The Biodiversity Audit Approach:
Evidence-based conservation management of N2K

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Mimicking 'traditional' management of semi-natural habitats

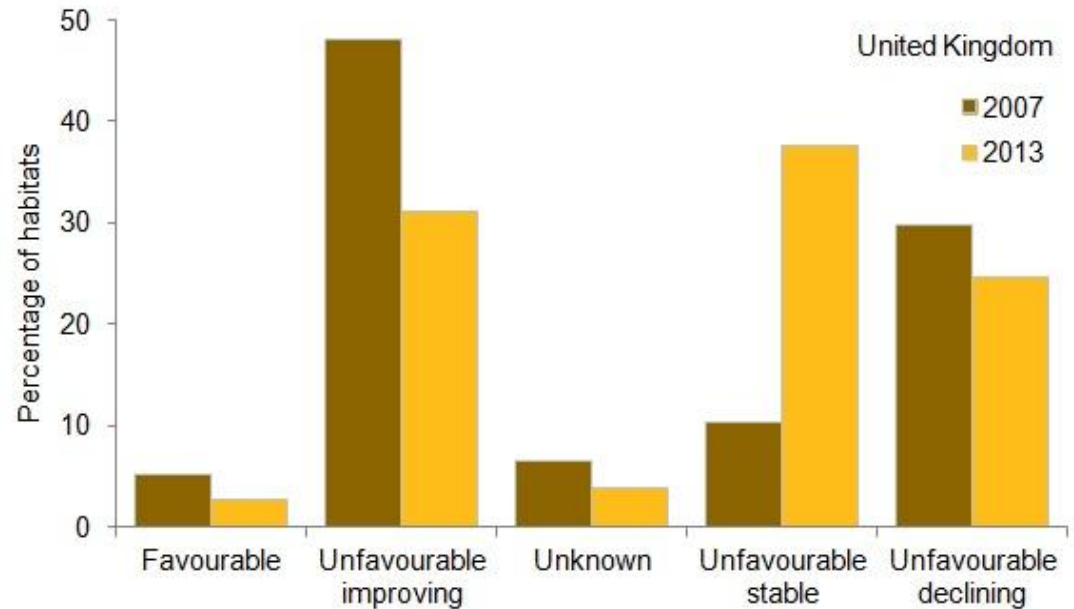'**Habitats' are accidents** of past landuse...

Conservation **goal** not the habitat, but the **Biodiversity** it supports.

Historic management was far more **variable and complex** than generic prescriptions

Understanding biased by shifting baselines, incomplete understanding of species priorities and requirements

Wright, Lake & Dolman (2012) *Cons. Letts.,* Fuller, Williamson, Barnes & Dolman (2017) *J. Appl. Ecol*

Conservation Status of UK habitats of European importance

Favourable Condition assessment

- Crucial aspect: **linking species requirements** to **habitat condition** (structure, prescriptions)

- **But – how? And for which species?**

- What is 'Favourable Condition'?

- What are we managing for and what does it need?

The Biodiversity Audit Approach
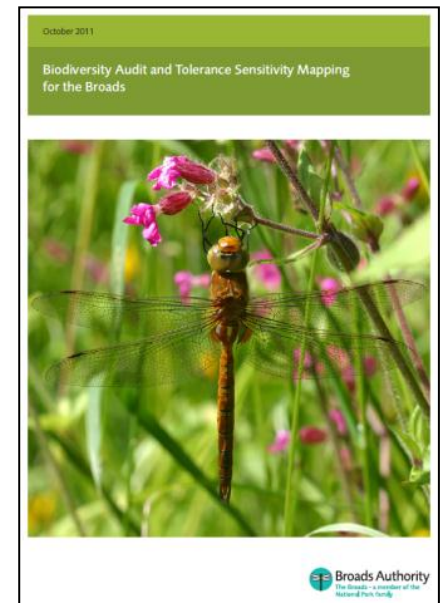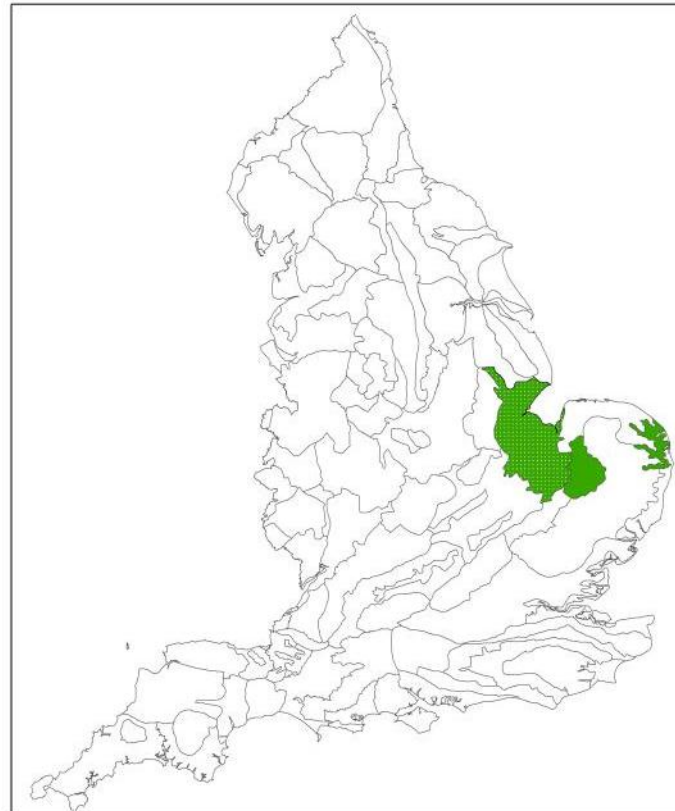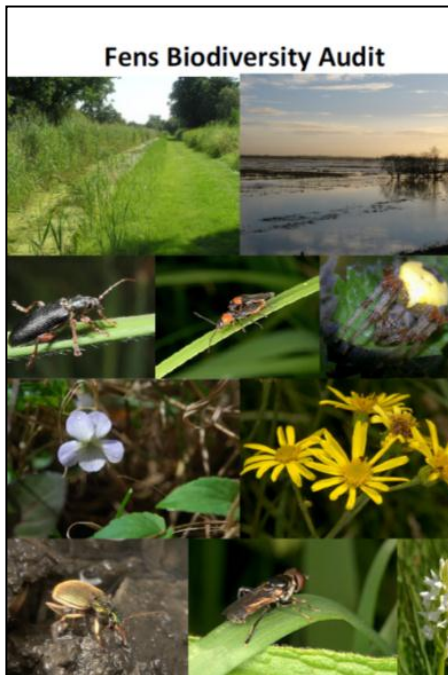

Journal of Applied Ecology

Journal of Applied Ecology 2012

doi: 10.1111/j.1365-2664.2012.02174.x

The biodiversity audit approach challenges regional priorities and identifies a mismatch in conservation
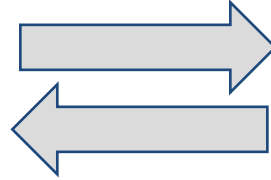
Paul M. Dolman*, Christopher J. Panter and Hannah L. Mossman

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Dolman et al. (2012) *J. Appl. Ecol*
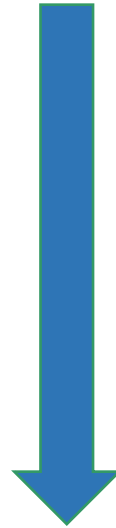
The Biodiversity Audit Approach

Biodiversity ⇄ Landscape

What biodiversity ?

Where is it ?

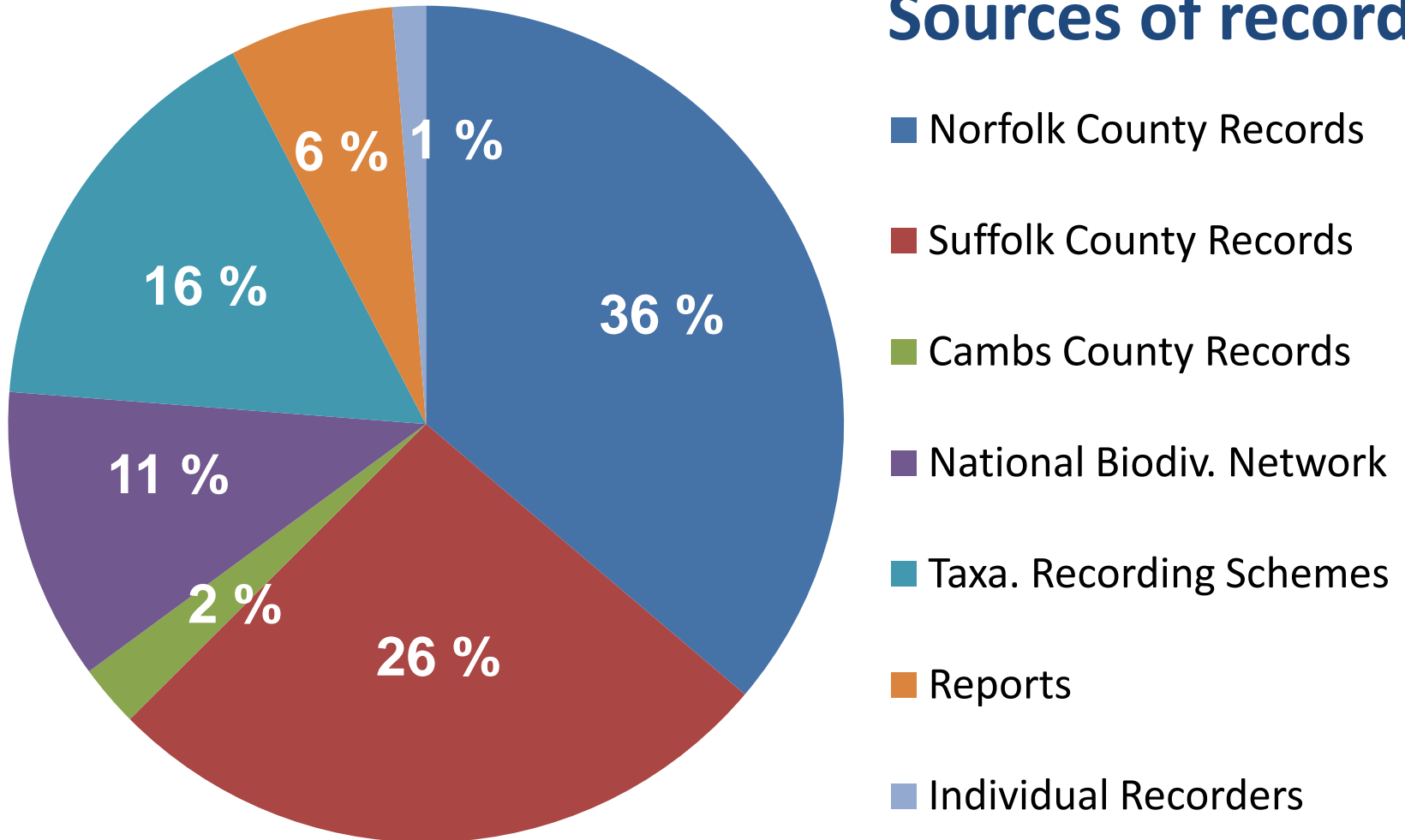**How** to mange ?
(needs for multiple taxa)

Evidence-based

Simplified guidance

Spatial targeting

ES-BD trade-off

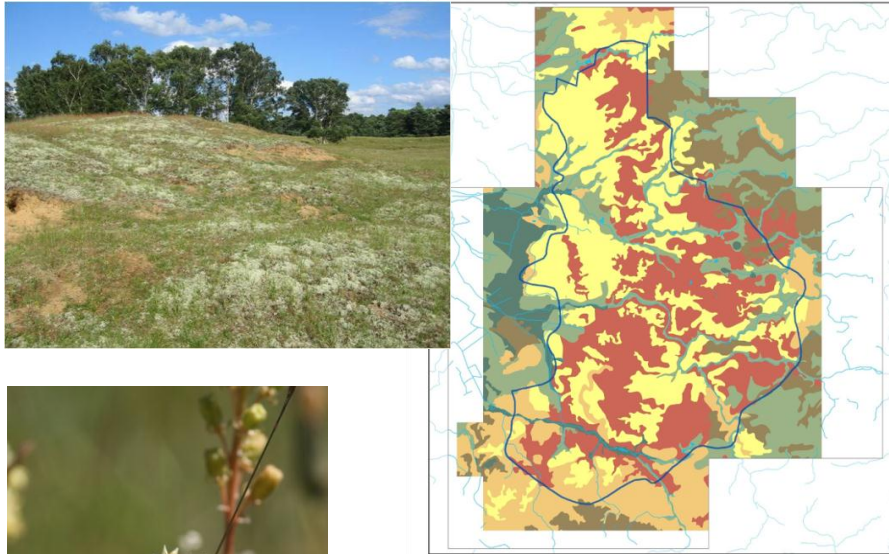Integrated groups of species
Cost-effective delivery

830,747 records

Sources of records

- Norfolk County Records
- Suffolk County Records
- Cambs County Records
- National Biodiv. Network
- Taxa. Recording Schemes
- Reports
- Individual Recorders

What 'Biodiversity'?

Breckland 1,020 km^2

Well drained sandy soils
Calcareous soils
Dry loamy soils
Damp loamy or clay soils
Gleys
Fen peat
Water

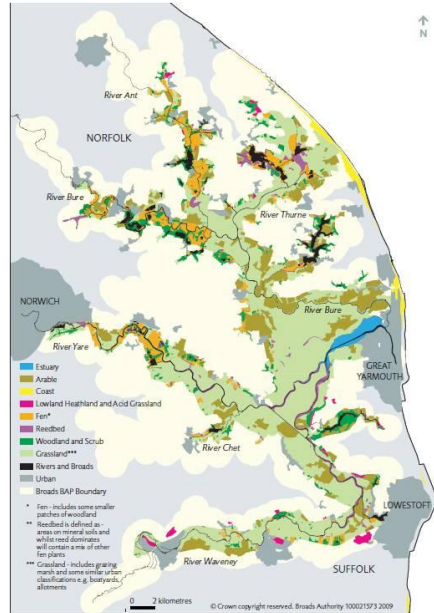**12,845** species

2,149 priority species
(BAP / S41, Nationally Rare, Regionally-restricted)

72 regional specialists

Dolman *et al.* (2010); Dolman *et al.* (2012) *J. Appl. Ecol*

What 'Biodiversity'?

The Broads 301 km^2

11,067 species

1,519 priority species

66 regional specialists

Panter *et al.* (2011); Dolman *et al.* (2012) *J. Appl. Ecol*

What 'Biodiversity'?

The Fens 3,800 km^2
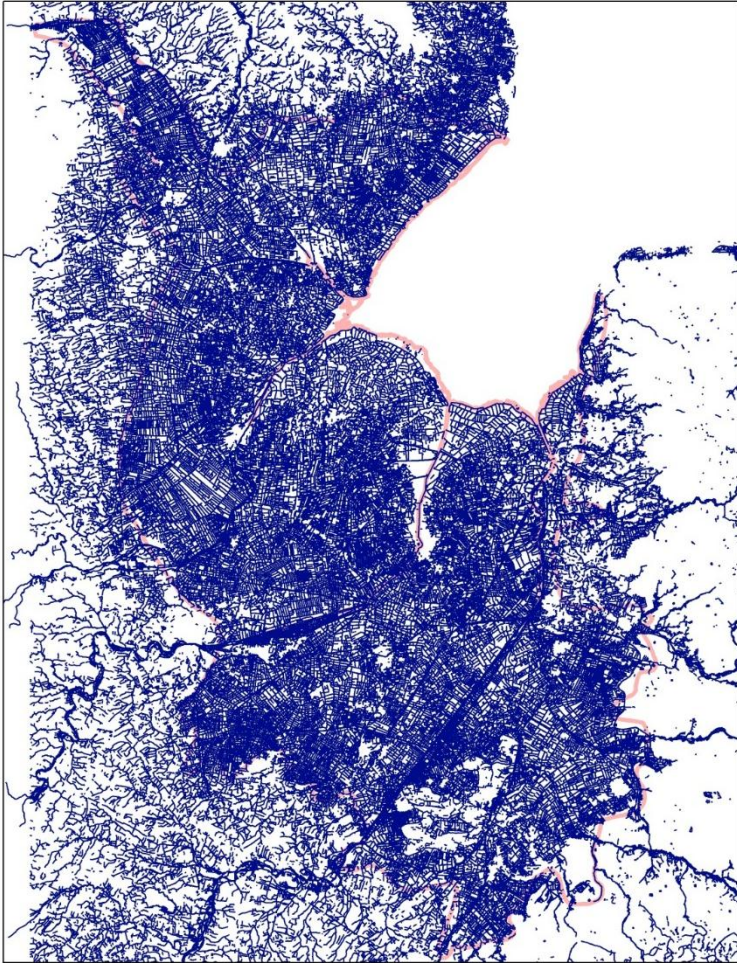
13,474 species

1,932 priority species

82 regional specialists

Mossman *et al*. (2012); Dolman *et al*. (2012) *J. Appl. Ecol*

Priority Biodiversity in the Fens

	Species	Priorities
Coleoptera	2159	630
Diptera	2630	345
Flowering plants	1530	183
Moths	1521	164
Hemiptera	562	60
Hymenoptera	569	91
Spiders	363	93
Lichens	305	42

Neglected biodiversity, 'off-radar' !

Requirements?
Niche, Resource, Process

- micro-habitats
- vegetation structure
- ecological processes
- potential management actions

Scrub

Sward mosaics

Grazing

Ungrazed nectar

Bare ground

Compaction

Major disturbance

Wind-blown sand

Evidence-based management:
Breckland Pingos - shaded or open?


Wet wood: 98 (22 RDB)

Wet open: 446 (166 RDB)

Match & Mis-match in Management

			OPEN (e.g. arable, heath)	OPEN + SCRUB	OPEN + WOODLAND	WOODLAND
Veteran/ Deadwood					VETERAN 3	VETERAN 48
				DEAD WOOD 27		DEAD WOOD 95
?Grazing ?Dist				O + S 23	O + W 85	WOODLAND 156
NO GRAZING			NO DIST + NO GRAZING 54	NO DIST + NO GRAZING 8	NO GRAZING 3	
	PHYSICAL DISTURBANCE		DIST + NO GRAZING 135	DIST + NO GRAZING 9		
?			DIST + ?GRAZING 76		DIST 9	
GRAZING			DIST + GRAZING 136	DIST + GRAZING 13		GRAZING 8
			NO DIST + GRAZING 81	NO DIST + GRAZING 2		
Grazing Flux			SWARD MOSAIC 62	SWARD MOSAIC 7		
LANDSCAPE COMPLEXITY			JUXTAPOSITION 54	JUXTAPOSITION 7		
			WIND BLOWN SAND 9			
			WET + OPEN + WOODLAND 68			
			OPEN + WOODLAND 60			

Evidence Supported 'Best Practice'

'Management': Disturbed + Grazed
- 149 priority spp., 35 regional

Arenocoris waltli RDB2, reg.
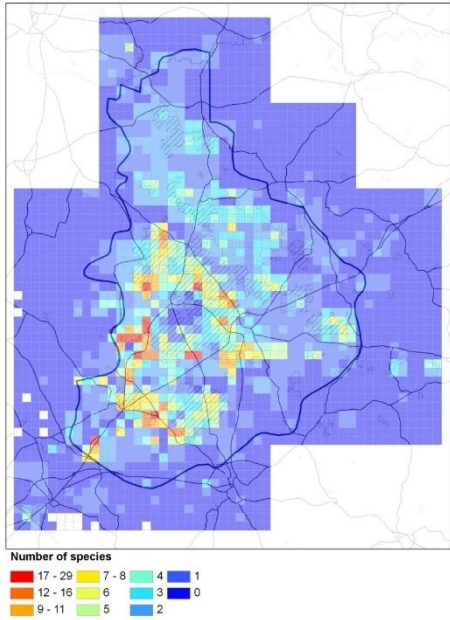
Management Mis-match: 'Best Practice' Not Widespread

£ **4.2 Million** for 4 SSSI's (490 ha, 20 yr @ £430 $ha^{-1}.yr^{-1}$)

Biodiversity Audit

Cost-effective, evidence based

SAC feature = veg composition = Inappropriate prescriptions
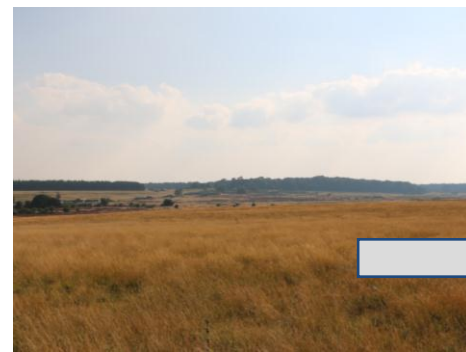
Priority biodiversity damaged

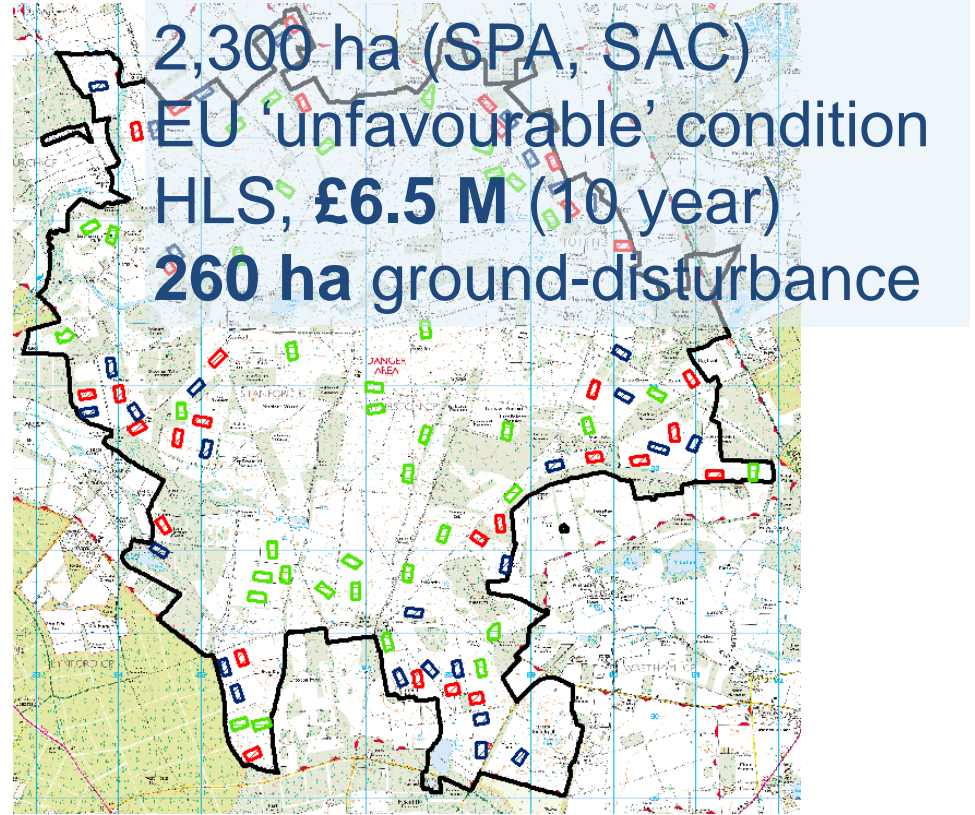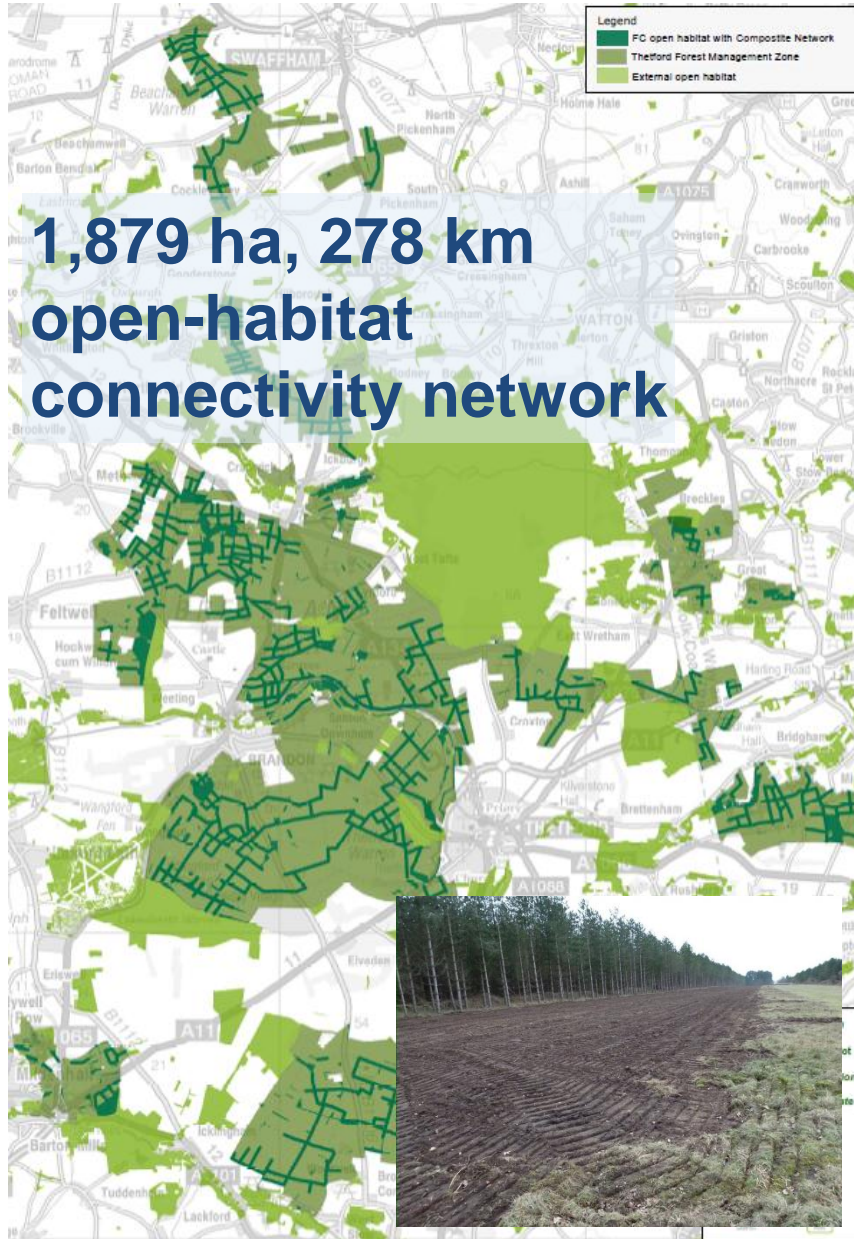Supports **just 7%** of potential 1,237 priority terrestrial species

'Best Practice' Rolled-out

1,879 ha, 278 km open-habitat connectivity network

2,300 ha (SPA, SAC)
EU 'unfavourable' condition
HLS, **£6.5 M** (10 year)
260 ha ground-disturbance

Evidence for spatial prioritisation

Richness of species vulnerable to saline incursion

October 2011

Biodiversity Audit and Tolerance Sensitivity Mapping for the Broads

Broads Authority
The Broads – a member of the National Park family

63% of 1,053 priority species coded are intolerant of brackish conditions

Richness of species requiring disturbance & grazing

Securing Biodiversity in Breckland

Guidance for conservation and research

First Report of the Breckland Biodiversity Audit

Legend

	Salt Tolerance Category 1				
SSSI			15.7 - 26.3		2.1 - 3.3
Coast outline		74.8 - 126		9.4 - 15.6		1.3 - 2
Major rivers		44.4 - 74.7		5.6 - 9.3		0.1 - 1.2
Minor rivers		26.4 - 44.3		3.4 - 5.5		0

Number of species

17 - 29	7 - 8	4	1
12 - 16	6	3	0
9 - 11	5	2	

The Biodiversity Audit Approach:

What species, but also…

- **Define integrated 'Management Guilds'** based on traits, ecological requirements (processes, niche)

- **Favourable condition monitoring:** integrated across multiple priority taxa

- **Evidence-base for management**

- **ERDF - Cost-effective for priority biodiversity**

Key references:

Fuller, R.J., Williamson, T., Barnes, G., **Dolman**, P.M. (2017) Human activites and biodiversity opportunities in pre-industrial cultural landscapes: relevance to conservation. *Journal of Applied Ecology*, **54**, 459-469. doi: 10.1111/1365-2664.12762

Dolman, P.M., Panter, C.J., Mossman, H.L. (2012) The biodiversity audit approach challenges regional priorities and identifies a mismatch in conservation. *Journal of Applied Ecology* **49**, 986–997.

Mossman, H.L., Panter, C.J., **Dolman**, P. M. (2012) *Fens Biodiversity Audit: Part 1 & 2 - Methodology and Results*. School of Environmental Sciences, University of East Anglia, Norwich; November 2012. ISBN 978-0-9567812-2-2. http://www.cperc.org.uk/downloads/5_Fens_Biodiversity_Audit_FINAL_Report_24-10-2012.pdf

Panter, C.J, Mossman, H.L., **Dolman**, P. M. (2011) *Biodiversity Audit and Tolerance Sensitivity Mapping for the Broads. Broads Authority Report*. School of Environmental Sciences, University of East Anglia, Norwich; November 2011. ISBN: 978-0-9567812-0-9.

http://www.broads-authority.gov.uk/__data/assets/pdf_file/0020/412922/Broads-Biodiversity_audit_report.pdf

Dolman, P.M., Panter, C.J, Mossman, H.L. (2010) *Securing Biodiversity in Breckland: Guidance for Conservation and Research. First Report of the Breckland Biodiversity Audit.* School of Environmental Sciences, University of East Anglia, Norwich; December 2010. ISBN: 978-0-9567812-0-8