiptera	Graptopeltus lynceus		N:B		19	OPEN/DIST-GRAZ
Hemiptera	Ortholomus punctipennis	R			4	OPEN/SWARDM
Hemiptera	Psammotettix albomarginatus		N:B		2	OPEN/DIST-GRAZ
Moss	Physcomitrium eurystomum	CR	S:NR	X	2	LITT/DIST-GRAZ
Moth	Emmelia trabealis	EN			7	OPEN/DIST-NGRAZ
Moth	Falseuncaria degreyana				8	OPEN/DIST-?GRAZ
Moth	Hadena irregularis	EN			9	OPEN/DIST-NGRAZ
Moth	Lithostege griseata	R		X	100	OPEN/DIST-NGRAZ
Moth	Scopula rubiginata	R			61	OPEN/GRAZ-NDIST
	Secondary Stronghold					
Araneae	Agroeca cuprea		N:A	X	7	OPEN/DIST-GRAZ
Araneae	Micaria silesiaca		N:B		5	OPEN/DIST-?GRAZ
Araneae	Ozyptila scabricula		N:B		15	OPEN/DIST-GRAZ
Araneae	Steatoda albomaculata		N:B		22	O-S/DIST-GRAZ
Bird	Lullula arborea			X	-	BIRD
Coleoptera	Acrotrichis (Acrotrichis) pumila	INSU			3	W-NW/DETRI
Coleoptera	Amara (Amara) lucida		N:B		23	OPEN/GRAZ-NDIST
Coleoptera	Amara (Bradytus) consularis		N:B		21	OPEN/DIST-?GRAZ
Coleoptera	Amara (Celia) infima		N:A		8	OPEN/DIST-GRAZ
Coleoptera	Amara (Percosia) equestris		N:B		24	OPEN/DIST-?GRAZ
Coleoptera	Aphodius (Agrilinus) sordidus		N:A		3	OPEN/GRAZ-NDIST
Coleoptera	Aphodius (Planolinus) fasciatus		N:B		9	VARIETY/CARRION-DUNG

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Coleoptera	Augyles hispidulus	R			3	LITT/DETRI
Coleoptera	Aulacobaris lepidii		N:A		1	UNASSIGNED
Coleoptera	Badister (Baudia) peltatus		N:A		4	LITT/NGRAZ
Coleoptera	Bagous (Abagous) glabrirostris		N:B		1	W-NW/DETRI
Coleoptera	Bagous (Abagous) lutosus	EN			1	LITT/NGRAZ
Coleoptera	Bagous (Abagous) puncticollis	EN			1	SW/AQVEG
Coleoptera	Bembidion (Trepanes) octomaculatum	EX			2	LITT/DETRI
Coleoptera	Bidessus unistriatus	EN		X	6	LITT/DIST
Coleoptera	Cardiophorus asellus		N:B		24	OPEN/DIST-GRAZ
Coleoptera	Carpelimus lindrothi		N		5	LITT/DIST
Coleoptera	Cassida nebulosa	INDE			40	OPEN/DIST-NGRAZ
Coleoptera	Ceutorhynchus pumilio		N:A		5	OPEN/DIST-NGRAZ
Coleoptera	Chrysolina marginata		N:A		8	OPEN/DIST-GRAZ
Coleoptera	Chrysolina sanguinolenta		N:A		22	OPEN/DIST-NGRAZ
Coleoptera	Corticarina truncatella	INSU			1	OPEN/NDIST-NGRAZ
Coleoptera	Cryptolestes spartii		N:A		8	O-S
Coleoptera	Dryops (Dryops) anglicanus	R			13	SW
Coleoptera	Dryops (Dryops) griseus	R			13	W-NW
Coleoptera	Enochrus nigritus	R			34	SW/ECOTONE
Coleoptera	Enochrus quadripunctatus		S:NS		28	SW
Coleoptera	Euheptaulacus villosus		N:A		5	OPEN/DIST-GRAZ
Coleoptera	Harpalus (Harpalus) servus		N:B		7	OPEN/DIST-GRAZ
Coleoptera	Harpalus (Pseudoophonus) griseus				1	OPEN/DIST-?GRAZ
Coleoptera	Hydraena palustris	VU			12	SW
Coleoptera	Hygropora cunctans	INSU			1	W-NW/SWARDM
Coleoptera	Licinus depressus		N:B		34	OPEN/DIST-GRAZ
Coleoptera	Masoreus wetterhallii		N:A		15	OPEN/DIST-?GRAZ
Coleoptera	Medon castaneus	INDE			2	OPEN/NDIST-NGRAZ
Coleoptera	Nicrophorus vestigator		N:A		11	OPEN/GRAZ-NDIST
Coleoptera	Onthophagus (Paleonthophagus) nuchicornis		N:A		8	OPEN/DIST-GRAZ
Coleoptera	Ophonus (Metophonus) laticollis		N:A	X	11	OPEN/NDIST-NGRAZ
Coleoptera	Panagaeus bipustulatus		N:B		18	OPEN/SWARDM
Coleoptera	Phloeotribus rhododactylus				6	UNASSIGNED
Coleoptera	Trox sabulosus		N:A		1	OPEN/GRAZ-NDIST
Diptera	Acinia corniculata	EN			2	OPEN/NDIST-NGRAZ
Diptera	Eutolmus rufibarbis	R			44	OPEN/NDIST-NGRAZ
Diptera	Exechia dizona	DD			4	WOODLAND
Diptera	Mycetophila confusa		S:NS		3	W-NW/WOOD
Diptera	Myopa strandi	R			9	O+W
Diptera	Odontomyia angulata	EN			4	SW
Diptera	Odontomyia argentata	VU			8	LITT
Diptera	Oxyna flavipennis		N		10	OPEN/GRAZ-NDIST
Diptera	Pelidnoptera nigripennis		N		11	WOODLAND/DAMP
Diptera	Pherbellia argyra	VU			8	LITT
Diptera	Pherbellia knutsoni	R			4	OPEN/SWARDM
Diptera	Psacadina zernyi	VU			5	LITT/SWARDM
Diptera	Siphonella oscinina		N		5	UNASSIGNED
Diptera	Thereva plebeja		N		12	OPEN/DIST-GRAZ
Flowering plant	Apera interrupta				211	OPEN/DIST-NGRAZ

Appendix 3.Breckland specialists

Flowering plant	Arabis glabra	EN	S:NS	X	87	OPEN/DIST-NGRAZ
Flowering plant	Carex ericetorum	VU	S:NS	X	61	OPEN/GRAZ-NDIST
Flowering plant	Galium parisiense	VU	S:NS		101	OPEN/DIST-?GRAZ
Flowering plant	Medicago minima	VU	S:NS		230	OPEN/DIST-GRAZ
Flowering plant	Orchis militaris	VU	S:NR		2	O-S/DIST-GRAZ
Flowering plant	Scleranthus annuus	EN	S:NS	X	223	OPEN/DIST-NGRAZ
Flowering plant	Silene conica	VU	S:NS		89	OPEN/DIST-NGRAZ
Hemiptera	Arenocoris falleni				13	OPEN/DIST-GRAZ
Hemiptera	Chlamydatus (Euattus) pulicarius		N:B		8	OPEN/DIST-GRAZ
Hemiptera	Odontoscelis (Odontoscelis) lineola		N:B		17	OPEN/DIST-GRAZ
Hymenopteran	Cerceris quinquefasciata	R		X	33	O-S/DIST-GRAZ
Hymenopteran	Colletes (Colletes) marginatus		N:A		22	WBS
Hymenopteran	Lasioglossum (Lasioglossum) sexnotatum	EN			2	OPEN/JUXT
Hymenopteran	Nomada argentata	R			6	OPEN/JUXT
Hymenopteran	Oxybelus argentatus		N:A		19	WBS
Hymenopteran	Rhopalum (Corynopus) gracile	VU			2	W-NW/SWARDM
Moth	Cochylidia heydeniana				6	OPEN/DIST-NGRAZ
Moth	Coleophora clypeiferella				3	OPEN/DIST-NGRAZ
Moth	Coleophora vestianella				2	OPEN/DIST-NGRAZ
Moth	Eulamprotes wilkella		N:B		13	OPEN/DIST-?GRAZ
Moth	Evergestis extimalis		N:B		27	OPEN/DIST-NGRAZ
Moth	Heliophobus reticulata			X	26	OPEN/NDIST-NGRAZ
Moth	Heliothis viriplaca	R			67	OPEN/NDIST-NGRAZ
Moth	Loxostege sticticalis	EX			16	OPEN/DIST-NGRAZ
Moth	Noctua orbona			X	130	OPEN/SWARDM
Moth	Oxyptilus distans				30	OPEN/DIST-?GRAZ
Moth	Phibalapteryx virgata				64	OPEN/NDIST-NGRAZ
Moth	Platytes cerussella				67	OPEN/DIST-?GRAZ
Moth	Thisanotia chrysonuchella		N:B		45	OPEN/SWARDM

Appendix 4.Habitat and ecological processes and structures used to assess the requirements of species

Table A3. Broad habitat, micro habitat, ecological structuresd and process and management action variables identified and used for assigning ecological requirements of species

BROAD HABITAT CLASSES - *Major habitat types recognised by LCM 2000: the finer-scale details of the structure or condition (e.g. grass length, etc.) at any particular site will depend on management* and **SUB-HABITAT CLASSES -** *Recognised by stakeholders & workshop participants*
Running water – permanent flowing water incl. streams, rivers
Standing Water – Permanent standing waterbodies
Brackish waterbodies
Fluctuating waterbodies – Fluctuating waterbodies
Pingos
Fen – Fen, marsh & swamp vegetation which is permanently, seasonally or periodically waterlogged.
Mature fen carr
Bog – bog and mire (includes ericaceous, herbaceous and mossy vegetation in areas with peat)
Moorland – upland grass and dwarf-shrub heath communities on organic soils
Saltmarsh – coastal vegetated saltmarsh, distinct from littoral sediment (mud and sand flats with algae)
Shingle – coastal stable shingle
Sand dune – either coastal dune, or inland lichen-rich dune-heath or stable grey dune communities dominated by *Cladonia* spp.
Wet Grassland – seasonally flooded or waterlogged, grazed or cut wet meadow / pasture
Neutral grassland – managed and rough neutral grassland communities, including semi-improved grasslands
Improved grassland – swards dominated by agriculturally 'preferred' species, generally 'improved' by reseeding and/or fertilizer treatment, incl. long term set aside.
Acid Grassland – Lowland acidic (unimproved / semi-natural) grassland / grass heath on acidic sandy soil
Calcareous Grassland – Lowland chalk (unimproved / semi-natural) grassland / calcareous grass heath
Lowland Heath – Lowland dry dwarf-shrub heathland (Calluna)
Arable & horticulture – Annual crops, recent leys, freshly ploughed land, rotational setaside, but excluding perennial crops such as berries and orchards. Once setaside is substantially vegetated with weeds or rough grass, it is considered improved grassland.
Brown-field
Gardens
Scrub
Hedgerow
Pine belts
Wood pasture – veteran trees in grazed pasture or parkland
Coniferous woodland
Broadleaved woodland – Broadleaved/mixed woodland
MICRO-HABITAT STRUCTURES - *Micro-habitat structures that may occur within one or more habitats*
Wet – very wet or water logged habitat
Littoral/Lake margins – the wet margins of running or standing and permanent or fluctuating waterbodies (i.e. draw down zones)
Clear water – clear, non silty/peaty water
Xeric – very dry, arid habitats
Aquatic vegetation – standing or runningwater with rich aquatic vegetation
Sandy
Wind-blown sand – e.g. Accumulated along fencelines, field margins, banks and pine belts
Soft cliffs – coastal landslips + coastal soft rock cliffs
Bare ground

Appendix 4.Habitat and ecological processes and structures used to assess the requirements of species

Stones – Exposed stones

Early Successional – initial early-successional phase of vegetation establishment after physical disturbance

Warm sunny areas – often associated with open bareground, but can be in woodland (e.g. open glades)

Banks – embanked slopes

Short grass – short grass sward

Broken turf

Compacted – compacted bare (moisture retaining) ground, e.g. along track wheelings.

Rabbit scrapes – dug soil, burrow aprons, latrines and scrapes

Chalkpits – chalk or marlpits (with unstable slopes)

Chalk spoil – mounds of excavated chalk rubble

Sandpits, Gravelpits – Sand + gravel pits (with unstable slopes)

Walls/Concrete features – Stone walls, or concrete features (i.e. pavements/runways)

Mesic – humid/temperate habitats

Unsprayed margin – unsprayed cropped cereal field margins

Uncropped margin – cultivated uncropped field margins

Uncultivated margin – uncultivated field margins (e.g. Grass, cut)

Winter stubble

Fallow arable – Fallow arable still some open character, long-term fallow with closed sward may be classified as improved grassland

Obligate species –species is singularly dependent on a specific prey/plant/larval foodplant/host species

Flower rich areas

Perennial herbs – ungrazed or lightly grazed perennial herbs providing nectar, e.g. Scabious, *Centaurea* - knapweed (If grazing tolerance of the associated perennial species is known, then the grazing column is also scored)

Ruderal herbs – Flowering ruderal plant communities providing nectar and or maturing seedheads, or larval foodplants (If grazing tolerance of the associated ruderal species is known, then the grazing column is also scored)

Sward mosaics – variety of sward heights and varied grassland structure.

Grass/heath with scrub mosaics – juxtaposition of grassland or heathland habitat with some scrub

Pioneer heather – pioneer or grazed cushions of heather in open ground

Mature heather

Livestock Dung

Rabbit Dung

Moss

Detritus/Leaf Litter

Fungi/Lichen

Carrion

Dead herbaceous stems

Burrows – rabbit and mole burrows/nests, badger setts etc.

Standing deadwood – if you know whether the species requires deadwood to be shaded, or exposed in sunlight, please add this information as a note (in 'Other')

Fallen deadwood

Veteran trees – ancient trees within woodland or open areas

Sap runs

Root-plates – exposed vertical rootplate (incl. attached chalk or soil) of windblown/grubbed up trees, including forestry stump-rows

ECOLOGICAL PROCESSES - *Dynamic actions, transformations or processes that create and modify habitats and micro-habitats; these may include management activities*

Enrichment – Moderate nutrient enrichment (e.g. Nitrogen deposition, cessation of biomass cropping, application of organic fertiliser)

Appendix 4.Habitat and ecological processes and structures used to assess the requirements of species

Eutrophication – Extreme nutrient enrichment (e.g. application of inorganic fertiliser, run-off from manure piles, etc.)

Nutrient limitation – stunting of vegetation, reduced height of individual plants, slow vegetation closure and prolonged open conditions following disturbance

Low intensity grazing – light or low intensity grazing (i.e. extensive grazing)

Intensive grazing – hard grazing (e.g. to <2cm, with some mineral soil exposed)

Rabbit grazing

Sheep grazing

Cattle grazing

Horse grazing

Light Trampling

Heavy Trampling – e.g. by cattle

No grazing

Biomass harvest – removal of biomass (e.g. Litter collection, forage harvesting)

Low-intensity disturbance – small scale physical disruption of vegetation (e.g. by rabbit scrapes, mole hills, scarification)

Medium-intensity disturbance – moderate disruption creating extensive bare ground, but disrupting rather than destroying perennial roots (e.g. rotovation, discing, plough cleaning)

Infrequent major disturbance – occasional major disruption of sward killing majority of perennial root matter (e.g. infrequent ploughing, subsoiling, trenching, pipelines)

Frequent major disturbance – preventing vegetation establishing, repeatedly mixing and destabilising soil (e.g. annual cultivation or ploughing, continued motorcycle scrambling, active mineral extraction)

Turf removal – removal of sward, root mat, litter and organic soil layer to expose mineral peat, mineral soil or chalk (e.g. turf digging, bulldozing)

Light Burn – light controlled burn (e.g. Feb/March)

Intense Burn – e.g. Accidental summer burn

Abandonment – Fallowing of arable / cessation of cultivation

Sward Closure – maturation of swards to a dense structure, even if closely grazed

Bracken invasion – advance of bracken into open ground

Scrub invasion

Wind Erosion – wind erosion of surface soil, exposing stones or tussock bases

Droughting

Silting up – Detritus accumulation (e.g. in ponds)

Poaching – trampling / rutting of muddy pond or ditch margins or wet grassland ('controlled abuse')

Appendix 5. Breckland sites where physical disturbance has been used for conservation management

Table A4. Database of plots and sites where physical disturbance has been carried out as a conservation management tool

Site Name	Date	Physical disturbance	Area of disturbance	Frequency of disturbance
			SSSIs	
East Wretham	79-92	Ploughing	0.4 ha	repeated infrequently
East Wretham	1980-90	Ploughing (ungrazed)	single short strip	
East Wretham	2000-01	Turf removal	6 plots -Total area 0.7ha- Two depth treatments (5cm and 10cm)	Single treatment
East Wretham	2001	Turf Cutting - over runway to expose decaying concrete (grazing excluded)	0.1-0.2ha	
Thetford Heath	1995-present	Rotovation	c. 3ha	Annual (October)
Thetford Heath	2005-present	Rotovation, Turf Removal	Turf Removal = 3 areas, c. 1ha (2006), Rotovation= 3 areas c. 2ha	R = Annual (October)
Thetford Heath	2005	Turf Removal in chalky areas	Turf Stripping = 3 plots	single treatment, to mineral chalk
Thetford Heath	1956-1977	Rotovation	up to 10 Rotovated Plots	most years
Thetford Heath	1989-present	Rotovation	six plots from 1989, five continued to present	1989-1995 spring, every 2-3 yrs: from 1996 annually in autumn to winter
Thetford Heath	1978-present	Rotovation	Firebreak (Southern + Eastern boundaries)	Annually (autumn/winter) 3m width; additional 1m margin on part of s margin firebreak repeated every 2-3 yr for Scleranthus perennis
Weeting	2005-present	Turf Removal		
Weeting	1959-70's?	Rotovation	various plots	annually
Weeting	1990-present	Rotovation	3 plots (>1ha)	Initially spring every 3yr 1990-95 , from c1996 annually autumn / winter
Weeting	1998-present	Rotovation	southern large plot from 1998	annually autumn / winter
Weeting	1990?	Plough/Rotovate	4 replicates, blocked experiment (c.2ha)	treatment for 2 years only
Wangford Warren	1995-present	Rotovation	0.5 ha	Annual
Maidscross Hill	2009	turf removal planned, not known if implemented		
Cavenham Heath	2005-present	rotovating, turf stripping and soil removal		
Cavenham Heath	1995-05	Rotovation	0.4 (2 plots)	
Brettenham Heath	1995-present	Rotovation	firebreak (c. 4800m2), stone curlew plot (0.5ha)	firebreak = 1-2 times a year, SC plot =annually
Brandon Artemisia Reserve	2000-05	Harrowing (litter removal and small disturbance)	very small	?
Brandon Artemisia Reserve	1995-00	Turf Cutting	very small	?
Brandon Artemisia Reserve	1990-95	Rotovation	very small	?
Little Heath	c2000-03	turf stripping: ditch and chalk bank created	?	single treatment
Deadman's Graves (lichen site)	c2000-03	turf stripping: ditch and chalk bank created	?	single treatment
Bridgham Heath		2-3 rotovated plots for SC	?	annual?
STANTA		sprayed off plots	?	annual?
STANTA		rotovated plots for SC	?	annual?
Lakenheath Warren	?	Rotovated verge strip – planned not known if done	?	annual?
Dead Mans Grave	2008	Rotovate Scleranthus perennis	?	every 3-5years, recently done autumn 2008
Dead Mans Grave	?	Turf Cutting, Bank/ditch creation	?	Once?
Avenue Heath	?	"lightly cutlivated areas of Veronica verna"	?	
Berners Heath	?	Rotovation	?	every 3-5 years

Appendix 5. Breckland sites where physical disturbance has been used for conservation management

Foxhole	?	Planned 1ha rotovation for SC, not yet implemented?	?	
Weather and Horn	?	Rotovation (firebreak around weather, SC plots – planned not known if done	?	
		FC experimental plots		
Weeting, Munford, Grimes Graves, Elveden,	Feb-2009	Discing	150x3m (16 plots)	Once
Thetford, Munford, Elveden,	Feb-2009	Forage	150x3m (10 plots)	Once
Thetford, Munford, Elveden, Cranwich,	Feb-2009	Plough (agricultural)	150x3m (19 plots)	Once
Thetford, Grimes Graves, Weeting, Elveden, Cranwich,	Feb-2009	Plough (forest)	150x3m (22 plots)	Once
Thetford, Grimes Graves, Elveden,	Feb-2009	Swipe	150x3m (10 plots)	Once
Mumford, Weeting, Elveden,	Feb 2009 and Dec 2009	Turf Strip	150x3m (19 plots)	Once
		RNR Sites		
Whinburgh	?	scarification	<0.1ha	?
Cranwich	?	scarification	<0.1ha (2 sites)	?
Thetford	?	scarification	<0.1ha (3 sites)	?
Caston (B1077 - Carbrooke Hill)	?	scarification	<0.1ha	?
Mundford (A134)	?	scarification	<0.1ha	?

Minutes of BBA Species Ecology Workshop
5th October 2009

Attendees

Commissioning Group & UEA:
Hannah Mossman, Paul Dolman, Chris Panter, Neil Featherstone, Scott Perkin, Bev Nicholls, Gen Broad, Neal Armour-Cleu, Tim Pankhurst, Martin Horlock

Species Experts:

Fungi:	Tony Leech
Lichens:	Peter Lambley
Bryophytes:	Robin Stevenson
Vasc Plants:	Yvonne Leonard, Ian Simper, Nick Gibbons, Martin Sanford
Hymenoptera:	Doreen Wells (ants), Nick Owens, Tim Strudwick, Adrian Knowles
Molluscs:	Roy Baker
Diptera:	Ian Rabarts
Coleoptera:	Martin Collier, Duncan Sivell (*Buglife,* Diptera & Coloeptera)
Spiders:	Scott Pedley
Lepidoptera:	Sharon Hearle, Rob Parker, Andy Brazil, Gerry Haggett, Chris Jones, Tony Pritchard
Odonata:	David White

General Discussion

What cut-off date should we use for records?

- agreed no consistency between groups in terms of timing of bulk of records or monitoring effort through time, so not possible to apply a single cut off based on data distribution; no a priori basis for taking a 50% threshold.
- Distribution of ruderal and other Breckland species is sporadic so need to consider using a series of time slices - Broad slices capture intermittent and shifting distribution of sporadically appearing species.
- General agreement that slices would be the best way forward and slices of 20 yrs agreed most appropriate - rather than “before and after”. Also general agreement that complete historical distribution required.

Other points

- Vipers bugloss moth and spotted carpet moth were very common but both disappeared in 1968. Verge spraying a big contributor
- Decline in lichens post mid 1980's so cut off in late 1980s suggested
- Cut-off post 1989 (i.e. circa introduction of ESA management) relevant
- Note that recent rise in GPS allows much more precise recording compared to 1 or 10 km recording in past.

Appendix 6. Minutes of the BBA Species Ecology Workshop

Assigning weighting priorities

- General agreement that classification of BAP species is inconsistent among groups (due to inconsistent data quality and knowledge), and thus problematic
- However, note that BAP species whilst not rare may be flagship species and good indicators for other species.
- General agreement that biggest weighting should go to Breckland speciality rather than national rarity.
- We should separate criteria SEPARATE and not combine in a single index of importance
- BBA report will generate separate maps – for each criteria, within each time period, for each group - Hence map:
- rarity (RDB, NR, NS, etc.);
- BAP,
- Breckland specialist (restricted or largely restricted to Breckland within the UK);
- Breckland stronghold (centre of distribution important to sustaining species within UK);
- Coastal species rarely occurring elsewhere inland apart from Breckland

Other points

We should note that particularly for Diptera, Breckland species are a subset of wider axis of chalk species – i.e. many are not actually Breckland specialists.

To define Breckland Specialists - need to accept 'expert opinion' for most groups, quantitative data only available for spiders, vascular plants?

Outcomes

- The process was very important and successful in generating engagement across all groups - many specialists asked to take away, or be sent, the priority list so that they could annotate this subsequently.
- A number of suspect records were identified, further synonyms identified, and some species records requiring caution (e.g. species with frequent garden escapes) highlighted
- All groups provided important information on the autecology of some species.
- The experts within the most species rich groups were over-whelmed!
- Species ecology and Breckland specialist info received is highly incomplete for the most species rich groups (e.g. fungi, coleoptera, lichens, bryophytes) requiring subsequent and further engagement with specialists
- Lepidoptera 'priority' information combined multiple criteria (rarity, Breckland speciality) into the assessment of 'importance', further separate information of priority and Breckland Speciality will need to be sought
- Importantly, most groups (including vascular plants, lepidoptera, lichens/fungi/bryophytes, formicidae, aculeate hymenoptera) produced a synthesis of important processes, although this was not achieved for all invertebrate sub-groups.

Minutes of BBA Management Workshop
29th October 2009

Attendees

Neal Armour-Chelu (FC), Gen Broad (Suffolk Biodiversity Partnership), Dorothy Casey (SWT), Tim Cowen (RSPB), Paul Dolman (UEA), Neil Featherstone (Brecks Partnership), Gerald Gray (Hilborough Estate), Matt Ginn (NE), Ben Heaver (SBRC), Sue Hooton (Suffolk County Council), Martin Horlock (NBIS), Yvonne Leonard, Ian Levett (NE), Hannah Mossman (UEA), Bev Nicholls (NE), Bill Nickson (NE), Mary Norden (RSPB), Andy Palles-Clark (Suffolk County Council), Tim Pankhurst (Plantlife), Chris Panter (UEA), Scott Perkin (Norfolk Biodiversity Partnership), Nick Sibbett, Mel Stoke (NWT), Mike Taylor (NE)

Objectives

- Examine effects of the full range of management techniques to provide for Breckland biodiversity
- Explore effectiveness of current approaches and assess innovative techniques

Agenda

09.30 *Coffee and tea, welcome*

10.00 **Presentation**: Conserving Breckland biodiversity: What is it, Where is it and How can we do it ?
(Hannah Mossman & Paul Dolman, UEA; Bev Nichols NE)
Questions, discussion, capturing further management information

11.15 *BREAK - coffee and tea*

11.30 **Presentation**: Case studies of biological records from key sites - is the information adequate? What monitoring is possible and how do we do this?
(Hannah Mossman, UEA)
Questions, discussion, approaches to monitoring

12.15 *LUNCH (45 mins)*

13.00 **Workshop introduction**

13.15 Break into small groups of 4-5 people plus facilitator and scribe
Each group to be provided with: OS map; list of conditions (habitats, microhabitats, processes) with blank space to input management prescriptions and notes; a list of questions (below).
Each group to answer the questions listed below:

15.00 *BREAK – coffee and tea*

15.20 **Feedback session** - reporting by facilitators

16.00 **Concluding remarks**

Notes

Question A: Does what we do work?

This depends on a site's objectives and targets, and is therefore site-specific:

- There are factors outside our control – climate/weather
- Agri-env schemes generally constant/regular intervention
    - May need to be more episodic for certain assemblages
    - Need to monitor/ survey ousting works.
    - May need new measures/capital inventions available through scheme.

    - May not be appropriate prescriptions for species/assemblages.

- Some management is working (to a degree) for some notified species, but we simply don't know about the rest. Assessments of effectiveness are hampered by the fact that there is no real monitoring and that the recording system is not working particularly well. (There are problems with information flows and records are not being passed on to the site managers).
- Key importance of having strong, one-to-one relationships between land managers and officers in organisations such as Natural England.
- Some sites managed primarily as a public amenity. This makes it difficult to achieve species targets. Management practices may be orientated more towards "visual" achievements than biodiversity gains.
- There is some conflict between the needs of stone curlews and wood lark, as the former require bare ground whilst the latter require tufts of grass (which sheep tend to remove).

Question B: What are the practicalities, the evidence of effectiveness and the costs of management techniques, to produce the required conditions?

- In theory, the condition assessments that are carried out for SSSIs should provide the evidence base. However, in practice, the group felt that the assessments do not provide sufficient information. For example, because the condition assessments are carried out at six-yearly intervals, they do not detect changes sufficiently quickly.
- Favourable condition tables identify attributes and targets. However, these are based on generic, national criteria. Although the tables are supposed to be tailored to specific sites, in practice, this rarely happens. As result, the criteria that are being used to manage/monitor sites in the Brecks are often not as "locally distinct" as they should be.
- At Hillborough, "effectiveness" is assessed primarily by counting the numbers of grey partridge in the spring and autumn; stone curlews are also closely monitored by the RSPB. Gerald Gray also suggested that another indicator that can provide a measure of "ecosystem health" is the number of predators controlled each year (eg, brown hares are controlled on one day each year, so there is a relatively constant level of effort). Gerald also noted that management effectiveness is assessed through the personal field observations of staff.
- At Knettishall, effectiveness is measured by using a number of approaches, including condition assessments, fixed point photography and invertebrate surveys.
- At Weeting, the focus is on the number of stone curlews.
- Timing: The group noted that management interventions often have to be carefully timed, eg, in order to take account of weather and the needs of particular species. For example, it is important to avoid disturbing young grey partridge chicks, particularly during cold weather; the rounding of sheep at Weeting is timed to avoid disturbing stone curlew chicks; and rotovation is carried out between October and December.
- As a general observation, managers noted that they are primarily concerned about "staying within budget", and are perhaps less concerned about trying to assess "cost effectiveness" of particular interventions.
- Timing is critical for certain species.
- Management practices – recorded at estate level, may not be by recorders.
- Important to record species along with state/habitat practices
- Activities such as droving – not recorded
- Assemblages arisen through management practices as a by product – we now manage in reserve

- Grazing often very many inflexible. Phrases such as sheep/cattle is meaningless – move towards a "picture" not a method/prescription
- If grazing is very well done it isn't cheap – need to take sheep on and off, lots of fencing
- Must be more radical with grazing. Sometimes needs of animal > needs of conservation
- 20 ponies one year – 10 the next, what are you going to do with the other 10!
- Grazing now doesn't match old grazing management

Question C: What are the constraints to successful conservation (practical, costs, knowledge)?

- It is not possible to get onto sites at critical times (eg, for monitoring), because of the perceived need to avoid disturbing stone curlews. However, the group felt that stone curlews are less sensitive than generally believed and that higher levels of small-scale disturbance should be permitted, when access is required for monitoring or management purposes.
- The need to balance multiple objectives at most sites (eg, military training at Stanta, public access at Knettishall, commercial vegetable growing at Hillborough) leads to conservation compromises.
- This situation is further exacerbated by the absence of clearly-defined management objectives for some sites.
- Knowledge is widely scattered and there is a need for this to be pooled and made more accessible. In addition, managers often do not receive records from their sites.
- There is a lack of knowledge about wider biodiversity (beyond notified species). One result of this is that managers do not have the confidence to try different approaches and techniques. Lack of awareness of multiple benefits of differing taxa – plant life will benefit Coleoptera.
- Staff tend to be posted at sites for relatively short periods of time. As a result, they rarely have the opportunity to build up a depth of knowledge, experience and familiarity with the area they are managing. This also means that they do not have the confidence to experiment with new management techniques; they tend to be cautious and stick to methods that have already been used.
- Costs - insufficient funding and capacity are both significant constraints.
- Competing pressures
- Scale/fragmentation
- Capacity of resources
- Availability of suitable livestock/appropriate livestock
- Knowledge of cause/effect of practices
- Designation of sites - limitation to innovative practices
- Perceived wisdom driving management practices when practices that challenge that wisdom may be more appropriate
- Awareness of special nature of area
- Availability of knowledge of site/species/etc.

Question D: Are there examples of sites available for monitoring where innovative management has been implemented?

- Availability of information is a limitation

- It would be interesting to look at the plant communities that have colonised the old stone curlew plots at Stanta.

- It would also be interesting to look at the "hills and valleys" area at Weeting, where a digger was used to create a series of trenches, banks and south-facing slopes.
- Sites may be monitored for limited taxa – birds not plants
- Rideside plots – FC
- Butterfly Cons – Grey carpet moth. Flixweed – may not be monitored for plants
- Ex-arable site – Ropers Heath. 30 ha fallow site, arable site 15 years
- Thetford NNR
- Santon Downham – former arable site 30 ha – meadow restoration work
- South facing sites – Stanta, Maidscross Hill
- Innovative management – Dartmoor ponies

Stone curlew plots. Plots are quite successful on arable sites, although not as successful as grass heaths. Plots are sometimes rotovated and are sometimes sprayed. Some plots are not mentioned anywhere or reported on, i.e. plots at Elveden and Lakenheath Warren.
Funding: initially from the Stone curlew recovery project, RSPB are now trying for HLS on sites. Reporting from the plots doesn't include other species.
Timing: plots are rotovated half at a time, i.e. every 2 years.
Size: 2 ha

Grey carpet moth plots
Butterfly Conservation put in 2 irregular sized plots of about 50m x 50 m. Rotavation and turf strip.

Question E: What monitoring is most useful managers to implement within constraints?

- The group felt that it would be useful for site managers to have access to more training and guidance on monitoring.
- It was suggested that it would be useful to develop simple, standardised monitoring pro formas that could be given to the "man on the tractor", so that site managers and staff can collect data in the course of their day-to-day duties.
- Ian Levett mentioned that NE is seeking to develop custom-designed monitoring forms for sites in the Brecks, tailored to specific units.
- As a specific information requirement, it was noted that there is a need at Stanta for information about the location of bat roosts in trees.
- It was suggested that one of the outputs from the project should be a "dating service", which would seek to match recorders/taxonomic experts with sites where there is a need for more recording.
- We have been too "precious" with our Breckland sites and that it is now time to "take the gloves off". We have "cotton wooled" the environment for too long. For example, foxholes dug at STANTA have been filled back in…. why not simply leave them and see what happens?
- Fixed point photography for habitats
- Aerial photographs
- Indicator species – should be available – should be developed
- Beware of extrapolation from one or two criteria – onion fields for stone curlew
- Use BBA to create awareness of sites and make links to taxa recorders
- Monitoring should be more palatable/entertaining
- Be clear of monitoring objectives before undertaking management prescriptions
- Consider all available information and make considered judgement

Constraints to monitoring are time, funding and expertise particularly for inverts.

Question F: What further experimental work is required to better inform management?

- The effects of burning
- Nutrient flows
- The effects of agricultural pesticides/herbicides on arable species of conservation concern, eg, those found in arable field margins, cultivated headlands, etc.
- Compaction
- Integrated management approaches, eg, incorporating a field margin into the edge of a heath
- How are mechanical management techniques working?
- Monitor agricultural margins
- There's a mismatch between broadscale generic prescriptions and regional areas such as the Brecks. We need to know which prescriptions to advocate
- Species autoecological factors
- Collate practices in other relevant areas
- More traditional practices now absent – wild boar/stock droving
- Gang mowing and other mechanial intervention
- Cycle timings i.e. Cultivation – fallow
- Site connectivity – physical or processes
- Use of organic manure – heathlands
- South facing slopes
- Sheep grazing:
    - grazer vs conservation bodies
    - what effects effectiveness?
- Need to monitor for long enough period to determine success/failure
- Mowing introduced for perennial knawel but increased rabbit number devastated any plant increases
- Soil organic matter
- Bracken control with less winter frosts.

Minutes of BBA Arable Management Workshop
22nd Feburary 2010

Attendees

Dorothy Casey (SWT), Tim Cowan (RSBP), Paul Dickinson (Elveden Estate), Paul Dolman (UEA), Neal Featherstone (Brecks Partnership), Gerald Gray (Hilborough Estate), Gerry Haggart (Entomologist), Sharon Hearle (Butterfly Conservation), Bev Nichols (NE), Bill Nickson (NE), Monica O'Donnell (NE), Tim Pankhurst (Plantlife), Chris Panter (UEA), Ann Sherwood (ADAS), Emily Swan (NE), David Whiting (NE)

Objectives

To capture the experience and expertise of advisers, ecologists and species specialists, to inform approaches for managing and enhancing arable land in Breckland, especially for species particularly characteristic of the area.

Specific objectives were:

- Review knowledge about what species are where, and what management they require
- Examine the effects of different field margin management – what species benefit; what vegetation results; what influences these outcomes
- Develop prescriptions for arable options (such as cultivated margins, conservation headlands, fallow plots, low input cereals) to enhance conditions for rare, scarce and declining species.

Background and workshop structure

The value of a workshop to discuss options for enhancing Breckland's biodiversity through arable management was identified during the Breckland Biodiversity Audit. Individuals with relevant regional or national experience and expertise were identified and invited to contribute to a workshop; the fifteen participants are listed in Appendix 1.

The workshop began with introductory presentations. The first by Paul Dolman summarised the initial work of the Breckland Biodiversity Audit, which has emphasised the important contribution of arable and other ungrazed physically disturbed ruderal habitats to important biodiversity in Breckland. The second by Bev Nichols provided an overview of how this biodiversity has been supported through agri-environment schemes, both under the Breckland ESA, and the new opportunities presented by Environmental Stewardship.

A subsequent open discussion explored participants' initial perspectives on management for arable biodiversity in Breckland. This was followed by two further workshop discussions on arable management options:

Workshop 1: cultivated margin / plot prescriptions – tailoring for plants and invertebrates

Workshop 2: cereal conservation headlands, whole crop options (e.g. low input cereals, extended overwintered stubbles)

Conclusions from open discussion

1. Maintenance of regularly cultivated, uncropped, ungrazed areas in arable fields in Breckland provides for a key component of biodiversity. These options should be promoted widely in Breckland in Environmental Stewardship.
2. There is a need for arable options to be tailored to Breckland and also the need for a variety of habitats (which are specific to Breckland) in the landscape, including transitional habitats of farming to heathland (e.g. cultivated margins, fallow field options).
3. Farmers in Breckland are pressured and motivated by many factors, such as supermarkets demands and other interests (i.e. shooting or conservation). Therefore it is important to understand the farming system specific to each farm in order to apply arable options effectively. Also there is a need for ELS/HLS options to be sold more to farmers if these can be linked in with the interests/opinions of the farmers themselves.
4. Cultivated margins (EF11/HF20) and Conservation Headlands (EF9/EF10/HF14), are best at replicating what Breckland used to look like, with extensive uncropped fallows.
5. Cultivated margins /plots and conservation headlands are likely to be more successful and more saleable to farmers in Breckland than on heavier land.
6. Cultivated margins probably deliver best for Breckland biodiversity, but conservation headlands may be more appropriate in some circumstances (e.g. where they are more acceptable to the farmer)
7. Large scale cultivated fallows are now virtually unknown in Breckland, but were once more widespread in Breckland and key to specialist biodiversity. They should be promoted (under the HF20 cultivated fallow plot/margin option) instead of or alongside HF1 grass field corner or rough grassland creation (HK17).
8. The results of cultivation treatments in margins/plots are unpredictable. We need to educate advisers and farmers to expect the unexpected!
9. Spray drift of fertilisers and irrigation onto margins is an issue and can lead to conditions unsuitable for target species.
10. Cultivated margins are intended to be targeted in Environmental Stewardship primarily for plants of arable land, but in Breckland are likely to be highly beneficial to a range of rare/scarce/declining invertebrates. They are also likely to be highly beneficial to farmland birds in providing nest sites, summer food and winter food.
11. Grass buffer strips (EE2, 3, 4/ HE2, 3, 4) appear to be of limited value to farmland birds or to specialist invertebrates, and destructive of arable headland plants. They should be used sparingly, e.g. where cultivated margins/unharvested conservation headlands are unlikely to be successful.
12. Grass buffer strips and floristically enhanced grass margins (HE10) – there is scope for these to be developed with Breckland-specific grass/herb mixtures to benefit different species/guilds.
13. Heterogeneity of arable options is useful - different options, give different results and benefit different species/guilds. A mix of both in farms may be best, but with a strong emphasis on cultivated margins.
14. Juxtaposition of arable options is beneficial and should be promoted with advisers and farmers, e.g. supplying cover adjacent to food sources for grey partridge can be beneficial to invertebrates with a juxtaposition of ungrazed rough grassland (providing overwintering refugia) next to cultivated margins (providing ruderal foodplants and sources of seed).
15. Whole crop cereal options (reduced herbicide EF15/extended overwintered stubbles EF22/low input spring cereals HG7), though beneficial, may be difficult to promote in Breckland because of the relatively small part played by cereals in Breckland farm rotations (where dominated by vegetable growing). They need not be promoted heavily in Breckland, but may be applicable on some farms without vegetables.

16. Options targeted specifically at ground-nesting birds (i.e. fallow plots for stone curlew/lapwing [EF13/HF13] and skylark plots [EF8/HF8], have less certain benefits for other species. They should continue to be managed for the named target bird species, and any other biodiversity benefits are regarded as a bonus.
17. Increased monitoring of options is advised. There is a need for improved evidence as to what guilds are benefitting from different options and the effectiveness of certain options (especially bird/game) for other species. In particular, as the focus of monitoring of uncropped wildlife strips during the ESA has been for vascular plants, there is limited evidence for understanding outcomes for specialist invertebrates.

Cultivated margins – Key Conclusions

1. EF11 is unlikely to have a large uptake, but it should nevertheless be promoted, especially to farms with ELS only agreements.
2. With HLS agreements, cultivated margins should be included as HF20, not the "more of the same" HF11. This allows NE to use a tailored prescription to maximise benefit (and also pays the farmer an additional £40/ha)
3. NE should devise a Breckland-specific HF20 prescription (drawing from the workshop discussions) which can be promoted across Breckland by NE. This maximises benefits, increases adviser/farmer confidence, and is quicker for NE advisers than tailoring individually to farms.
4. Margins should be at least 6m wide to alleviate effects of spray/irrigator drift.
5. Better to have a longer length of 6m margins than a shorter length of 12m margins – edge benefits are very important for a range of species (e.g. grey partridge, inverts)
6. Desirable locations: anywhere on light soils (chalky and acid), but especially alongside old tracks, tussocky verges, and grassland areas; on lines of old hedges & pine-lines; near edge of Thetford Forest; locations of known rare species (plants and inverts; existing well-managed ESA cultivated margins.
7. Undesirable locations: heavier soils (unless there is a known rare species which will benefit); in shaded locations (e.g. north sides of woods); under over-hanging trees.
8. Cultivations should be annual or biennial, since both have benefits, but this must be tied to stronger indicators of success in prescriptions, e.g. spray off once perennial grasses reach >50% cover.
9. Rotational and non-rotational approaches each have benefits, so either approach is appropriate.
10. Where existing ESA cultivated margins are being managed well, they are likely to have accrued benefits over time – these should be maintained as non-rotational margins wherever possible under new HLS agreements.
11. Cultivation timing should be varied from September through to March. Different cultivation timings have different benefits for different species. Practicalities of management mean it is likely that headlands will be cultivated at the same time as preparing the adjacent field (although this is not always the case), thus there will be inherent variability among headlands and years depending on cropping patterns.
12. Cultivation timing should only be fixed to a specific month/period where rare/scarce species are known to be present, and the optimal cultivation timing for these is also known. Given the presence of long term seedbanks and the high potential for population increase of invertebrates given appropriate conditions, variability in timing is unlikely to be a serious problem in most cases.
13. Note: subsequent discussion between PD and BN: where biennial or rotational cultivated margins are agreed, for heterogeneity that provides suitable habitat in any one year located close to last

years suitable habitat, thus helping invertebrate dispersal, it may be desirable to cultivate half of each field margin in alternate years. However, this may not be practicable and may prove a disincentive from the farmer's point of view. Furthermore, it is not permitted to increase complexity of prescriptions. An alternative may be to juxtapose a 3m annually cultivate margin (next to the crop) alongside a 3m biennially cultivated strip (along the hedge), applied as a generic prescription. Further discussion, monitoring and research into these issues would be useful in refining guidance.

Conservation Headlands – Key Conclusions

1. Will support many key target species (farmland birds, Breckland speciality inverts/plants), but probably deliver less than cultivated margins. Where possible promote HF20 over these options.
2. May be particularly useful on farms where the farmer prefers to have a less weedy appearance to the farm, and also very welcome on shooting farms.
3. The over-wintered options (EF10, HF14) giver greater benefits than the harvested option (EF9/HF9).
4. Unharvested (HF14) – retention date should be set to "at least 14 February" with guidance on benefits of longer retention.

For full details on discussions, conclusions and outcomes see:- Panter, C., Nichols, B., Dolman. P.M. (2010) Breckland Biodiversity Audit Report of Workshop: Arable Management for Breckland Biodiversity. Unpublished report, University of East Anglia and Natural England.

Appendix 9. List of all priority species recorded in Breckland

Table A5. All priority species recorded in the Breckland area of interest, showing conservation designation and Breckland specialist status.

If subspecies are designated element of the grouped species, this is listed and where both the species and subspecies are the designated elements then designations are merged and these are listed. RDB designations are listed as previously, but those listed as G:xx, are Global designations. Rare and Scarce designations: N - Notable, N:A - Notable A, N:B - Notable B, S:NS - Status:Near Scarce, S:NR - Status:Near Rare. Bird designations; A - Amber, R - Red.

Taxonomic group	Recommended Taxa	Sub species	RDB	Rare and Scarce	Bird	BAP	Breckland specialists
Fungi	Battarrea phalloides					X	
Fungi	Geastrum corollinum					X	
Fungi	Hericium coralloides					X	
Fungi	Hydnellum ferrugineum					X	
Fungi	Sarcodon squamosus					X	
Fungi	Uromyces gentianae					X	
Lichen	Cyrtidula hippocastani			S:NS			
Lichen	Dirina massiliensis	forma massiliensis	NT	S:NS			
Lichen	Cladonia chlorophaea			S:NS			
Lichen	Lepraria nivalis			S:NS			
Lichen	Agonimia gelatinosa			S:NS			
Lichen	Catapyrenium lachneum			S:NS			
Lichen	Catapyrenium squamulosum			S:NS			
Lichen	Staurothele hymenogonia			S:NS			
Lichen	Verrucaria bryoctona			S:NS			
Lichen	Placynthiella dasaea			S:NS			
Lichen	Placynthiella oligotropha			S:NS			
Lichen	Ramonia interjecta			S:NS			
Lichen	Chaenotheca brachypoda			S:NS			
Lichen	Sarcosagium campestre	var. campestre		S:NS			
Lichen	Bacidia incompta		VU			X	
Lichen	Lecania cyrtella		DD	S:NR			
Lichen	Lecanora campestris	subsp. dolomitica		S:NS			
Lichen	Squamarina lentigera		CR	S:NR		X	LR
Lichen	Toninia sedifolia					X	
Lichen	Cladonia arbuscula	subsp. arbuscula	DD	S:NR			
Lichen	Cladonia cariosa			S:NS			
Lichen	Cladonia coccifera		DD	S:NS			
Lichen	Cladonia crispata	var. crispata		S:NR			
Lichen	Cladonia incrassata			S:NS			
Lichen	Cladonia uncialis	subsp. uncialis	VU	S:NR			
Lichen	Candelariella medians	forma steepholmensis		S:NR			
Lichen	Leptogium brebissonii		NT	S:NS		X	
Lichen	Lecanora albella			S:NS			
Lichen	Lecanora quercicola		NT	S:NS		X	
Lichen	Lecanora subaurea			S:NS			
Lichen	Micarea prasina			S:NS			
Lichen	Bryoria bicolor			S:NS			
Lichen	Parmelia submontana		DD	S:NR			
Lichen	Punctelia ulophylla			S:NS			
Lichen	Anaptychia ciliaris	subsp. ciliaris	VU			X	
Lichen	Buellia asterella		CR	S:NR		X	LR
Lichen	Buellia stellulata			S:NS			
Lichen	Diplotomma murorum			S:NR			
Lichen	Rinodina exigua		DD	S:NR			
Lichen	Clauzadea metzleri			S:NS			
Lichen	Psora decipiens			S:NS			
Lichen	Ramalina pollinaria			S:NS			
Lichen	Caloplaca chalybaea			S:NS			
Lichen	Caloplaca crenulatella			S:NS			
Lichen	Caloplaca luteoalba		VU	S:NS		X	

Appendix 9. List of all priority species recorded in Breckland

Lichen	Fulgensia fulgens		EN	S:NR	X	
Lichen	Xanthoria ucrainica			S:NS		
Stonewort	Chara aculeolata			S:NS		
Stonewort	Chara canescens		EN		X	
Stonewort	Chara curta			S:NS		
Stonewort	Chara rudis		NT			
Stonewort	Nitella flexilis			S:NS		
Stonewort	Nitella mucronata			S:NS		
Stonewort	Nitella tenuissima		EN		X	
Stonewort	Tolypella glomerata			S:NS		
Stonewort	Tolypella intricata		EN		X	
Stonewort	Tolypella nidifica		EN		X	
Stonewort	Tolypella prolifera		EN		X	
Liverwort	Calypogeia azurea			S:NS		
Liverwort	Cladopodiella francisci			S:NS		
Liverwort	Leiocolea rutheana		EN	S:NR	X	
Liverwort	Moerckia hibernica			S:NS		
Liverwort	Riccardia incurvata			S:NS		
Liverwort	Riccia beyrichiana			S:NS		
Liverwort	Riccia cavernosa			S:NS		
Liverwort	Ricciocarpos natans			S:NS		
Liverwort	Sphaerocarpos michelii			S:NS		
Moss	Grimmia dissimulata			S:NS		
Moss	Acaulon muticum			S:NR		
Moss	Aloina ambigua			S:NS		
Moss	Aloina rigida			S:NS		
Moss	Amblyodon dealbatus			S:NS		
Moss	Amblystegium humile			S:NS		
Moss	Brachythecium salebrosum			S:NS		
Moss	Bryum intermedium		DD	S:NS		
Moss	Bryum knowltonii		VU	S:NR	X	
Moss	Bryum pallescens			S:NS		
Moss	Bryum torquescens			S:NS		
Moss	Campyliadelphus elodes			S:NS		
Moss	Campylophyllum calcareum			S:NS		
Moss	Cinclidium stygium			S:NS		
Moss	Dicranum polysetum			S:NS		
Moss	Didymodon acutus			S:NS		
Moss	Didymodon umbrosus			S:NS		
Moss	Ditrichum flexicaule			S:NS		
Moss	Drepanocladus lycopodioides			S:NS		
Moss	Drepanocladus sendtneri			S:NS		
Moss	Ephemerum recurvifolium			S:NS		
Moss	Eurhynchium pulchellum	sp. And var. diversifolium	EN	S:NR	X	
Moss	Eurhynchium striatulum			S:NS		
Moss	Hamatocaulis vernicosus			S:NS		
Moss	Herzogiella seligeri			S:NS		
Moss	Hypnum imponens			S:NS		
Moss	Leptobarbula berica			S:NS		
Moss	Leptodontium gemmascens		VU	S:NR	X	
Moss	Microbryum starckeanum			S:NS		
Moss	Orthotrichum obtusifolium		VU	S:NR	X	
Moss	Orthotrichum pumilum		EN	S:NR	X	
Moss	Orthotrichum striatum		EX			
Moss	Physcomitrium eurystomum		CR	S:NR	X	PS
Moss	Plagiomnium ellipticum			S:NR		
Moss	Platygyrium repens			S:NS		
Moss	Pleurochaete squarrosa			S:NS		
Moss	Pottiopsis caespitosa			S:NS		
Moss	Pterigynandrum filiforme			S:NS		
Moss	Pterygoneurum ovatum		DD	S:NS		
Moss	Racomitrium canescens			S:NS		
Moss	Racomitrium elongatum			S:NS		
Moss	Rhytidium rugosum			S:NS		
Moss	Syntrichia virescens			S:NS		
Moss	Thuidium abietinum	subsp. abietinum		S:NS		
Moss	Tomentypnum nitens			S:NS		
Moss	Tortella inclinata			S:NS		
Moss	Tortella inflexa			S:NS		

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Moss	Weissia sterilis		VU	S:NS	X	
Moss	Sphagnum subsecundum			S:NS		
Clubmoss	Lycopodiella inundata		EN	S:NS	X	
Fern	Adiantum capillus-veneris			S:NS		
Fern	Dryopteris cristata		CR	S:NR	X	
Fern	Thelypteris palustris			S:NS		
Fern	Gymnocarpium robertianum			S:NS		
Conifer	Juniperus communis				X	
Flowering Plant	Baldellia ranunculoides		NT			
Flowering Plant	Blysmus compressus		VU		X	
Flowering Plant	Carex appropinquata		NT	S:NS		
Flowering Plant	Carex diandra		NT			
Flowering Plant	Carex ericetorum		VU	S:NS	X	PS
Flowering Plant	Carex flava		VU	S:NR		
Flowering Plant	Carex rotae		VU	S:NR		
Flowering Plant	Cyperus longus		NT	S:NS		
Flowering Plant	Hydrocharis morsus-ranae		VU			
Flowering Plant	Stratiotes aloides		NT	S:NR		
Flowering Plant	Juncus compressus		NT			
Flowering Plant	Allium oleraceum		VU			
Flowering Plant	Fritillaria meleagris			S:NS		
Flowering Plant	Muscari neglectum		VU	S:NR	X	PS
Flowering Plant	Aceras anthropophorum		EN	S:NS	X	
Flowering Plant	Cephalanthera longifolia		VU	S:NS	X	
Flowering Plant	Coeloglossum viride		VU		X	
Flowering Plant	Dactylorhiza traunsteinerioides			S:NS		
Flowering Plant	Epipactis phyllanthes			S:NS		
Flowering Plant	Gymnadenia conopsea	subsp. densiflora	DD			
Flowering Plant	Herminium monorchis		VU	S:NS	X	
Flowering Plant	Himantoglossum hircinum		NT	S:NS		
Flowering Plant	Liparis loeselii		EN	S:NR	X	
Flowering Plant	Neottia nidus-avis		NT			
Flowering Plant	Ophrys insectifera		VU		X	
Flowering Plant	Ophrys sphegodes			S:NS		
Flowering Plant	Orchis militaris		VU	S:NR		SS
Flowering Plant	Orchis morio		NT			
Flowering Plant	Orchis ustulata		EN	S:NS	X	
Flowering Plant	Platanthera bifolia		VU		X	
Flowering Plant	Platanthera chlorantha		NT			
Flowering Plant	Spiranthes spiralis		NT			
Flowering Plant	Apera interrupta					SS
Flowering Plant	Apera spica-venti		NT			
Flowering Plant	Bromus hordeaceus	subsp. thominei		S:NS		
Flowering Plant	Bromus interruptus		EW		X	
Flowering Plant	Bromus secalinus		VU	S:NS		
Flowering Plant	Calamagrostis stricta		VU	S:NR	X	
Flowering Plant	Corynephorus canescens		NT	S:NR		C
Flowering Plant	Cynodon dactylon			S:NR		
Flowering Plant	Deschampsia setacea			S:NS		
Flowering Plant	Medicago minima		VU	S:NS		SS
Flowering Plant	Festuca longifolia			S:NR		
Flowering Plant	Hordelymus europaeus			S:NS		
Flowering Plant	Lolium temulentum		CR	S:NR	X	
Flowering Plant	Phleum phleoides			S:NR		LR
Flowering Plant	Poa bulbosa			S:NS		
Flowering Plant	Polypogon monspeliensis			S:NS		
Flowering Plant	Vulpia ciliata	subsp. ambigua		S:NS		
Flowering Plant	Groenlandia densa		VU			
Flowering Plant	Potamogeton coloratus			S:NS		
Flowering Plant	Potamogeton compressus		EN	S:NS	X	
Flowering Plant	Potamogeton friesii		NT	S:NS		
Flowering Plant	Potamogeton praelongus		NT			
Flowering Plant	Bupleurum rotundifolium		CR	S:NR	X	
Flowering Plant	Carum carvi		EN	S:NS	X	
Flowering Plant	Caucalis platycarpos		EX			
Flowering Plant	Cicuta virosa			S:NS		
Flowering Plant	Oenanthe fistulosa		VU		X	
Flowering Plant	Peucedanum palustre		VU	S:NS		
Flowering Plant	Scandix pecten-veneris		CR		X	
Flowering Plant	Sium latifolium		EN	S:NS	X	

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Flowering Plant	Torilis arvensis		EN	S:NS	X	
Flowering Plant	Anthemis arvensis		EN			
Flowering Plant	Anthemis cotula		VU			
Flowering Plant	Arnoseris minima		EX		X	
Flowering Plant	Artemisia campestris		VU	S:NR	X	ER
Flowering Plant	Centaurea cyanus				X	
Flowering Plant	Chamaemelum nobile		VU		X	
Flowering Plant	Crepis foetida		EW	S:NR	X	
Flowering Plant	Filago gallica		EW	S:NR		
Flowering Plant	Filago lutescens		EN	S:NS	X	
Flowering Plant	Filago pyramidata		EN	S:NS	X	
Flowering Plant	Filago vulgaris		NT			
Flowering Plant	Glebionis segetum		VU			
Flowering Plant	Gnaphalium sylvaticum		EN			
Flowering Plant	Hieracium acuminatum			S:NR		
Flowering Plant	Hieracium diaphanum			S:NR		
Flowering Plant	Hypochaeris glabra		VU			
Flowering Plant	Hypochaeris maculata		NT	S:NR		
Flowering Plant	Pulicaria vulgaris		CR	S:NR	X	
Flowering Plant	Senecio paludosus		CR	S:NR	X	
Flowering Plant	Sonchus palustris			S:NS		
Flowering Plant	Tephroseris integrifolia		EN	S:NS		
Flowering Plant	Tephroseris palustris		EX			
Flowering Plant	Cynoglossum officinale		NT			
Flowering Plant	Lithospermum arvense		EN			
Flowering Plant	Lithospermum purpureocaeruleum			S:NR		
Flowering Plant	Pulmonaria obscura		EN	S:NR	X	
Flowering Plant	Arabis glabra		EN	S:NS	X	SS
Flowering Plant	Brassica oleracea			S:NS		
Flowering Plant	Camelina sativa			S:NS		
Flowering Plant	Iberis amara		VU	S:NS	X	
Flowering Plant	Lepidium latifolium			S:NS		
Flowering Plant	Rorippa islandica			S:NS		
Flowering Plant	Teesdalia nudicaulis		NT			
Flowering Plant	Campanula rapunculus		EN	S:NR	X	
Flowering Plant	Dianthus deltoides		NT	S:NS		
Flowering Plant	Herniaria glabra			S:NR		LR
Flowering Plant	Minuartia hybrida		EN	S:NS	X	
Flowering Plant	Petrorhagia prolifera			S:NR		PS
Flowering Plant	Scleranthus annuus	sp. and subsp. annuus	EN	S:NS	X	SS
Flowering Plant	Scleranthus perennis	subsp. perennis, subsp. prostratus	EN	S:NR	X	ER
Flowering Plant	Silene conica		VU	S:NS		SS
Flowering Plant	Silene gallica		EN	S:NS	X	
Flowering Plant	Silene noctiflora		VU			
Flowering Plant	Silene nutans		NT	S:NS		
Flowering Plant	Silene otites		EN	S:NR	X	ER
Flowering Plant	Spergula arvensis		VU			
Flowering Plant	Stellaria palustris		VU		X	
Flowering Plant	Chenopodium bonus-henricus		VU			
Flowering Plant	Chenopodium glaucum		VU	S:NS		
Flowering Plant	Chenopodium murale		VU			
Flowering Plant	Chenopodium urbicum		CR	S:NR	X	
Flowering Plant	Chenopodium vulvaria		EN	S:NS	X	
Flowering Plant	Helianthemum oelandicum	subsp. incanum		S:NS		
Flowering Plant	Hypericum undulatum			S:NS		
Flowering Plant	Crassula tillaea			S:NS		
Flowering Plant	Sedum forsterianum			S:NS		
Flowering Plant	Cuscuta epithymum		VU			
Flowering Plant	Drosera anglica		NT			
Flowering Plant	Hippophae rhamnoides			S:NS		
Flowering Plant	Euphorbia exigua		NT			
Flowering Plant	Euphorbia peplis		EX			
Flowering Plant	Astragalus danicus		EN		X	
Flowering Plant	Genista anglica		NT			
Flowering Plant	Genista pilosa		NT	S:NR		
Flowering Plant	Lathyrus aphaca		VU	S:NS		
Flowering Plant	Lathyrus hirsutus			S:NR		
Flowering Plant	Lathyrus palustris		NT	S:NS		
Flowering Plant	Medicago polymorpha			S:NS		

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Flowering Plant	Medicago sativa	subsp. falcata		S:NS		PS
Flowering Plant	Onobrychis viciifolia		NT			
Flowering Plant	Trifolium glomeratum			S:NS		
Flowering Plant	Trifolium ochroleucon		NT	S:NS		
Flowering Plant	Trifolium suffocatum			S:NS		
Flowering Plant	Vicia parviflora		VU	S:NS		
Flowering Plant	Vicia orobus		NT	S:NS		
Flowering Plant	Fumaria parviflora		VU	S:NS		
Flowering Plant	Centaurium littorale			S:NS		
Flowering Plant	Gentianella anglica				X	
Flowering Plant	Gentianella campestris		VU		X	
Flowering Plant	Gentiana pneumonanthe			S:NS		
Flowering Plant	Erodium lebelii			S:NS		
Flowering Plant	Ribes spicatum			S:NS		
Flowering Plant	Myriophyllum verticillatum		VU			
Flowering Plant	Ajuga chamaepitys		EN	S:NR	X	
Flowering Plant	Clinopodium acinos		VU		X	
Flowering Plant	Clinopodium calamintha		VU	S:NS		
Flowering Plant	Galeopsis angustifolia		CR	S:NS	X	
Flowering Plant	Galeopsis speciosa		VU			
Flowering Plant	Marrubium vulgare			S:NS		
Flowering Plant	Mentha pulegium		EN	S:NS	X	
Flowering Plant	Mentha suaveolens		DD	S:NS		
Flowering Plant	Nepeta cataria		VU			
Flowering Plant	Salvia pratensis		NT	S:NS		
Flowering Plant	Stachys arvensis		NT			
Flowering Plant	Teucrium scordium		EN	S:NR	X	
Flowering Plant	Thymus serpyllum			S:NR		ER
Flowering Plant	Linum perenne			S:NS		
Flowering Plant	Radiola linoides		NT			
Flowering Plant	Lythrum hyssopifolia		EN	S:NR	X	
Flowering Plant	Nymphoides peltata			S:NS		
Flowering Plant	Monotropa hypopitys	sp. And subsp. hypophegea	EN	S:NS	X	
Flowering Plant	Orobanche alba			S:NS		
Flowering Plant	Orobanche purpurea		VU	S:NR		
Flowering Plant	Orobanche rapum-genistae		NT	S:NS		
Flowering Plant	Papaver argemone		VU			
Flowering Plant	Fallopia dumetorum		VU	S:NS	X	
Flowering Plant	Persicaria mitis		VU	S:NS		
Flowering Plant	Anagallis arvensis	subsp. foemina		S:NS		
Flowering Plant	Anagallis minima		NT			
Flowering Plant	Lysimachia thyrsiflora			S:NS		
Flowering Plant	Primula elatior		NT	S:NS		
Flowering Plant	Adonis annua		EN	S:NS	X	
Flowering Plant	Helleborus foetidus			S:NS		
Flowering Plant	Myosurus minimus		VU			
Flowering Plant	Pulsatilla vulgaris		VU	S:NS	X	
Flowering Plant	Ranunculus arvensis		CR		X	
Flowering Plant	Potentilla argentea		NT			
Flowering Plant	Potentilla tabernaemontani			S:NS		
Flowering Plant	Rubus britannicus			S:NR		
Flowering Plant	Galium parisiense		VU	S:NS		SS
Flowering Plant	Galium tricornutum		CR	S:NR	X	
Flowering Plant	Thesium humifusum			S:NS		
Flowering Plant	Euphrasia anglica		EN		X	
Flowering Plant	Euphrasia confusa		DD			
Flowering Plant	Euphrasia pseudokerneri		EN	S:NS	X	
Flowering Plant	Limosella aquatica			S:NS		
Flowering Plant	Melampyrum arvense			S:NR		
Flowering Plant	Melampyrum cristatum		VU	S:NR	X	
Flowering Plant	Misopates orontium		VU			
Flowering Plant	Scrophularia scorodonia			S:NS		
Flowering Plant	Verbascum lychnitis			S:NS		
Flowering Plant	Verbascum pulverulentum			S:NS		
Flowering Plant	Veronica spicata	subsp. spicata		S:NR		ER
Flowering Plant	Veronica triphyllos		EN	S:NR	X	ER
Flowering Plant	Veronica verna		EN	S:NR	X	ER
Flowering Plant	Hyoscyamus niger		VU			
Flowering Plant	Daphne mezereum		VU	S:NS		

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Flowering Plant	Tilia platyphyllos			S:NS		
Flowering Plant	Valerianella dentata		EN			
Flowering Plant	Valerianella eriocarpa			S:NR		
Flowering Plant	Valerianella rimosa		EN	S:NS	X	
Flowering Plant	Viola canina	sp. and subsp. canina	NT			
Flowering Plant	Viola persicifolia		EN	S:NR	X	
Flowering Plant	Viola tricolor	sp. and subsp. tricolor	NT			
Flowering Plant	Viola tricolor	subsp. curtisii				C
Mollusc	Marstoniopsis insubrica		R			
Mollusc	Valvata (Tropidina) macrostoma		VU		X	
Mollusc	Omphiscola glabra		VU		X	C
Mollusc	Anisus (Disculifer) vorticulus		VU		X	
Mollusc	Segmentina nitida		EN		X	
Mollusc	Truncatellina cylindrica		VU		X	
Mollusc	Vertigo (Vertigo) moulinsiana		R		X	
Mollusc	Vertigo (Vertilla) angustior				X	
Mollusc	Pseudanodonta complanata				X	
Mollusc	Pisidium pseudosphaerium		R			
Mollusc	Sphaerium solidum		EN		X	
Spider	Ero tuberculata			N:B		
Spider	Dipoena coracina		EN			
Spider	Dipoena prona			N:B		
Spider	Crustulina sticta			N:B		
Spider	Steatoda albomaculata			N:B		SS
Spider	Achaearanea simulans			N:B		
Spider	Achaearanea riparia			N:B		
Spider	Theridiosoma gemmosum			N:B		
Spider	Walckenaeria incisa			N:B		
Spider	Walckenaeria stylifrons		EN			ER
Spider	Entelecara congenera			N:B		
Spider	Entelecara omissa			N:A		
Spider	Hypomma fulvum			N:A		
Spider	Maso gallicus			N:A		
Spider	Saloca diceros			N:B		
Spider	Gongylidiellum murcidum			N:B		
Spider	Notioscopus sarcinatus			N:B	X	
Spider	Glyphesis servulus		INS			
Spider	Donacochara speciosa			N:A		
Spider	Mioxena blanda			N:B		
Spider	Porrhomma oblitum			N:B		
Spider	Meioneta mollis				X	
Spider	Meioneta fuscipalpa					LR
Spider	Maro sublestus			N:A		
Spider	Centromerus incilium			N:B		
Spider	Saaristoa firma				X	
Spider	Lepthyphantes insignis			N:B		
Spider	Tetragnatha striata			N:B		
Spider	Tetragnatha pinicola			N:B		
Spider	Meta bourneti			N:B		
Spider	Araniella inconspicua			N:B		
Spider	Araniella displicata			N:A		
Spider	Pardosa agrestis			N:B		
Spider	Hygrolycosa rubrofasciata			N:A		
Spider	Xerolycosa nemoralis			N:B		
Spider	Trochosa robusta			N:B		
Spider	Dolomedes plantarius		EN		X	
Spider	Dictyna pusilla				X	
Spider	Agroeca cuprea			N:A	X	SS
Spider	Clubiona juvenis		VU			
Spider	Clubiona frisia		R			
Spider	Clubiona rosserae		EN		X	
Spider	Trachyzelotes pedestris			N:B		
Spider	Drassyllus lutetianus			N:A		C
Spider	Drassyllus praeficus			N:B		
Spider	Micaria silesiaca			N:B		SS
Spider	Micaria subopaca			N:B		
Spider	Philodromus albidus			N:B		
Spider	Philodromus praedatus			N:B		
Spider	Philodromus collinus			N:B		
Spider	Xysticus luctuosus			N:B		

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Spider	Ozyptila scabricula		N:B		SS
Spider	Ozyptila blackwalli		N:B		
Spider	Marpissa radiata		N:A		
Spider	Marpissa muscosa		N:B		
Spider	Neon valentulus	VU			PS
Spider	Sitticus caricis		N:B	X	
Spider	Sitticus saltator		N:B		C
Spider	Evarcha arcuata		N:B		
Spider	Aelurillus v-insignitus		N:B		
Spider	Myrmarachne formicaria		N:B		
False Scorpion	Dendrochernes cyrneus	R			
Crustacean	Austropotamobius pallipes	G:V		X	
Crustacean	Cypris bispinosa				ER
Crustacean	Dunhevedia crassa				ER
Dragonfly	Coenagrion pulchellum	NT			
Dragonfly	Ischnura pumilio	NT			
Dragonfly	Lestes dryas	NT			
Dragonfly	Libellula fulva	NT			
Stonefly	Nemoura dubitans		N		
Stonefly	Rhabdiopteryx acuminata		N		
Orthopteran	Conocephalus discolor		N:A		
Orthopteran	Platycleis albopunctata		N:B		C
Orthopteran	Metrioptera roeselii		N:B		
Orthopteran	Gomphocerippus rufus		N:B		
Earwig	Apterygida media		N:B		
Cockroach	Ectobius pallidus		N:B		
True Bug	Anoscopus albifrons		N:B		
True Bug	Hebrus pusillus		N:B		
True Bug	Microvelia buenoi	R			
True Bug	Microvelia pygmaea		N:B		
True Bug	Acalypta platycheila		N:B		
True Bug	Adelphocoris ticinensis		N:B		
True Bug	Agnocoris reclairei		N:B		
True Bug	Systellonotus triguttatus		N:B		
True Bug	Chlamydatus (Euattus) pulicarius		N:B		SS
True Bug	Lygus pratensis	R			
True Bug	Myrmecoris gracilis	R			
True Bug	Nabis (Nabis) brevis	R			
True Bug	Nabis (Nabis) pseudoferus		N:B		
True Bug	Aradus aterrimus	R			
True Bug	Aphanus rolandri		N:A		
True Bug	Ortholomus punctipennis	R			PS
True Bug	Megalonotus antennatus		N:B		
True Bug	Megalonotus dilatatus		N:B		
True Bug	Megalonotus praetextatus		N:B		
True Bug	Megalonotus sabulicola		N:B		
True Bug	Graptopeltus lynceus		N:B		PS
True Bug	Raglius alboacuminatus		N:B		
True Bug	Rhopalus (Aeschyntelus) maculatus		N:B		
True Bug	Stictopleurus abutilon	EX			
True Bug	Stictopleurus punctatonervosus	EX			
True Bug	Arenocoris falleni				SS
True Bug	Arenocoris waltlii	VU			PS
True Bug	Legnotus picipes		N:B		
True Bug	Odontoscelis (Odontoscelis) fuliginosa	R			
True Bug	Odontoscelis (Odontoscelis) lineola		N:B		SS
True Bug	Eurygaster maura		N:B		
True Bug	Aphrophora alpina		N:B		
True Bug	Ulopa trivia		N:B		
True Bug	Idiocerus fulgidus		N:A		
True Bug	Hephathus nanus		N:B		
True Bug	Agallia brachyptera		N:B		
True Bug	Stroggylocephalus livens		N:B		
True Bug	Metalimnus formosus	INS			
True Bug	Psammotettix albomarginatus		N:B		PS
True Bug	Psammotettix nodosus	INS			
True Bug	Paralimnus phragmitis		N:B		
True Bug	Platymetopius undatus		N:A		
True Bug	Scleroracus decumanus		N:B		
True Bug	Macrosteles quadripunctulatus		N:A		

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True Bug	Chlorita viridula		N:A	X	
True Bug	Asiraca clavicornis		N:B		
True Bug	Stenocranus fuscovittatus		N:B		
True Bug	Chloriona vasconica		N:B		
True Bug	Megamelodes lequesnei		N:B		
True Bug	Delphacodes capnodes		N:B		
True Bug	Paradelphacodes paludosus		N:A		
True Bug	Paraliburnia clypealis	INS			
True Bug	Florodelphax paryphasma		N:A		
True Bug	Oncodelphax pullulus		N:B		
True Bug	Sciocoris (Sciocoris) cursitans		N:B		
Beetle	Clambus pallidulus	INS			
Beetle	Microscydmus nanus		N		
Beetle	Adonia variegata		N:B		
Beetle	Agonum livens		N:B		
Beetle	Mycetoporus longicornis		N		
Beetle	Oligota apicata		N		
Beetle	Malthodes brevicollis	EN			
Beetle	Phalacrus brunnipes		N:A		
Beetle	Ceutorhynchus punctiger		N:B		
Beetle	Sibinia primitus		N:B		
Beetle	Sphaerius acaroides	INS			
Beetle	Gyrinus aeratus		N:B		
Beetle	Gyrinus natator	EN			
Beetle	Gyrinus paykulli		N:A		
Beetle	Gyrinus suffriani	R			
Beetle	Gyrinus urinator		N:B		
Beetle	Haliplus (Haliplinus) furcatus	EN			
Beetle	Haliplus (Haliplinus) heydeni		N:B		
Beetle	Haliplus (Liaphlus) laminatus		N:B		
Beetle	Haliplus (Liaphlus) mucronatus		N:A		
Beetle	Haliplus (Liaphlus) variegatus	R			
Beetle	Noterus crassicornis		N:B		
Beetle	Nebrioporus (Nebrioporus) depressus		N:B		
Beetle	Stictonectes lepidus		N:B		
Beetle	Agabus (Agabus) labiatus		N:B		
Beetle	Agabus (Agabus) uliginosus		N:B		
Beetle	Agabus (Agabus) undulatus	R			
Beetle	Agabus (Gaurodytes) biguttatus		N:B		
Beetle	Agabus (Gaurodytes) conspersus		N:B		
Beetle	Agabus (Gaurodytes) melanarius		N:B		
Beetle	Agabus (Gaurodytes) unguicularis		N:B		
Beetle	Ilybius aenescens		N:B		
Beetle	Ilybius chalconatus		N:B		
Beetle	Ilybius fenestratus		N:B		
Beetle	Ilybius guttiger		N:B		
Beetle	Ilybius subaeneus		N:B		
Beetle	Rhantus (Nartus) grapii		N:B		
Beetle	Rhantus (Rhantus) frontalis		N:B		
Beetle	Rhantus (Rhantus) suturalis		N:B		
Beetle	Dytiscus circumflexus		N:B		
Beetle	Dytiscus dimidiatus	R			
Beetle	Hydaticus seminiger		N:B		
Beetle	Bidessus unistriatus	EN		X	SS
Beetle	Hydroglyphus geminus		N:B		
Beetle	Deronectes latus		N:B		
Beetle	Graptodytes granularis		N:B		
Beetle	Hydroporus elongatulus	R			
Beetle	Hydroporus glabriusculus	R			
Beetle	Hydroporus longicornis		N:B		
Beetle	Hydroporus marginatus		N:B		
Beetle	Hydroporus neglectus		N:B		
Beetle	Hydroporus rufifrons	VU		X	
Beetle	Hydroporus scalesianus	VU			
Beetle	Scarodytes halensis		N:B		
Beetle	Hygrotus (Coelambus) nigrolineatus		N:A		
Beetle	Hygrotus (Coelambus) novemlineatus		N:B		
Beetle	Hygrotus (Coelambus) parallelogrammus		N:B		
Beetle	Hygrotus (Hygrotus) decoratus		N:B		
Beetle	Laccornis oblongus	R			

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Beetle	Laccophilus poecilus	VU		X	
Beetle	Poecilus lepidus		N:B		
Beetle	Omophron limbatum	EN			PS
Beetle	Notiophilus aesthuans		N:B		
Beetle	Broscus cephalotes				C
Beetle	Trechus (Epaphius) rivularis	R			
Beetle	Tachys (Paratachys) bistriatus		N:B		
Beetle	Elaphropus parvulus		N:B		
Beetle	Bembidion (Testedium) bipunctatum		N:B		
Beetle	Bembidion (Notaphus) obliquum		N:B		
Beetle	Bembidion (Semicampa) gilvipes		N:B		
Beetle	Bembidion (Diplocampa) clarkii		N:B		
Beetle	Bembidion (Diplocampa) fumigatum		N:B		
Beetle	Bembidion (Bembidion) quadripustulatum		N:B	X	
Beetle	Bembidion (Trepanes) octomaculatum	EX			SS
Beetle	Poecilus kugelanni	EN		X	
Beetle	Pterostichus (Pedius) longicollis		N:B		
Beetle	Pterostichus (Bothriopterus)		N:B		
Beetle	Pterostichus (Pseudomaseus) anthracinus		N:B		
Beetle	Pterostichus (Pseudomaseus) gracilis		N:B		
Beetle	Platyderus depressus		N:B		
Beetle	Calathus (Calathus) ambiguus		N:B		
Beetle	Calathus (Calathus) mollis				C
Beetle	Agonum (Europhilus) scitulum		N:A	X	
Beetle	Agonum (Agonum) gracilipes		N:A		
Beetle	Agonum (Agonum) sexpunctatum		N:A		
Beetle	Agonum (Agonum) versutum		N:B		
Beetle	Zabrus tenebrioides		N:A		
Beetle	Amara (Amara) famelica	R		X	
Beetle	Amara (Amara) lucida		N:B		SS
Beetle	Amara (Celia) fusca	EN		X	PS
Beetle	Amara (Celia) infima		N:A		SS
Beetle	Amara (Amara) nitida		N:A		
Beetle	Amara (Celia) praetermissa		N:B		
Beetle	Amara (Bradytus) consularis		N:B		SS
Beetle	Amara (Bradytus) fulva		N:B		
Beetle	Amara (Percosia) equestris		N:B		SS
Beetle	Harpalus (Harpalus) froelichii	VU		X	PS
Beetle	Harpalus (Harpalus) pumilus		N:A		PS
Beetle	Harpalus (Harpalus) serripes		N:B		
Beetle	Harpalus (Harpalus) servus		N:B		SS
Beetle	Harpalus (Harpalus) smaragdinus		N:B		PS
Beetle	Harpalus (Pseudoophonus) griseus				SS
Beetle	Ophonus (Ophonus) stictus	EN		X	
Beetle	Ophonus (Metophonus) laticollis		N:A	X	SS
Beetle	Ophonus (Metophonus) rupicola		N:B		
Beetle	Ophonus (Metophonus) schaubergerianus		N:B		
Beetle	Anisodactylus nemorivagus		N:A	X	
Beetle	Bradycellus csikii	IND			PS
Beetle	Stenolophus teutonus		N:B		
Beetle	Anthracus consputus		N:B		
Beetle	Chlaenius nigricornis		N:B		
Beetle	Oodes helopioides		N:B		
Beetle	Licinus depressus		N:B		SS
Beetle	Badister (Badister) unipustulatus		N:B		
Beetle	Badister (Baudia) dilatatus		N:B		
Beetle	Badister (Baudia) peltatus		N:A		SS
Beetle	Panagaeus bipustulatus		N:B		SS
Beetle	Masoreus wetterhallii		N:A		SS
Beetle	Lebia (Lamprias) chlorocephala		N:B		
Beetle	Demetrias (Risophilus) imperialis		N:B		
Beetle	Demetrias (Demetrias) monostigma		N:B		
Beetle	Cymindis (Cymindis) axillaris		N:A		PS
Beetle	Cymindis (Cymindis) macularis	EN			ER
Beetle	Paradromius longiceps		N:A		
Beetle	Odacantha melanura		N:B		
Beetle	Helophorus (Helophorus) griseus		N:B		
Beetle	Helophorus (Helophorus) nanus		N:B		
Beetle	Helophorus (Helophorus) strigifrons		N:B		
Beetle	Georissus crenulatus		N:A		

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Beetle	Hydrochus angustatus		N:B	
Beetle	Hydrochus brevis	R		
Beetle	Hydrochus crenatus	R		
Beetle	Hydrochus elongatus	R		
Beetle	Hydrochus ignicollis	R		
Beetle	Hydrochus megaphallus	VU		
Beetle	Anacaena bipustulata		N:B	
Beetle	Berosus (Berosus) affinis		N:B	
Beetle	Berosus (Berosus) luridus		N:B	
Beetle	Berosus (Berosus) signaticollis		N:B	
Beetle	Chaetarthria seminulum		N:B	
Beetle	Enochrus affinis		N:B	
Beetle	Enochrus melanocephalus		N:B	
Beetle	Enochrus nigritus	R		SS
Beetle	Enochrus ochropterus		N:B	
Beetle	Enochrus quadripunctatus		S:NS	SS
Beetle	Helochares lividus		N:B	
Beetle	Helochares obscurus	R		
Beetle	Helochares punctatus		N:B	
Beetle	Laccobius atratus		N:B	
Beetle	Laccobius sinuatus		N:B	
Beetle	Cercyon (Cercyon) bifenestratus		N:A	
Beetle	Cercyon (Cercyon) convexiusculus		N:B	
Beetle	Cercyon (Cercyon) granarius	R		
Beetle	Cercyon (Cercyon) nigriceps		N:B	
Beetle	Cercyon (Cercyon) sternalis		N:B	
Beetle	Cercyon (Cercyon) tristis		N:B	
Beetle	Cercyon (Dicyrtocercyon) ustulatus		N:B	
Beetle	Cryptopleurum crenatum		N	
Beetle	Hololepta plana			LR
Beetle	Plegaderus dissectus		N:B	
Beetle	Saprinus immundus		N:B	C
Beetle	Saprinus planiusculus		N:B	
Beetle	Hypocaccus (Hypocaccus) metallicus	R		C
Beetle	Gnathoncus buyssoni		N:A	
Beetle	Onthophilus punctatus	INS		PS
Beetle	Margarinotus (Promethister) marginatus		N:B	
Beetle	Hydraena nigrita		N:B	
Beetle	Hydraena palustris	VU		SS
Beetle	Hydraena testacea		N:B	
Beetle	Limnebius aluta	R		
Beetle	Limnebius nitidus		N:B	
Beetle	Limnebius papposus		N:B	
Beetle	Ochthebius (Hymenodes) nanus		N:B	
Beetle	Ochthebius (Ochthebius) marinus		N:B	
Beetle	Nossidium pilosellum		N	
Beetle	Ptiliolum (Ptiliolum) marginatum	INS		
Beetle	Microptilium palustre	INS		
Beetle	Microptilium pulchellum	INS		
Beetle	Ptinella britannica	INS		PS
Beetle	Ptinella denticollis		N	
Beetle	Acrotrichis (Acrotrichis) brevipennis		N	
Beetle	Acrotrichis (Acrotrichis) dispar		N	
Beetle	Acrotrichis (Acrotrichis) lucidula	INS		
Beetle	Acrotrichis (Acrotrichis) pumila	INS		SS
Beetle	Acrotrichis (Acrotrichis) strandi		N	
Beetle	Hydnobius latifrons	INS		
Beetle	Hydnobius punctatus		N	
Beetle	Triarthron maerkelii		N	
Beetle	Leiodes cinnamomea		N	
Beetle	Leiodes flavescens	IND		PS
Beetle	Leiodes gyllenhalii	INS		
Beetle	Leiodes lunicollis	INS		
Beetle	Leiodes oblonga		N	
Beetle	Leiodes rugosa		N	
Beetle	Leiodes triepkii	INS		
Beetle	Agaricophagus cephalotes	INS		
Beetle	Agathidium (Neoceble) confusum	IND		
Beetle	Agathidium (Neoceble) marginatum		N	
Beetle	Colon (Myloechus) appendiculatum	INS		PS

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Beetle	Colon (Myloechus) dentipes	INS		
Beetle	Choleva (Choleva) glauca		N	
Beetle	Catopidius depressus		N	
Beetle	Ptomaphagus varicornis	INS		
Beetle	Eutheia scydmaenoides		N	
Beetle	Neuraphes (Pararaphes) plicicollis		N	
Beetle	Neuraphes (Pararaphes) praeteritus		N	
Beetle	Scydmoraphes helvolus		N	
Beetle	Scydmaenus (Cholerus) rufus	VU		
Beetle	Aclypea opaca		N:A	
Beetle	Dendroxena quadrimaculata		N:B	
Beetle	Silpha obscura	VU		
Beetle	Nicrophorus interruptus		N:B	
Beetle	Nicrophorus vestigator		N:A	SS
Beetle	Acidota cruentata		N:B	
Beetle	Alevonota gracilenta	INS		
Beetle	Carpelimus similis		N	
Beetle	Falagria sulcatula		N	
Beetle	Mocyta orphana		N	
Beetle	Pseudopsis sulcata		N	
Beetle	Omalium allardi		N	
Beetle	Omalium exiguum		N	
Beetle	Proteinus crenulatus		N:B	
Beetle	Bibloporus minutus		N:B	
Beetle	Pselaphaulax dresdensis		N	
Beetle	Lamprinodes saginatus		N:A	
Beetle	Sepedophilus bipunctatus		N:B	
Beetle	Sepedophilus constans		N	
Beetle	Sepedophilus pedicularius		N	
Beetle	Sepedophilus testaceus		N	
Beetle	Tachinus flavolimbatus	INS		
Beetle	Tachinus lignorum		N	
Beetle	Tachyporus formosus		N:A	
Beetle	Bryoporus cernuus	INS		
Beetle	Mycetoporus punctus		N	
Beetle	Calodera nigrita		N	
Beetle	Calodera riparia		N	
Beetle	Dexiogyia corticina		N	
Beetle	Haploglossa marginalis		N	
Beetle	Hygropora cunctans	INS		SS
Beetle	Ilyobates nigricollis	INS		
Beetle	Oxypoda exoleta		N	
Beetle	Oxypoda flavicornis		N	
Beetle	Oxypoda lurida		N	
Beetle	Oxypoda recondita		N	
Beetle	Dacrila fallax		N	
Beetle	Gnypeta ripicola		N	
Beetle	Tachyusa coarctata		N	
Beetle	Acrotona obfuscata		N	
Beetle	Amidobia talpa		N	
Beetle	Anopleta corvina	INS		
Beetle	Badura puncticollis		N	
Beetle	Datomicra zosterae		N	
Beetle	Dochmonota clancula		N	
Beetle	Microdota aegra		N	
Beetle	Neohilara subterranea	INS		
Beetle	Parameotica difficilis		N	
Beetle	Philhygra deformis		N	
Beetle	Philhygra hygrobia		N	
Beetle	Schistoglossa aubei	INS		
Beetle	Schistoglossa gemina		N	
Beetle	Schistoglossa viduata	INS		
Beetle	Aleochara (Aleochara) brevipennis		N	
Beetle	Aleochara (Xenochara) discipennis		N	
Beetle	Aleochara (Xenochara) kamila		N	
Beetle	Aleochara (Xenochara) sanguinea		N	
Beetle	Lomechusa emarginata		N	
Beetle	Gyrophaena congrua		N	
Beetle	Gyrophaena hanseni		N	
Beetle	Gyrophaena joyi		N	

Appendix 9. List of all priority species recorded in Breckland

Beetle	Gyrophaena lucidula		N		
Beetle	Gyrophaena manca		N		
Beetle	Gyrophaena pseudonana	IND			ER
Beetle	Gyrophaena strictula		N		
Beetle	Leptusa norvegica		N		
Beetle	Placusa tachyporoides		N		
Beetle	Cypha discoidea		N:B		
Beetle	Cypha pulicaria		N		
Beetle	Scaphisoma boleti		N:B		
Beetle	Carpelimus lindrothi		N		SS
Beetle	Carpelimus obesus		N		
Beetle	Anotylus insecatus		N		
Beetle	Oxytelus fulvipes		N:A		
Beetle	Oxytelus piceus	INS			
Beetle	Platystethus (Craetopycrus) nodifrons		N		
Beetle	Stenus (Hemistenus) fuscicornis		N:B		
Beetle	Stenus (Hemistenus) palustris		N:B		
Beetle	Stenus (Hypostenus) fornicatus		N:B		
Beetle	Stenus (Metatesnus) butrintensis		N		
Beetle	Stenus (Metatesnus) niveus		N:B		
Beetle	Stenus (Stenus) argus		N:B		
Beetle	Stenus (Stenus) ater		N:B		
Beetle	Stenus (Stenus) carbonarius		N:B		
Beetle	Stenus (Stenus) circularis		N:B		
Beetle	Stenus (Stenus) europaeus		N:B		
Beetle	Stenus (Stenus) proditor	IND			
Beetle	Stenus (Stenus) pusillus		N:B		
Beetle	Stenus (Tesnus) nigritulus		N:B		
Beetle	Stenus (Tesnus) opticus		N:A		
Beetle	Astenus (Astenus) immaculatus		N		
Beetle	Lathrobium (Lathrobium) pallidum	INS			
Beetle	Medon castaneus	IND			SS
Beetle	Rugilus fragilis		N		
Beetle	Rugilus similis		N		
Beetle	Sunius bicolor	INS			
Beetle	Sunius melanocephalus		N		
Beetle	Gabrius bishopi		N:B		
Beetle	Gabrius osseticus		N:B		C
Beetle	Philonthus corvinus		N:A		
Beetle	Philonthus ebeninus		N		
Beetle	Philonthus fumarius		N:B		
Beetle	Philonthus lepidus	INS			ER
Beetle	Emus hirtus	EN			
Beetle	Ocypus (Ocypus) ophthalmicus		N:A		PS
Beetle	Ocypus (Pseudocypus) fortunatarum		N:B		PS
Beetle	Ocypus (Pseudocypus) fuscatus		N:B		
Beetle	Ocypus (Matidus) nitens		N:A		
Beetle	Platydracus fulvipes		N:B		
Beetle	Platydracus latebricola		N:B		
Beetle	Heterothops dissimilis	INS			
Beetle	Quedius (Quedius) balticus	EN			
Beetle	Quedius (Microsaurus) longicornis		N:B		
Beetle	Quedius (Microsaurus) microps		N:B		
Beetle	Quedius (Microsaurus) nigrocaeruleus		N:B		
Beetle	Quedius (Microsaurus) puncticollis		N:B		
Beetle	Quedius (Microsaurus) scitus		N:B		
Beetle	Velleius dilatatus	EN			
Beetle	Hypnogyra angularis		N:A		
Beetle	Xantholinus (Purrolinus) tricolor		N:A		
Beetle	Lucanus cervus		N:B	X	
Beetle	Trox sabulosus		N:A		SS
Beetle	Odonteus armiger		N:A		
Beetle	Trypocopris pyrenaeus		N:A		
Beetle	Aegialia (Psammoporus) insularis		N:B		
Beetle	Onthophagus (Paleonthophagus)	INS			
Beetle	Onthophagus (Paleonthophagus)		N:A		SS
Beetle	Euheptaulacus villosus		N:A		SS
Beetle	Aphodius (Agrilinus) sordidus		N:A		SS
Beetle	Aphodius (Chilothorax) distinctus		N:B		PS
Beetle	Aphodius (Chilothorax) paykulli		N:B		

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Beetle	Aphodius (Planolinus) fasciatus		N:B	SS
Beetle	Psammodius asper		N:A	
Beetle	Diastictus vulneratus	VU		ER
Beetle	Omaloplia ruricola		N:B	
Beetle	Anomala dubia			C
Beetle	Cyphon pubescens		N:B	
Beetle	Cyphon punctipennis		N:A	
Beetle	Prionocyphon serricornis		N:B	
Beetle	Agrilus (Anambus) angustulus		N:B	
Beetle	Agrilus (Anambus) biguttatus		N:A	
Beetle	Agrilus (Anambus) laticornis		N:B	
Beetle	Agrilus (Anambus) sinuatus		N:A	
Beetle	Aphanisticus pusillus		N:B	
Beetle	Byrrhus arietinus		N:B	
Beetle	Porcinolus murinus		N:B	
Beetle	Curimopsis setigera		N:A	
Beetle	Oulimnius major		N:A	
Beetle	Oulimnius troglodytes		N:B	
Beetle	Dryops (Dryops) anglicanus	R		SS
Beetle	Dryops (Dryops) auriculatus		N:B	
Beetle	Dryops (Dryops) griseus	R		SS
Beetle	Dryops (Dryops) similaris	R		
Beetle	Dryops (Yrdops) nitidulus	R		
Beetle	Augyles hispidulus	R		SS
Beetle	Melasis buprestoides		N:B	
Beetle	Aulonothroscus brevicollis	R		
Beetle	Ampedus pomorum		N:B	
Beetle	Ampedus quercicola		N:B	
Beetle	Elater ferrugineus	EN		
Beetle	Cardiophorus asellus		N:B	SS
Beetle	Platycis minutus		N:B	
Beetle	Cantharis fusca	R		
Beetle	Rhagonycha lutea		N:B	
Beetle	Rhagonycha translucida		N:B	
Beetle	Crudosilis ruficollis		N:B	
Beetle	Malthinus balteatus		N:B	
Beetle	Malthinus frontalis		N:B	
Beetle	Malthodes maurus		N:B	
Beetle	Ctesias serra		N:B	
Beetle	Hedobia (Ptinomorphus) imperialis		N:B	
Beetle	Ptinus palliatus		N:A	
Beetle	Dryophilus anobioides	R		
Beetle	Gastrallus immarginatus	EN		
Beetle	Anobium inexspectatum		N:B	
Beetle	Anobium nitidum	IND		
Beetle	Hadrobregmus denticollis		N:B	
Beetle	Dorcatoma flavicornis		N:B	
Beetle	Dorcatoma substriata		N:A	
Beetle	Caenocara affinis	IND		ER
Beetle	Anitys rubens		N:B	
Beetle	Phloiophilus edwardsii		N:B	
Beetle	Nemozoma elongatum	R		
Beetle	Tillus elongatus		N:B	
Beetle	Opilo mollis		N:B	
Beetle	Korynetes caeruleus		N:B	
Beetle	Clanoptilus marginellus		N:B	
Beetle	Dasytes plumbeus		N:B	
Beetle	Dasytes virens		N:B	
Beetle	Cerapheles terminatus		N:A	
Beetle	Sphindus dubius		N:B	
Beetle	Epuraea (Epuraea) silacea	R		
Beetle	Meligethes atramentarius		N	
Beetle	Meligethes fulvipes		N	
Beetle	Meligethes gagathinus		N	
Beetle	Meligethes incanus		N	
Beetle	Meligethes lugubris		N	
Beetle	Meligethes ochropus		N	
Beetle	Meligethes solidus		N	
Beetle	Cryptarcha strigata		N:B	
Beetle	Uleiota planata		N:A	

Appendix 9. List of all priority species recorded in Breckland

Beetle	Silvanus bidentatus		N:B	
Beetle	Pediacus depressus		N:A	
Beetle	Cryptolestes spartii		N:A	SS
Beetle	Olibrus flavicornis	INS		
Beetle	Olibrus millefolii		N:B	PS
Beetle	Olibrus pygmaeus		N:B	
Beetle	Stilbus atomarius	INS		
Beetle	Telmatophilus brevicollis	R		
Beetle	Telmatophilus schoenherrii	INS		
Beetle	Cryptophagus (Cryptophagus) labilis		N	
Beetle	Cryptophagus (Cryptophagus) micaceus	INS		
Beetle	Cryptophagus (Cryptophagus) populi		N	
Beetle	Cryptophagus (Cryptophagus) ruficornis		N	
Beetle	Atomaria (Anchicera) atra		N	
Beetle	Atomaria (Anchicera) clavigera	INS		
Beetle	Atomaria (Anchicera) peltata	INS		
Beetle	Atomaria (Anchicera) pseudatra	IND		
Beetle	Atomaria (Anchicera) rhenana		N	
Beetle	Atomaria (Anchicera) scutellaris	INS		
Beetle	Atomaria (Anchicera) zetterstedti	INS		
Beetle	Atomaria (Atomaria) fimetarii		N	
Beetle	Atomaria (Atomaria) lohsei	INS		
Beetle	Tritoma bipustulata		N:A	
Beetle	Diplocoelus fagi		N:B	
Beetle	Lycoperdina bovistae	R		
Beetle	Lycoperdina succincta	VU		ER
Beetle	Clitostethus arcuatus	EN		
Beetle	Scymnus (Scymnus) femoralis		N:B	
Beetle	Scymnus (Scymnus) schmidti		N:B	
Beetle	Scymnus (Neopullus) limbatus		N:B	
Beetle	Nephus quadrimaculatus	VU		
Beetle	Hyperaspis pseudopustulata		N:B	
Beetle	Platynaspis luteorubra		N:A	
Beetle	Orthoperus aequalis	INS		
Beetle	Orthoperus brunnipes	R		
Beetle	Orthoperus nigrescens		N:B	
Beetle	Latridius consimilis		N	
Beetle	Enicmus brevicornis		N	
Beetle	Enicmus rugosus		N	
Beetle	Corticaria alleni		N	
Beetle	Corticaria inconspicua		N	
Beetle	Corticaria rubripes		N	
Beetle	Corticarina truncatella	INS		SS
Beetle	Mycetophagus piceus		N:B	
Beetle	Mycetophagus quadriguttatus		N:A	
Beetle	Cis festivus		N:B	
Beetle	Hallomenus binotatus		N:B	
Beetle	Tetratoma desmarestii		N:A	
Beetle	Orchesia micans		N:B	
Beetle	Orchesia minor		N:B	
Beetle	Anisoxya fuscula		N:A	
Beetle	Abdera biflexuosa		N:B	
Beetle	Abdera flexuosa		N:B	
Beetle	Abdera quadrifasciata		N:A	
Beetle	Abdera triguttata		N:A	
Beetle	Melandrya caraboides		N:B	
Beetle	Conopalpus testaceus		N:B	
Beetle	Mordellistena (Mordellistena) humeralis	INS		
Beetle	Mordellistena (Mordellistena)	INS		
Beetle	Mordellistena (Mordellistena) parvula	INS		
Beetle	Mordellistena (Mordellistena)	INS		
Beetle	Mordellistena (Mordellina) acuticollis	INS		
Beetle	Orthocerus clavicornis		N:B	C
Beetle	Synchita humeralis		N:B	
Beetle	Synchita separanda	R		
Beetle	Eledona agricola		N:B	
Beetle	Prionychus ater		N:B	
Beetle	Pseudocistela ceramboides		N:B	
Beetle	Mycetochara humeralis		N:A	
Beetle	Cteniopus sulphureus			C

Appendix 9. List of all priority species recorded in Breckland

Beetle	Crypticus quisquilius		N:B		C
Beetle	Myrmechixenus vaporariorum	R			
Beetle	Scaphidema metallicum		N:B		
Beetle	Platydema violaceum	EN			
Beetle	Diaperis boleti	VU			
Beetle	Ischnomera cinerascens	VU			
Beetle	Ischnomera cyanea		N:B		
Beetle	Oedemera (Oncomera) femoralis		N:B		
Beetle	Oedemera (Oedemera) virescens	VU			
Beetle	Meloe proscarabaeus			X	
Beetle	Lissodema cursor		N:A		
Beetle	Lissodema denticolle		N:B		
Beetle	Notoxus monoceros				C
Beetle	Omonadus bifasciatus		N:B		
Beetle	Aderus populneus		N:B		
Beetle	Euglenes oculatus		N:B		
Beetle	Scraptia testacea	R			
Beetle	Anaspis (Anaspis) thoracica	IND	N:A		
Beetle	Grammoptera abdominalis		N:A		
Beetle	Anoplodera sexguttata	R			
Beetle	Aromia moschata		N:B		
Beetle	Poecilium alni		N:B		
Beetle	Anaglyptus mysticus		N:B		
Beetle	Saperda carcharias		N:A		
Beetle	Phytoecia cylindrica		N:B		
Beetle	Oberea oculata	EN		X	
Beetle	Tetrops starkii	INS			
Beetle	Bruchus atomarius		N:B		
Beetle	Macroplea mutica		N:A		
Beetle	Donacia aquatica	R		X	
Beetle	Donacia bicolora	VU		X	
Beetle	Donacia clavipes		N:B		
Beetle	Donacia impressa		N:A		
Beetle	Donacia sparganii		N:A		
Beetle	Donacia thalassina		N:B		
Beetle	Plateumaris affinis		N:B		
Beetle	Plateumaris braccata		N:A		
Beetle	Cryptocephalus aureolus		N:B		
Beetle	Cryptocephalus exiguus	EN		X	ER
Beetle	Cryptocephalus frontalis		N:A		
Beetle	Cryptocephalus parvulus		N:B		
Beetle	Chrysolina graminis		N:A	X	
Beetle	Chrysolina marginata		N:A		SS
Beetle	Chrysolina oricalcia		N:B		
Beetle	Chrysolina sanguinolenta		N:A		SS
Beetle	Chrysolina violacea		N:B		
Beetle	Gonioctena decemnotata		N:B		
Beetle	Luperus flavipes		N:B		
Beetle	Calomicrus circumfusus		N:A		
Beetle	Phyllotreta cruciferae		N:B		
Beetle	Phyllotreta vittula		N:A		
Beetle	Longitarsus aeneicollis		N:B		
Beetle	Longitarsus agilis		N:A		
Beetle	Longitarsus anchusae		N:B		
Beetle	Longitarsus ballotae		N:B		
Beetle	Longitarsus brunneus		N:B		
Beetle	Longitarsus curtus		N:A		
Beetle	Longitarsus dorsalis		N:B		
Beetle	Longitarsus ferrugineus	EN			
Beetle	Longitarsus ganglbaueri		N:A		
Beetle	Longitarsus lycopi		N:B		
Beetle	Longitarsus nasturtii		N:B		
Beetle	Longitarsus nigrofasciatus		N:A		
Beetle	Longitarsus parvulus		N:A		
Beetle	Longitarsus pratensis	INS			
Beetle	Longitarsus quadriguttatus		N:A		
Beetle	Longitarsus tabidus		N:B		
Beetle	Altica brevicollis		N:A		
Beetle	Altica ericeti		N:B		
Beetle	Lythraria salicariae		N:B		

Appendix 9. List of all priority species recorded in Breckland

Beetle	Podagrica fuscicornis		N:B		
Beetle	Mantura chrysanthemi		N:A		
Beetle	Mantura obtusata		N:B		
Beetle	Apteropeda globosa		N:B		
Beetle	Psylliodes chalcomera		N:B		
Beetle	Psylliodes luteola	INS			
Beetle	Psylliodes sophiae	R			PS
Beetle	Pilemostoma fastuosa		N:A		
Beetle	Cassida hemisphaerica		N:A		
Beetle	Cassida nebulosa	IND			SS
Beetle	Cassida nobilis		N:B		
Beetle	Cassida prasina		N:B		
Beetle	Anthribus nebulosus		N:B		
Beetle	Platyrhinus resinosus		N:B		
Beetle	Platystomos albinus		N:B		
Beetle	Choragus sheppardi		N:A		
Beetle	Lasiorhynchites (Lasiorhynchites) cavifrons		N:B		
Beetle	Neocoenorrhinus interpunctatus		N:B		
Beetle	Temnocerus longiceps		N:B		
Beetle	Temnocerus tomentosus		N:B		
Beetle	Byctiscus betulae		N:B		
Beetle	Apion rubiginosum	R			
Beetle	Melanapion minimum	R	N:B	X	
Beetle	Squamapion cineraceum		N:A		
Beetle	Squamapion vicinum		N:B		
Beetle	Cyanapion (Bothryorrhynchapion)		N:B		
Beetle	Hemitrichapion (Tinocyba) reflexum		N:A		
Beetle	Oxystoma cerdo		N:B		
Beetle	Catapion pubescens		N:B		
Beetle	Protapion difforme		N:B		
Beetle	Protapion dissimile		N:B		
Beetle	Protapion filirostre		N:B		
Beetle	Protapion varipes		N:B		
Beetle	Grypus equiseti		N:B		
Beetle	Notaris scirpi		N:B		
Beetle	Procas armillatus	IND			
Beetle	Thryogenes scirrhosus		N:B		
Beetle	Attactagenus plumbeus		N:B		
Beetle	Pelenomus canaliculatus		N:B		
Beetle	Sitona (Sitona) puberulus	INS			
Beetle	Trypophloeus binodulus		N:A		
Beetle	Tournotaris bimaculatus		N:B		
Beetle	Archarius villosus		N:B		
Beetle	Curculio betulae		N:B		
Beetle	Curculio rubidus		N:B		
Beetle	Acalyptus carpini		N:B		
Beetle	Anthonomus (Anthonomus) piri	INS			
Beetle	Cionus longicollis		N:A		PS
Beetle	Cionus nigritarsis		N:A		
Beetle	Ellescus bipunctatus		N:B		
Beetle	Dorytomus filirostris		N:B		
Beetle	Dorytomus ictor		N:B		
Beetle	Dorytomus salicinus		N:B		
Beetle	Dorytomus tremulae		N:B		
Beetle	Cleopomiarus graminis		N:B		
Beetle	Gymnetron beccabungae		N:A		
Beetle	Gymnetron melanarium		N:B		
Beetle	Gymnetron rostellum		N:A		
Beetle	Gymnetron veronicae		N:B		
Beetle	Gymnetron villosulum		N:B		
Beetle	Rhinusa collina		N:A		
Beetle	Rhinusa linariae		N:A		
Beetle	Isochnus foliorum		N:A		
Beetle	Orchestes (Orchestes) testaceus	VU		X	
Beetle	Isochnus populicola	INS			
Beetle	Pseudorchestes pratensis		N:B		
Beetle	Tachyerges decoratus	IND			
Beetle	Smicronyx jungermanniae		N:B		
Beetle	Orthochaetes setiger		N:B		
Beetle	Tychius parallelus		N:A		PS

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Beetle	Tychius quinquepunctatus	VU		
Beetle	Tychius schneideri		N:B	
Beetle	Tychius tibialis		N:A	
Beetle	Bagous (Bagous) limosus		N:B	
Beetle	Bagous (Bagous) lutulosus		N:A	
Beetle	Bagous (Abagous) glabrirostris		N:B	SS
Beetle	Bagous (Abagous) lutosus	EN		SS
Beetle	Bagous (Abagous) lutulentus		N:B	
Beetle	Bagous (Abagous) puncticollis	EN		SS
Beetle	Aulacobaris lepidii		N:A	SS
Beetle	Aulacobaris picicornis		N:B	
Beetle	Ceutorhynchus atomus		N:A	
Beetle	Ceutorhynchus constrictus		N:B	
Beetle	Ceutorhynchus hirtulus		N:B	
Beetle	Ceutorhynchus pulvinatus		N:A	PS
Beetle	Ceutorhynchus pumilio		N:A	SS
Beetle	Ceutorhynchus querceti	VU		
Beetle	Ceutorhynchus rapae		N:B	
Beetle	Ceutorhynchus resedae		N:B	
Beetle	Ceutorhynchus unguicularis	R		
Beetle	Coeliodes ruber		N:B	
Beetle	Coeliodes transversealbofasciatus		N:B	
Beetle	Coeliodinus nigritarsis		N:A	
Beetle	Datonychus angulosus		N:A	
Beetle	Drupenatus nasturtii		N:B	
Beetle	Hadroplontus trimaculatus		N:B	
Beetle	Microplontus campestris		N:B	
Beetle	Microplontus triangulum		N:B	
Beetle	Mogulones euphorbiae		N:A	
Beetle	Mogulones geographicus		N:B	
Beetle	Sirocalodes mixtus		N:B	
Beetle	Stenocarus ruficornis		N:B	
Beetle	Tapeinotus sellatus		N:A	
Beetle	Thamiocolus viduatus		N:B	
Beetle	Trichosirocalus barnevillei		N:B	
Beetle	Trichosirocalus horridus		N:A	
Beetle	Eubrychius velutus		N:B	
Beetle	Neophytobius muricatus		N:A	
Beetle	Pelenomus comari		N:B	
Beetle	Pelenomus quadricorniger		N:A	
Beetle	Cossonus linearis		N:A	
Beetle	Cossonus parallelepipedus		N:B	
Beetle	Stereocorynes truncorum		N:A	
Beetle	Cryptorhynchus lapathi		N:B	
Beetle	Acalles ptinoides		N:B	
Beetle	Gronops lunatus		N:B	
Beetle	Neliocarus faber		N:B	
Beetle	Otiorhynchus (Otiorhynchus) raucus		N:B	
Beetle	Otiorhynchus (Tournieria) desertus		N:B	
Beetle	Polydrusus (Chrysophis) formosus		N:A	
Beetle	Brachysomus echinatus		N:B	
Beetle	Trachyphloeus aristatus		N:B	
Beetle	Trachyphloeus spinimanus		N:B	
Beetle	Tropiphorus terricola		N:B	
Beetle	Hypera (Hypera) fuscocinerea		N:B	
Beetle	Hypera (Hypera) ononidis	INS		C
Beetle	Hypera (Antidonus) dauci		N:B	
Beetle	Hypera (Boreohypera) diversipunctata	R		
Beetle	Hypera (Dapalinus) meles		N:A	
Beetle	Hypera (Tigrinellus) pastinaceae	EN		
Beetle	Limobius borealis		N:A	
Beetle	Cleonis pigra		N:B	
Beetle	Magdalis (Odontomagdalis) carbonaria		N:B	
Beetle	Magdalis (Panus) barbicornis		N:A	
Beetle	Magdalis (Porrothus) cerasi		N:B	
Beetle	Scolytus mali		N:B	
Beetle	Ernoporicus caucasicus	EN		
Beetle	Ernoporicus fagi		N:A	
Beetle	Pityogenes trepanatus		N:A	
Beetle	Xyleborus dispar		N:B	

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Beetle	Hylesinus orni		N:B		
Beetle	Kissophagus hederae		N:B		
Beetle	Phloeotribus rhododactylus				SS
Beetle	Platypus cylindrus		N:B		
Caddis Fly	Erotesis baltica	VU			
Caddis Fly	Grammotaulius nitidus	EN			
Caddis Fly	Limnephilus pati	EN			
Caddis Fly	Limnephilus tauricus	EN			
Caddis Fly	Phacopteryx brevipennis		N		
Butterfly	Carterocephalus palaemon	EN		X	
Butterfly	Erynnis tages	NT		X	
Butterfly	Pyrgus malvae	VU		X	
Butterfly	Thecla betulae	VU		X	
Butterfly	Satyrium w-album	VU		X	
Butterfly	Cupido minimus	NT		X	
Butterfly	Plebejus argus	VU		X	
Butterfly	Lysandra coridon	RE			
Butterfly	Limenitis camilla	NT		X	
Butterfly	Apatura iris	CR			
Butterfly	Aglais polychloros	CR			
Butterfly	Boloria selene	EN		X	
Butterfly	Argynnis adippe	EN		X	
Butterfly	Euphydryas aurinia	NT		X	
Butterfly	Lasiommata megera	NT		X	
Butterfly	Hipparchia semele	NT		X	
Butterfly	Coenonympha pamphilus	EN		X	
Moth	Endromis versicolora	R			
Moth	Nemophora fasciella			X	
Moth	Phlyctaenia stachydalis	INS			
Moth	Hepialus humuli			X	
Moth	Phragmataecia castaneae	VU			
Moth	Cossus cossus			X	
Moth	Adscita statices			X	
Moth	Coleophora tricolor			X	LR
Moth	Coleophora vestianella				SS
Moth	Coleophora clypeiferella				SS
Moth	Stathmopoda pedella		N:B		
Moth	Agonopterix atomella			X	
Moth	Ethmia dodecea		N:B		
Moth	Ethmia quadrillella		N:A		
Moth	Acompsia schmidtiellus		N:B		
Moth	Eulamprotes wilkella		N:B		SS
Moth	Monochroa lutulentella	INS			
Moth	Monochroa palustrella		N:B		
Moth	Monochroa suffusella		N		
Moth	Monochroa arundinetella	IND			
Moth	Monochroa divisella	VU			
Moth	Recurvaria nanella		N:B		
Moth	Athrips tetrapunctella	IND			
Moth	Chionodes distinctella		N:B		
Moth	Neofriseria singula	INS			
Moth	Gelechia nigra		N:B		
Moth	Scrobipalpa pauperella	INS			
Moth	Caryocolum proximum	INS			
Moth	Caryocolum huebneri	EX			
Moth	Syncopacma cinctella		N:B		
Moth	Dichomeris derasella	EN			
Moth	Dichomeris alacella		N		
Moth	Brachmia inornatella		N:B		
Moth	Platyedra subcinerea		N		
Moth	Scythris siccella			X	
Moth	Cochylidia heydeniana				SS
Moth	Falseuncaria degreyana				PS
Moth	Ancylosis oblitella		N		
Moth	Calamotropha paludella		N:B		
Moth	Crambus uliginosellus		N:B		
Moth	Crambus hamella		N:B		
Moth	Crambus pratella		N:B		
Moth	Thisanotia chrysonuchella		N:B		SS
Moth	Pediasia fascelinella	VU			

Appendix 9. List of all priority species recorded in Breckland

Moth	Pediasia contaminella			N:B		
Moth	Pediasia aridella			N:B		
Moth	Platytes alpinella		R			
Moth	Platytes cerussella					SS
Moth	Schoenobius gigantella			N:B		
Moth	Eudonia lineola			N:B		
Moth	Evergestis extimalis			N:B		SS
Moth	Loxostege sticticalis		EX			SS
Moth	Sitochroa palealis			N		
Moth	Paratalanta pandalis			N:A		
Moth	Paratalanta hyalinalis			N:B		
Moth	Anania verbascalis			N:B		
Moth	Nascia cilialis			N:A		
Moth	Synaphe punctalis			N:B		
Moth	Oncocera semirubella			N:B		
Moth	Eurhodope cirrigerella		EX			
Moth	Apomyelois bistriatella	subsp. neophanes		N:B		
Moth	Nephopterix angustella			N:B		
Moth	Euzophera cinerosella			N:B		
Moth	Homoeosoma nebulella			N:B		
Moth	Oxyptilus distans					SS
Moth	Trichiura crataegi				X	
Moth	Eriogaster lanestris		VU			
Moth	Malacosoma neustria				X	
Moth	Watsonalla binaria				X	
Moth	Cymatophorima diluta				X	
Moth	Hemistola chrysoprasaria				X	
Moth	Cyclophora pendularia		R		X	
Moth	Cyclophora porata				X	
Moth	Timandra comae				X	
Moth	Scopula rubiginata		R			PS
Moth	Scopula marginepunctata				X	
Moth	Phibalapteryx virgata					SS
Moth	Orthonama vittata				X	
Moth	Xanthorhoe biriviata		R			
Moth	Xanthorhoe ferrugata				X	
Moth	Scotopteryx bipunctaria				X	
Moth	Scotopteryx chenopodiata				X	
Moth	Epirrhoe galiata				X	
Moth	Pelurga comitata				X	
Moth	Eulithis mellinata				X	
Moth	Ecliptopera silaceata				X	
Moth	Melanthia procellata				X	
Moth	Pareulype berberata		EN		X	
Moth	Perizoma albulata	subsp. albulata			X	
Moth	Perizoma sagittata		VU			
Moth	Eupithecia abietaria		R			
Moth	Eupithecia egenaria		R			
Moth	Chesias legatella				X	
Moth	Chesias rufata				X	
Moth	Lithostege griseata		R		X	PS
Moth	Trichopteryx polycommata				X	
Moth	Macaria wauaria				X	
Moth	Chiasmia clathrata				X	
Moth	Ennomos quercinaria				X	
Moth	Ennomos fuscantaria				X	
Moth	Ennomos erosaria				X	
Moth	Lycia hirtaria				X	
Moth	Aleucis distinctata				X	
Moth	Hemaris tityus				X	
Moth	Diloba caeruleocephala				X	
Moth	Laelia coenosa		EX			
Moth	Pelosia muscerda		R			
Moth	Arctia caja				X	
Moth	Spilosoma lubricipeda				X	
Moth	Spilosoma luteum				X	
Moth	Tyria jacobaeae				X	
Moth	Chortodes extrema		R		X	
Moth	Hecatera dysodea		EX			
Moth	Euxoa tritici				X	

Appendix 9. List of all priority species recorded in Breckland

Moth	Euxoa nigricans			X	
Moth	Noctua orbona			X	SS
Moth	Graphiphora augur			X	
Moth	Eugnorisma glareosa			X	
Moth	Diarsia rubi			X	
Moth	Xestia castanea			X	
Moth	Xestia agathina			X	
Moth	Polia bombycina			X	
Moth	Sideridis albicolon				C
Moth	Heliophobus reticulata			X	SS
Moth	Melanchra persicariae			X	
Moth	Melanchra pisi			X	
Moth	Hadena irregularis	EN			PS
Moth	Tholera cespitis			X	
Moth	Tholera decimalis			X	
Moth	Orthosia gracilis			X	
Moth	Mythimna comma			X	
Moth	Mythimna flammea	R			
Moth	Brachylomia viminalis			X	
Moth	Asteroscopus sphinx			X	
Moth	Aporophyla lutulenta			X	
Moth	Xylena exsoleta			X	
Moth	Allophyes oxyacanthae			X	
Moth	Blepharita adusta			X	
Moth	Agrochola helvola			X	
Moth	Agrochola litura			X	
Moth	Agrochola lychnidis			X	
Moth	Atethmia centrago			X	
Moth	Xanthia icteritia			X	
Moth	Xanthia gilvago			X	
Moth	Acronicta psi			X	
Moth	Acronicta rumicis			X	
Moth	Amphipyra tragopoginis			X	
Moth	Trachea atriplicis	EX			
Moth	Dicycla oo			X	
Moth	Cosmia diffinis			X	
Moth	Apamea remissa			X	
Moth	Apamea anceps			X	
Moth	Mesoligia literosa			X	
Moth	Chortodes brevilinea	R		X	
Moth	Amphipoea oculea			X	
Moth	Hydraecia micacea			X	
Moth	Celaena haworthii			X	
Moth	Celaena leucostigma			X	
Moth	Archanara algae	R			
Moth	Rhizedra lutosa			X	
Moth	Hoplodrina blanda			X	
Moth	Caradrina morpheus			X	
Moth	Athetis pallustris	R		X	
Moth	Stilbia anomala			X	
Moth	Heliothis viriplaca	R			SS
Moth	Heliothis maritima	R		X	
Moth	Deltote bankiana	VU			
Moth	Emmelia trabealis	EN			PS
Moth	Tyta luctuosa	VU		X	
Moth	Pechipogo strigilata			X	
Moth	Herminia tarsicrinalis	R			
Moth	Aspitates ochrearia				C
True Fly	Chrysopilus laetus	EN			
True Fly	Milichia ludens	DD			
True Fly	Minilimosina albinervis	DD			
True Fly	Minilimosina v-atrum	DD			
True Fly	Paralimosina fucata	DD			
True Fly	Palloptera usta	R			
True Fly	Periscelis annulata		N		
True Fly	Phora bullata	DD			
True Fly	Phora hamata	DD			
True Fly	Plectanocnema nudipes	DD			
True Fly	Odinia meijerei		N		
True Fly	Odinia ornata	VU			

Appendix 9. List of all priority species recorded in Breckland

True Fly	Epitriptus arthriticus	EN			
True Fly	Ctenophora pectinicornis		N		
True Fly	Prionocera subserricornis	VU			
True Fly	Nephrotoma crocata	R			
True Fly	Tipula helvola		N		
True Fly	Tipula livida		N		
True Fly	Tipula peliostigma		N		
True Fly	Tipula selene	R			
True Fly	Diogma glabrata		N		
True Fly	Phalacrocera replicata		N		
True Fly	Cheilotrichia imbuta		N		
True Fly	Limonia quadrimaculata	VU			
True Fly	Limonia inusta		N		
True Fly	Limonia danica	R			
True Fly	Limonia lucida		N		
True Fly	Limonia ventralis		N		
True Fly	Limonia uniseriata	R			
True Fly	Pedicia unicolor		N		
True Fly	Erioptera meijerei	VU			
True Fly	Laphria marginata		N		
True Fly	Erioptera nielseni		N		
True Fly	Agathomyia species 2		N		
True Fly	Gnophomyia viridipennis		N		
True Fly	Megasyrphus annulipes		N		
True Fly	Melangyna triangulifera		N		
True Fly	Metasyrphus lapponicus		N		
True Fly	Metasyrphus latilunulatus		N		
True Fly	Neocnemodon brevidens		N		
True Fly	Neocnemodon latitarsis		N		
True Fly	Neocnemodon pubescens		N		
True Fly	Neocnemodon verrucula		N		
True Fly	Vidalia cornuta	R			
True Fly	Icterica westermanni		N		
True Fly	Paroxyna absinthii		N		
True Fly	Gonomyia bifida		N		
True Fly	Chaetomus confusus		N		
True Fly	Pherbellia grisescens		N		
True Fly	Trachysiphonella carinfacies				PS
True Fly	Gonomyia abbreviata	R			
True Fly	Crassivenula brachyptera	R			
True Fly	Caricea falculata		N		
True Fly	Molophilus bihamatus		N		
True Fly	Molophilus corniger		N		
True Fly	Molophilus propinquus		N		
True Fly	Neolimnophila carteri		N		
True Fly	Tasiocera collini	EN			
True Fly	Tasiocera robusta		N		
True Fly	Phylidorea abdominalis		N		
True Fly	Pilaria fuscipennis		N		
True Fly	Pilaria scutellata		N		
True Fly	Helius pallirostris		N		
True Fly	Limonia masoni	R			
True Fly	Limonia trivittata		N		
True Fly	Orimarga juvenilis		N		
True Fly	Rhipidia ctenophora	VU			
True Fly	Thaumastoptera calceata		N		
True Fly	Cordyla insons	DD			
True Fly	Brevicornu glandis		S:NS		
True Fly	Exechiopsis membranacea		S:NS		
True Fly	Manota unifurcata	NT			
True Fly	Phronia portschinskyi	DD			
True Fly	Rymosia fosteri	NT			
True Fly	Sceptonia tenuis		S:NS		
True Fly	Synplasta rufilatera		S:NS		
True Fly	Ditomyia fasciata		S:NS		
True Fly	Keroplatus testaceus		S:NS		
True Fly	Asindulum nigrum	NT		X	
True Fly	Pyratula perpusilla		S:NS		
True Fly	Rutylapa ruficornis		S:NS		
True Fly	Macrocera crassicornis		S:NS		

Appendix 9. List of all priority species recorded in Breckland

True Fly	Macrocera fascipennis		S:NS		
True Fly	Macrocera maculata		S:NS		
True Fly	Ectrepesthoneura colyeri		S:NS		
True Fly	Palaeodocosia flava	NT			
True Fly	Docosia carbonaria		S:NS		
True Fly	Docosia pallipes		S:NS		
True Fly	Leia longiseta		S:NS		
True Fly	Allodia embla		S:NS		
True Fly	Allodia angulata		S:NS		
True Fly	Allodia neglecta		S:NS		
True Fly	Allodia silvatica		S:NS		
True Fly	Allodia protenta	NT			
True Fly	Exechia dizona	DD			SS
True Fly	Exechia lucidula	NT			
True Fly	Pseudexechia parallela		S:NS		
True Fly	Rymosia armata		S:NS		
True Fly	Rymosia britteni		S:NS		
True Fly	Rymosia spinipes		S:NS		
True Fly	Synplasta ingeniosa		S:NS		
True Fly	Dynatosoma cochleare		S:NS		
True Fly	Mycetophila caudata		S:NS		
True Fly	Mycetophila confusa		S:NS		SS
True Fly	Mycetophila deflexa	DD			
True Fly	Mycetophila dziedzickii	NT			
True Fly	Sceptonia flavipuncta		S:NS		
True Fly	Trichonta bicolor	DD			
True Fly	Trichonta clavigera		S:NS		
True Fly	Trichonta fragilis		S:NS		
True Fly	Mycomya britteni		S:NS		
True Fly	Mycomya collini	DD			
True Fly	Mycomya frequens		S:NS		
True Fly	Mycomya parva		S:NS		
True Fly	Azana anomala		S:NS		
True Fly	Sciophila buxtoni		S:NS		
True Fly	Sciophila adamsi	NT			
True Fly	Sciophila interrupta		S:NS		
True Fly	Sciophila nigronitida		S:NS		
True Fly	Sciophila thoracica		S:NS		
True Fly	Dixella filicornis		S:NS		
True Fly	Anopheles algeriensis	DD			
True Fly	Spania nigra		N		
True Fly	Hybomitra muehlfeldi	R			
True Fly	Tabanus miki	INS			
True Fly	Solva marginata		N		
True Fly	Beris clavipes		N		
True Fly	Chorisops nagatomii		N		
True Fly	Eupachygaster tarsalis		N		
True Fly	Zabrachia tenella		N		
True Fly	Oxycera analis	VU			
True Fly	Oxycera leonina	EN			ER
True Fly	Oxycera morrisii		N		
True Fly	Oxycera pygmaea		N		
True Fly	Vanoyia tenuicornis		N		
True Fly	Odontomyia angulata	EN			SS
True Fly	Odontomyia argentata	VU			SS
True Fly	Odontomyia tigrina		N		
True Fly	Stratiomys chamaeleon	EN			
True Fly	Stratiomys potamida		N		
True Fly	Stratiomys singularior		N		
True Fly	Ogcodes pallipes		N		
True Fly	Bombylius discolor		N		
True Fly	Phthiria pulicaria		N		C
True Fly	Thereva plebeja		N		SS
True Fly	Scenopinus niger		N		
True Fly	Asilus crabroniformis		N	X	
True Fly	Eutolmus rufibarbis	R			SS
True Fly	Machimus arthriticus				PS
True Fly	Dioctria oelandica		N		
True Fly	Lasiopogon cinctus		N		
True Fly	Tachydromia costalis	NT			

Appendix 9. List of all priority species recorded in Breckland

True Fly	Tachydromia halterata	EN		
True Fly	Euthyneura inermis		S:NS	
True Fly	Oedalea oriunda	DD		PS
True Fly	Bicellaria mera		S:NS	
True Fly	Drapetis infitialis	DD		
True Fly	Platypalpus articulatoides		S:NS	
True Fly	Platypalpus articulatus		S:NS	
True Fly	Platypalpus aurantiacus		S:NS	
True Fly	Platypalpus cryptospina		S:NS	
True Fly	Platypalpus excisus		S:NS	
True Fly	Platypalpus infectus		S:NS	
True Fly	Platypalpus ingenuus	NT		
True Fly	Platypalpus longimanus	DD		
True Fly	Platypalpus niveiseta		S:NS	
True Fly	Platypalpus praecinctus		S:NS	
True Fly	Platypalpus stigma		S:NS	
True Fly	Platypalpus tuomikoskii		S:NS	
True Fly	Platypalpus unicus		S:NS	
True Fly	Tachypeza fuscipennis		S:NS	
True Fly	Empis impennis	VU		
True Fly	Empis prodromus	NT		
True Fly	Empis woodi		S:NS	
True Fly	Hilara albitarsis		S:NS	
True Fly	Hilara hirtella	NT		PS
True Fly	Hilara lugubris		S:NS	
True Fly	Hilara medeteriformis	NT		
True Fly	Hilara platyura		S:NS	
True Fly	Hilara primula	VU		
True Fly	Hilara quadriseta		S:NS	
True Fly	Rhamphomyia albitarsis		S:NS	
True Fly	Rhamphomyia physoprocta	NT		
True Fly	Rhamphomyia sulcatina		S:NS	
True Fly	Melanostolus melancholicus		S:NS	
True Fly	Dolichopus agilis		S:NS	
True Fly	Dolichopus lineatocornis	NT		
True Fly	Dolichopus migrans	NT		LR
True Fly	Dolichopus notatus		S:NS	
True Fly	Dolichopus plumitarsis	EN		PS
True Fly	Hercostomus fulvicaudis		S:NS	
True Fly	Hercostomus plagiatus		S:NS	
True Fly	Medetera obscura		S:NS	
True Fly	Medetera parenti	DD		
True Fly	Medetera pinicola		S:NS	
True Fly	Systenus leucurus		S:NS	
True Fly	Systenus scholtzii		S:NS	
True Fly	Thrypticus divisus		S:NS	
True Fly	Thrypticus nigricauda		S:NS	
True Fly	Thrypticus tarsalis		S:NS	
True Fly	Campsicnemus pumilio		S:NS	
True Fly	Syntormon mikii	NT		
True Fly	Agathomyia collini	VU		
True Fly	Agathomyia elegantula		S:NS	
True Fly	Agathomyia wankowiczii		S:NS	
True Fly	Agathomyia woodella		S:NS	
True Fly	Seri obscuripennis	NT		
True Fly	Lonchoptera scutellata		S:NS	
True Fly	Anasimyia interpuncta	R		
True Fly	Brachyopa bicolor	R		
True Fly	Brachyopa insensilis		N	
True Fly	Brachyopa pilosa		N	
True Fly	Brachypalpus laphriformis		N	
True Fly	Callicera aurata	R		
True Fly	Cheilosia barbata		N	
True Fly	Cheilosia cynocephala		N	
True Fly	Cheilosia nebulosa	R		
True Fly	Cheilosia pubera		N	
True Fly	Cheilosia soror		N	
True Fly	Cheilosia velutina		N	
True Fly	Chrysotoxum elegans	R		
True Fly	Criorhina asilica		N	

Appendix 9. List of all priority species recorded in Breckland

True Fly	Criorhina ranunculi		N		
True Fly	Didea fasciata		N		
True Fly	Didea intermedia		N		
True Fly	Epistrophe diaphana		N		
True Fly	Eumerus ornatus		N		
True Fly	Eupeodes nielseni		N		
True Fly	Lejogaster tarsata		N		
True Fly	Melangyna barbifrons		N		
True Fly	Microdon devius	VU			
True Fly	Myolepta dubia		N		
True Fly	Neoascia geniculata		N		
True Fly	Neoascia interrupta		N		
True Fly	Orthonevra brevicornis		N		
True Fly	Orthonevra geniculata		N		
True Fly	Parasyrphus nigritarsis	EN			
True Fly	Parhelophilus consimilis	VU			
True Fly	Pipiza lugubris		N		
True Fly	Pipizella maculipennis	R			
True Fly	Pipizella virens		N		
True Fly	Platycheirus discimanus		N		
True Fly	Platycheirus sticticus		N		
True Fly	Sphegina verecunda		N		
True Fly	Triglyphus primus		N		
True Fly	Volucella inanis		N		
True Fly	Volucella inflata		N		
True Fly	Volucella zonaria		N		
True Fly	Xanthandrus comtus		N		
True Fly	Xylota abiens		N		
True Fly	Xylota florum		N		
True Fly	Xylota jakutorum		N		
True Fly	Xylota tarda		N		
True Fly	Xylota xanthocnema		N		
True Fly	Cephalops chlorionae		S:NS		
True Fly	Cephalosphaera germanica		S:NS		
True Fly	Cephalops pannonicus		S:NS		
True Fly	Cephalops perspicuus	NT			
True Fly	Claraeola halterata		S:NS		
True Fly	Claraeola melanostola		S:NS		
True Fly	Dasydorylas horridus		S:NS		
True Fly	Dorylomorpha clavifemora	VU		X	
True Fly	Eudorylas arcanus	NT			
True Fly	Eudorylas fusculus	DD			
True Fly	Eudorylas ruralis	DD			
True Fly	Eudorylas terminalis		S:NS		
True Fly	Eudorylas zermattensis		S:NS		
True Fly	Microcephalops vestitus	DD			
True Fly	Pipunculus oldenbergi	DD			
True Fly	Pipunculus spinipes		S:NS		
True Fly	Pipunculus zugmayeriae		S:NS		
True Fly	Tomosvaryella minima	NT			
True Fly	Micropeza lateralis		N		
True Fly	Tanypeza longimana	VU			
True Fly	Megamerina dolium		N		
True Fly	Chyliza annulipes		S:NS		
True Fly	Chyliza nova		N		
True Fly	Chyliza vittata		N		
True Fly	Chyliza extenuata	R	N		
True Fly	Conops strigatus		N		
True Fly	Conops vesicularis		N		
True Fly	Leopoldius brevirostris	VU			
True Fly	Leopoldius signatus		N		
True Fly	Myopa fasciata	R			
True Fly	Myopa polystigma	R			
True Fly	Myopa strandi	R			SS
True Fly	Myopa vicaria	VU			
True Fly	Thecophora fulvipes		N		
True Fly	Sicus abdominalis	EN			
True Fly	Zodion cinereum		N		
True Fly	Dasiops occultus		N		
True Fly	Earomyia schistopyga		N		

Appendix 9. List of all priority species recorded in Breckland

True Fly	Lonchaea britteni		N	
True Fly	Lonchaea collini		N	
True Fly	Lonchaea corusca		N	
True Fly	Lonchaea nitens		N	
True Fly	Lonchaea ultima		N	
True Fly	Herina oscillans	R		
True Fly	Herina palustris		N	
True Fly	Ulidia erythrophthalma	R		
True Fly	Myopites inulaedyssentericae	R		C
True Fly	Urophora cuspidata		N	
True Fly	Urophora solstitialis	R		
True Fly	Acinia corniculata	EN		SS
True Fly	Dioxyna bidentis		N	
True Fly	Oxyna flavipennis		N	SS
True Fly	Euphranta toxoneura		N	
True Fly	Trypeta zoe	EN		
True Fly	Homoneura interstincta	R		
True Fly	Homoneura thalhammeri		S:NS	
True Fly	Aulogastromyia anisodactyla		N	
True Fly	Sapromyza obsoleta		N	
True Fly	Sapromyza zetterstedti		N	
True Fly	Chamaemyia elegans		N	
True Fly	Chamaemyia fasciata		N	
True Fly	Chamaemyia paludosa	VU		
True Fly	Leucopomyia silesiaca		N	
True Fly	Parochthiphila spectabilis	EN		
True Fly	Pelidnoptera nigripennis		N	SS
True Fly	Colobaea bifasciella		N	
True Fly	Colobaea distincta		N	
True Fly	Colobaea pectoralis	VU		
True Fly	Colobaea punctata		N	
True Fly	Pherbellia argyra	VU		SS
True Fly	Pherbellia brunnipes		N	
True Fly	Pherbellia dorsata		N	
True Fly	Pherbellia griseola		N	
True Fly	Pherbellia knutsoni	R		SS
True Fly	Pherbellia nana		N	
True Fly	Pteromicra glabricula		N	
True Fly	Pteromicra leucopeza	VU		
True Fly	Pteromicra pectorosa	VU		
True Fly	Sciomyza simplex		N	
True Fly	Anticheta analis	R		
True Fly	Anticheta atriseta			ER
True Fly	Anticheta brevipennis	VU		
True Fly	Dichetophora finlandica	R		
True Fly	Psacadina verbekei		N	
True Fly	Psacadina vittigera	VU		
True Fly	Psacadina zernyi	VU		SS
True Fly	Tetanocera freyi	R		
True Fly	Tetanocera phyllophora		N	
True Fly	Meroplius minutus	R		
True Fly	Sepsis biflexuosa		N	
True Fly	Sepsis nigripes	R		
True Fly	Themira biloba	INS		
True Fly	Themira germanica		N	
True Fly	Themira nigricornis	R		
True Fly	Geomyza majuscula		N	
True Fly	Geomyza subnigra		S:NS	
True Fly	Geomyza venusta		N	
True Fly	Opomyza lineatopunctata		N	
True Fly	Opomyza punctata		N	
True Fly	Aulacigaster leucopeza		N	
True Fly	Stenomicra cogani	R		
True Fly	Asteia elegantula	VU		
True Fly	Meoneura triangularis		N	
True Fly	Philygria semialata	INS		
True Fly	Chlorops adjunctus		N	
True Fly	Chlorops fasciatus	DD		
True Fly	Chlorops laetus		N	
True Fly	Chlorops planifrons		N	

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True Fly	Chlorops rufinus		N		
True Fly	Cryptonevra consimilis	VU			PS
True Fly	Cryptonevra nigritarsis		N		
True Fly	Meromyza curvinervis	INS			ER
True Fly	Meromyza mosquensis		N		PS
True Fly	Meromyza nigriseta		N		
True Fly	Meromyza pluriseta		N		
True Fly	Thaumatomyia rufa		N		
True Fly	Dicraeus raptus		N		
True Fly	Dicraeus tibialis		N		
True Fly	Dicraeus styriacus		N		
True Fly	Dicraeus vallaris		N		
True Fly	Elachiptera austriaca		N		
True Fly	Eribolus nanus		N		
True Fly	Lasiambia baliola		N		
True Fly	Lasiambia brevibucca		N		
True Fly	Lasiambia palposa		S:NS		
True Fly	Lipara rufitarsis		N		
True Fly	Lipara similis	VU		X	
True Fly	Melanochaeta capreolus		N		
True Fly	Oscinella angularis		N		
True Fly	Oscinella angustipennis		N		
True Fly	Oscinimorpha arcuata		N		
True Fly	Oscinimorpha sordidissima		N		
True Fly	Oscinisoma gilvipes		N		
True Fly	Rhopalopterum femorale		S:NS		
True Fly	Siphonella oscinina		N		SS
True Fly	Speccafrons halophila		N		
True Fly	Trachysiphonella pygmaea		N		
True Fly	Trachysiphonella ruficeps		N		
True Fly	Trachysiphonella scutellata		N		
True Fly	Scoliocentra flavotestacea		N		
True Fly	Oecothea praecox		N		
True Fly	Suillia dumicola		N		
True Fly	Suillia oxyphora	VU			
True Fly	Suillia vaginata		N		
True Fly	Trixoscelis marginella		N		PS
True Fly	Leptocera finalis		S:NS		
True Fly	Leptocera oldenbergi		S:NS		
True Fly	Lotobia pallidiventris	DD			
True Fly	Acletoxenus formosus	R			
True Fly	Amiota basdeni	VU			
True Fly	Chymomyza costata		N		
True Fly	Stegana coleoptrata		N		
True Fly	Ochthera manicata	R			
True Fly	Cordilura aemula	R			
True Fly	Conisternum decipiens		S:NS		
True Fly	Norellia spinipes		N		
True Fly	Botanophila laterella		S:NS		
True Fly	Botanophila cuspidata	NT			
True Fly	Chirosia similata		S:NS		
True Fly	Egle bicaudata		S:NS		
True Fly	Eustalomyia vittipes		N		
True Fly	Leucophora sericea	VU			
True Fly	Pegomya conformis		S:NS		
True Fly	Fannia atra	NT			
True Fly	Fannia atripes	INS			
True Fly	Fannia clara		N		
True Fly	Fannia gotlandica		N		
True Fly	Fannia metallipennis		N		
True Fly	Fannia minutipalpis		S:NS		
True Fly	Fannia nigra		N		
True Fly	Fannia norvegica		N		
True Fly	Fannia ringdahlana		N		PS
True Fly	Fannia speciosa		N		
True Fly	Piezura graminicola	INS			
True Fly	Achanthiptera rohrelliformis		S:NS		
True Fly	Coenosia atra		N		
True Fly	Lispocephala falculata	R			
True Fly	Hydrotaea cinerea		N		

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True Fly	Hydrotaea glabricula	R		
True Fly	Hydrotaea borussica		N	
True Fly	Hydrotaea parva		N	
True Fly	Hydrotaea pilipes		N	
True Fly	Polietes steinii	EN		
True Fly	Hebecnema fumosa		S:NS	
True Fly	Mydaea anicula		S:NS	
True Fly	Helina arctata		N	
True Fly	Helina calceata		N	
True Fly	Helina crinita	VU		
True Fly	Helina pubescens	R		
True Fly	Helina tetrastigma	NT		
True Fly	Phaonia atriceps		N	
True Fly	Phaonia canescens	R		
True Fly	Phaonia exoleta	R		
True Fly	Phaonia mediterranea		N	
True Fly	Phaonia nymphaearum	VU		
True Fly	Angioneura cyrtoneurina	VU		
True Fly	Eggisops pecchiolii		N	
True Fly	Macronychia griseola	R		
True Fly	Macronychia polyodon	R		
True Fly	Macronychia striginervis		N	
True Fly	Metopia grandii	NT		
True Fly	Miltogramma germari	R		
True Fly	Sarcophila latifrons		N	C
True Fly	Athrycia curvinervis		S:NS	
True Fly	Bactromyia aurulenta	R		
True Fly	Campylocheta praecox		S:NS	
True Fly	Carcelia puberula	VU		
True Fly	Carcelia rasa	NT		
True Fly	Cistogaster globosa	EN		
True Fly	Diplostichus janitrix	R		
True Fly	Eloceria delecta		N	
True Fly	Exorista fasciata	NT		
True Fly	Senometopia pollinosa		S:NS	
True Fly	Subclytia rotundiventris	R		
True Fly	Goniglossum wiedemanni		N	
True Fly	Freraea gagatea	R		
True Fly	Medina separata	NT		
True Fly	Drino lota		N	
True Fly	Thecocarcelia acutangulata	VU		
True Fly	Brachicheta strigata		N	
True Fly	Erynnia ocypterata	VU		
True Fly	Gonia divisa	R		
True Fly	Cylindromyia interrupta		S:NS	
True Fly	Hemyda vittata	NT		
True Fly	Lophosia fasciata		N	
True Fly	Cinochira atra		S:NS	
True Fly	Eurithia intermedia		N	
True Fly	Loewia foeda		S:NS	
True Fly	Loewia submetallica	NT		
True Fly	Zophomyia temula		N	
True Fly	Actia infantula		S:NS	
True Fly	Ceromya silacea	EN		
True Fly	Siphona boreata	DD		
True Fly	Siphona collini		S:NS	
True Fly	Siphona pauciseta		S:NS	
True Fly	Oestrus ovis	R		
Hymenopteran	Earinus transversus			ER
Hymenopteran	Cleptes nitidulus		N:A	
Hymenopteran	Cleptes semiauratus		N:B	
Hymenopteran	Omalus puncticollis		N:A	
Hymenopteran	Pseudomalus violaceus		N:B	
Hymenopteran	Hedychridium cupreum		N:B	
Hymenopteran	Hedychrum niemelai	R		
Hymenopteran	Chrysis gracillima	VU		
Hymenopteran	Chrysis illigeri		N:B	
Hymenopteran	Tiphia minuta		N:B	
Hymenopteran	Methocha articulata		N:B	
Hymenopteran	Smicromyrme rufipes		N:B	

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Hymenopteran	Monosapyga clavicornis		N:B		
Hymenopteran	Lasius brunneus		N:A		
Hymenopteran	Myrmica karavajevi	INS			
Hymenopteran	Myrmica schencki		N:B		
Hymenopteran	Priocnemis (Priocnemis) agilis		N:B		
Hymenopteran	Priocnemis (Priocnemis) gracilis		N:B		
Hymenopteran	Priocnemis (Priocnemis) hyalinata		N:B		
Hymenopteran	Priocnemis (Priocnemis) schioedtei		N:B		
Hymenopteran	Priocnemis (Umbripennis) coriacea		N:A		
Hymenopteran	Arachnospila (Ammosphex) consobrina	R			
Hymenopteran	Arachnospila (Ammosphex) wesmaeli		N:A		
Hymenopteran	Arachnospila (Anoplochares) minutula		N:B		
Hymenopteran	Evagetes dubius		N:B		
Hymenopteran	Aporus unicolor		N:A		
Hymenopteran	Microdynerus exilis		N:B		
Hymenopteran	Ancistrocerus antilope	R			
Hymenopteran	Symmorphus connexus	R			
Hymenopteran	Dolichovespula (Dolichovespula) media		N:A		
Hymenopteran	Dolichovespula (Pseudovespula) saxonica	INS			
Hymenopteran	Odynerus (Spinicoxa) simillimus	EN		X	
Hymenopteran	Podalonia affinis	R			C
Hymenopteran	Crabro scutellatus		N:A		
Hymenopteran	Crossocerus (Crossocerus) distinguendus		N:A		
Hymenopteran	Crossocerus (Crossocerus) palmipes		N:B		
Hymenopteran	Crossocerus (Blepharipus) walkeri		N:B		
Hymenopteran	Ectemnius (Clytochrysus) ruficornis		N:B		
Hymenopteran	Ectemnius (Clytochrysus) sexcinctus		N:B		
Hymenopteran	Rhopalum (Corynopus) gracile	VU			SS
Hymenopteran	Oxybelus argentatus		N:A		SS
Hymenopteran	Oxybelus mandibularis		N:A		
Hymenopteran	Mimumesa spooneri	R			
Hymenopteran	Mimesa bicolor	VU			
Hymenopteran	Stigmus pendulus	INS			
Hymenopteran	Diodontus insidiosus	R			
Hymenopteran	Passaloecus clypealis	R			
Hymenopteran	Nysson dimidiatus		N:B		
Hymenopteran	Nysson trimaculatus		N:B		
Hymenopteran	Gorytes laticinctus	R			
Hymenopteran	Argogorytes fargeii		N:A		
Hymenopteran	Cerceris quadricincta	EN		X	C
Hymenopteran	Cerceris quinquefasciata	R		X	SS
Hymenopteran	Philanthus triangulum	VU			
Hymenopteran	Colletes (Colletes) halophilus		N:A	X	C
Hymenopteran	Colletes (Colletes) marginatus		N:A		SS
Hymenopteran	Hylaeus (Prosopis) pectoralis				C
Hymenopteran	Hylaeus (Prosopis) signatus		N:B		
Hymenopteran	Hylaeus (Paraprosopis) pictipes		N:A		
Hymenopteran	Hylaeus (Abrupta) cornutus		N:A		
Hymenopteran	Andrena (Cnemidandrena) nigriceps		N:B		
Hymenopteran	Andrena (Cnemidandrena) tridentata	EN			
Hymenopteran	Andrena (Plastandrena) bimaculata		N:B		
Hymenopteran	Andrena (Plastandrena) pilipes		N:B		
Hymenopteran	Andrena (Plastandrena) tibialis		N:A		
Hymenopteran	Andrena (Poliandrena) tarsata			X	
Hymenopteran	Andrena (Chlorandrena) humilis		N:B		
Hymenopteran	Andrena (Charitandrena) hattorfiana	R			
Hymenopteran	Andrena (Poecilandrena) labiata		N:A		
Hymenopteran	Andrena (Margandrena) marginata		N:A		
Hymenopteran	Andrena (Micrandrena) alfkenella	R			
Hymenopteran	Andrena (Micrandrena) falsifica		N:A		
Hymenopteran	Andrena (Micrandrena) floricola	EN			
Hymenopteran	Andrena (Micrandrena) minutuloides		N:A		
Hymenopteran	Halictus (Seladonia) confusus	R			
Hymenopteran	Lasioglossum (Lasioglossum)		N:A		
Hymenopteran	Lasioglossum (Lasioglossum) sexnotatum	EN			SS
Hymenopteran	Lasioglossum (Lasioglossum) xanthopus		N:B		
Hymenopteran	Lasioglossum (Evylaeus) brevicorne	R			
Hymenopteran	Lasioglossum (Evylaeus) malachurum		N:B		
Hymenopteran	Lasioglossum (Evylaeus) pauxillum		N:A		
Hymenopteran	Lasioglossum (Evylaeus) puncticolle		N:B		

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Hymenopteran	Lasioglossum (Dialictus) leucopus		R				
Hymenopteran	Sphecodes crassus			N:B			
Hymenopteran	Sphecodes longulus			N:A			
Hymenopteran	Sphecodes miniatus			N:B			
Hymenopteran	Sphecodes niger		R				
Hymenopteran	Sphecodes reticulatus			N:A			
Hymenopteran	Sphecodes rubicundus			N:A			
Hymenopteran	Sphecodes spinulosus		VU				
Hymenopteran	Melitta dimidiata		EN				
Hymenopteran	Melitta tricincta			N:B			
Hymenopteran	Macropis europaea			N:A			
Hymenopteran	Dasypoda hirtipes			N:B			
Hymenopteran	Stelis ornatula		R				
Hymenopteran	Stelis punctulatissima			N:B			
Hymenopteran	Osmia (Melanosmia) pilicornis			N:A			
Hymenopteran	Osmia (Neosmia) bicolor			N:B			
Hymenopteran	Megachile (Eutricharaea) dorsalis			N:B			C
Hymenopteran	Nomada argentata		R				SS
Hymenopteran	Nomada ferruginata		EN				
Hymenopteran	Nomada flavopicta			N:B			
Hymenopteran	Nomada fucata			N:A			
Hymenopteran	Nomada fulvicornis		R				
Hymenopteran	Nomada integra			N:A			
Hymenopteran	Nomada lathburiana		R				
Hymenopteran	Nomada signata		VU				
Hymenopteran	Anthophora (Pyganthophora) retusa		EN			X	
Hymenopteran	Bombus (Megabombus) ruderatus			N:B		X	
Hymenopteran	Bombus (Psithyrus) rupestris			N:B			
Hymenopteran	Bombus (Subterraneobombus)			N:A		X	
Hymenopteran	Bombus (Thoracombus) humilis					X	
Hymenopteran	Bombus (Thoracombus) ruderarius					X	
Hymenopteran	Bombus (Thoracombus) sylvarum			N:B		X	
Bryozoan	Lophopus crystallinus		R			X	
Jawless Fish	Petromyzon marinus					X	
Fish	Anguilla anguilla		G:C			X	
Fish	Lota lota					X	
Fish	Cobitis taenia					X	
Fish	Osmerus eperlanus					X	
Fish	Salmo trutta					X	
Amphibian	Triturus cristatus					X	
Amphibian	Bufo bufo					X	
Amphibian	Epidalea calamita					X	
Amphibian	Pelophylax lessonae					X	
Reptile	Anguis fragilis					X	
Reptile	Zootoca vivipara					X	
Reptile	Natrix natrix					X	
Reptile	Vipera berus					X	
Bird	Cygnus columbianus	sp. and subsp. bewickii			A	X	
Bird	Cygnus cygnus				A		
Bird	Anser fabalis				A		
Bird	Anser brachyrhynchus				A		
Bird	Anser erythropus		G:V				
Bird	Anser anser				A		
Bird	Branta leucopsis				A		
Bird	Branta bernicla				A		
Bird	Tadorna ferruginea				A		
Bird	Anas strepera				A		
Bird	Anas crecca				A		
Bird	Anas platyrhynchos				A		
Bird	Anas acuta				A		
Bird	Anas querquedula				A		
Bird	Anas clypeata				A		
Bird	Aythya ferina				A		
Bird	Aythya fuligula				A		
Bird	Aythya marila				R	X	
Bird	Somateria mollissima				A		
Bird	Melanitta nigra				R	X	
Bird	Bucephala clangula				A		
Bird	Mergellus albellus				A		
Bird	Gavia arctica				A	X	

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Bird	Gavia immer		A		
Bird	Perdix perdix		R	X	
Bird	Coturnix coturnix		A		
Bird	Tachybaptus ruficollis		A		
Bird	Podiceps grisegena		A		
Bird	Podiceps auritus		A		
Bird	Podiceps nigricollis		A		
Bird	Fulmarus glacialis		A		
Bird	Puffinus puffinus		A		
Bird	Morus bassanus		A		
Bird	Phalacrocorax aristotelis		A		
Bird	Botaurus stellaris		R	X	
Bird	Egretta garzetta		A		
Bird	Platalea leucorodia		A		
Bird	Pernis apivorus		A		
Bird	Milvus milvus		A		
Bird	Circus aeruginosus		A		
Bird	Circus cyaneus		R		
Bird	Circus pygargus		A		
Bird	Pandion haliaetus		A		
Bird	Falco tinnunculus		A		
Bird	Falco columbarius		A		
Bird	Grus grus		A		
Bird	Haematopus ostralegus		A		
Bird	Recurvirostra avosetta		A		
Bird	Burhinus oedicnemus		A	X	PS
Bird	Charadrius dubius		A		
Bird	Charadrius morinellus		A		
Bird	Pluvialis apricaria		A		
Bird	Pluvialis squatarola		A		
Bird	Vanellus vanellus		R	X	
Bird	Calidris canutus		A		
Bird	Calidris temminckii		R		
Bird	Calidris alpina		R		
Bird	Philomachus pugnax		R		
Bird	Lymnocryptes minimus		A		
Bird	Gallinago gallinago		A		
Bird	Scolopax rusticola		A		
Bird	Limosa limosa		R		
Bird	Limosa lapponica		A		
Bird	Numenius arquata		A	X	
Bird	Tringa erythropus		A		
Bird	Tringa totanus		A		
Bird	Tringa ochropus		A		
Bird	Tringa glareola		A		
Bird	Actitis hypoleucos		A		
Bird	Arenaria interpres		A		
Bird	Phalaropus lobatus		R	X	
Bird	Larus melanocephalus		A		
Bird	Larus minutus		A		
Bird	Larus ridibundus		A		
Bird	Larus canus		A		
Bird	Larus fuscus		A		
Bird	Larus michahellis		A		
Bird	Larus argentatus	sp. and subsp. argentatus	R	X	
Bird	Larus glaucoides		A		
Bird	Larus hyperboreus		A		
Bird	Larus marinus		A		
Bird	Rissa tridactyla		A		
Bird	Sternula albifrons		A		
Bird	Chlidonias niger		A		
Bird	Sterna sandvicensis		A		
Bird	Sterna hirundo		A		
Bird	Sterna paradisaea		A		
Bird	Columba oenas		A		
Bird	Streptopelia turtur		R	X	
Bird	Cuculus canorus		R	X	
Bird	Tyto alba		A		
Bird	Asio flammeus		A		

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Bird	Caprimulgus europaeus	R	X	
Bird	Apus apus	A		
Bird	Alcedo atthis	A		
Bird	Jynx torquilla	R	X	
Bird	Picus viridis	A		
Bird	Dendrocopos minor	R		
Bird	Lullula arborea	A	X	SS
Bird	Alauda arvensis	R		
Bird	Eremophila alpestris	A		
Bird	Riparia riparia	A		
Bird	Hirundo rustica	A		
Bird	Delichon urbicum	A		
Bird	Anthus trivialis	R	X	
Bird	Anthus pratensis	A		
Bird	Anthus spinoletta	A		
Bird	Motacilla flava	R		
Bird	Motacilla cinerea	A		
Bird	Prunella modularis	A		
Bird	Luscinia megarhynchos	A		
Bird	Phoenicurus ochruros	A		
Bird	Phoenicurus phoenicurus	A		
Bird	Saxicola rubetra	A		
Bird	Oenanthe oenanthe	A		
Bird	Turdus torquatus	R	X	
Bird	Turdus pilaris	R		
Bird	Turdus philomelos	R		
Bird	Turdus iliacus	R		
Bird	Turdus viscivorus	A		
Bird	Locustella naevia	R	X	
Bird	Locustella luscinioides	R	X	
Bird	Acrocephalus palustris	R	X	
Bird	Sylvia communis	A		
Bird	Sylvia undata	A		
Bird	Phylloscopus sibilatrix	R	X	
Bird	Phylloscopus trochilus	A		
Bird	Regulus ignicapilla	A		
Bird	Muscicapa striata	R	X	
Bird	Ficedula hypoleuca	A		
Bird	Panurus biarmicus	A		
Bird	Poecile montanus	R		
Bird	Poecile palustris	R		
Bird	Oriolus oriolus	R		
Bird	Lanius collurio	R	X	
Bird	Sturnus vulgaris	R		
Bird	Passer domesticus	R	X	
Bird	Passer montanus	R	X	
Bird	Carduelis cannabina	R		
Bird	Carduelis flavirostris	R		
Bird	Carduelis cabaret	R	X	
Bird	Loxia pytyopsittacus	A		
Bird	Pyrrhula pyrrhula	A		
Bird	Coccothraustes coccothraustes	R	X	
Bird	Serinus serinus	A		
Bird	Emberiza citrinella	R	X	
Bird	Emberiza schoeniclus	A	X	
Bird	Emberiza calandra	R		
Bird	Plectrophenax nivalis	A		
Mammal	Erinaceus europaeus		X	
Mammal	Rhinolophus hipposideros		X	
Mammal	Barbastella barbastellus		X	
Mammal	Nyctalus noctula		X	
Mammal	Pipistrellus pygmaeus		X	
Mammal	Plecotus auritus		X	
Mammal	Lutra lutra		X	
Mammal	Meles meles		X	
Mammal	Mustela putorius		X	
Mammal	Sciurus vulgaris		X	
Mammal	Arvicola terrestris		X	
Mammal	Micromys minutus		X	
Mammal	Muscardinus avellanarius		X	

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Mammal	Lepus europaeus	X