

Habitat Restoration for Butterflies:

Case studies from Butterfly Conservation
reserves in the UK

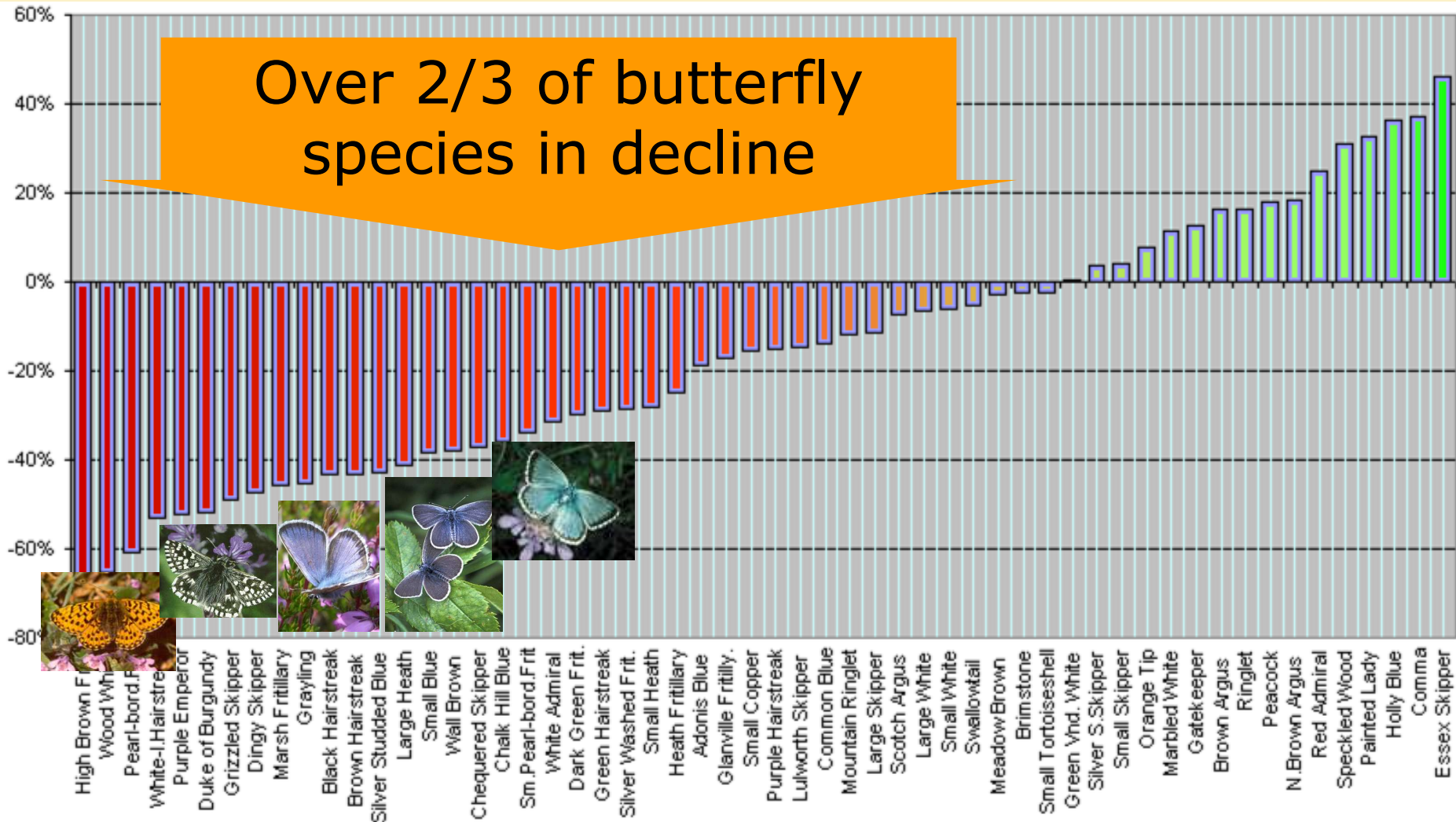
Martin Warren

John Davis



Decline of butterflies

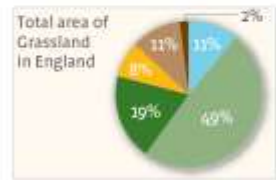
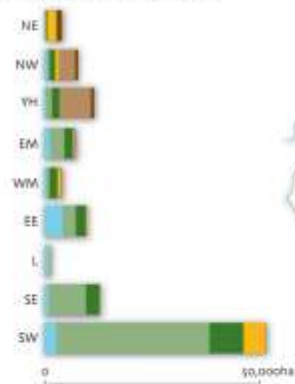
Over 2/3 of butterfly species in decline



Habitat loss and fragmentation

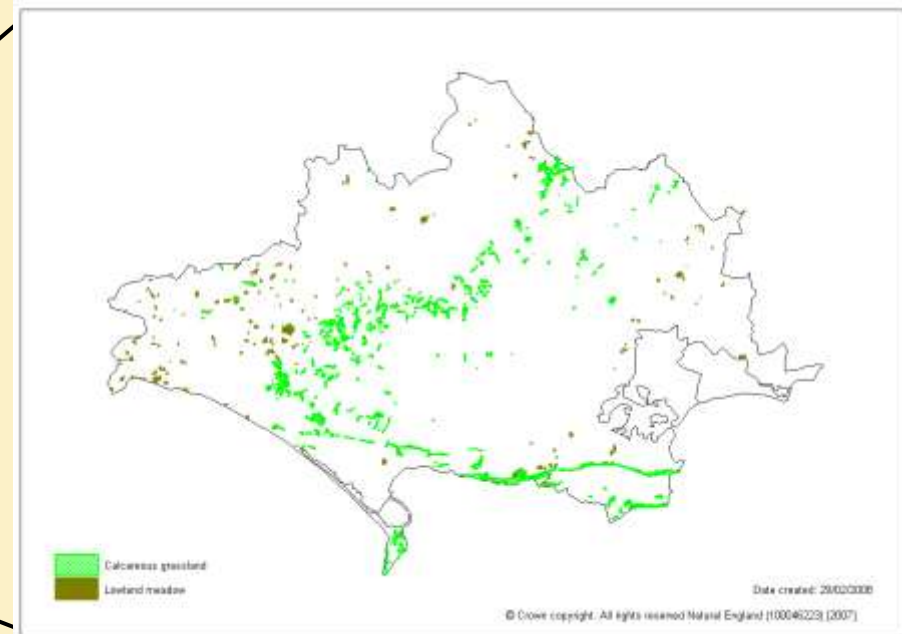
Fig 1: Grassland Extent

Area of grassland by region



Lowland Acid Grassland
Lowland Calcareous Grassland
Lowland Meadow
Purple Moor Grass and Rush Pasture
Upland Calcareous Grassland
Upland Hay Meadow
Region boundary

**Flower-rich grassland
= 3% land area**



New EU target for 2020

*"Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020,
and restoring them in so far as feasible,*

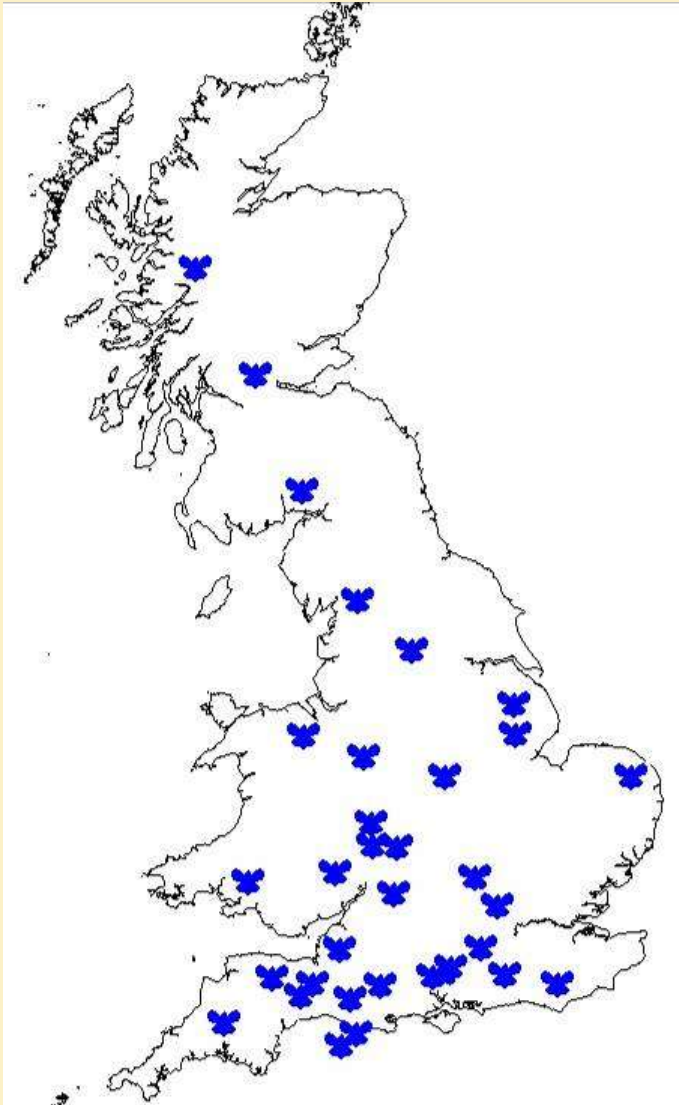


Habitat restoration for butterflies

1. Restoring breeding conditions within existing habitats (following neglect or unsuitable management)
2. Restoring habitats from other (intensive) land uses – typically on sites where the original habitat has been destroyed

Butterfly Conservation Reserves

- 33 sites in UK
- 750 ha
- Managed for butterflies, moths and other wildlife



Restoring existing habitats: Grafton Wood (56ha)



Grafton Wood management



Grafton Wood Butterflies increasing



Thecla betulae

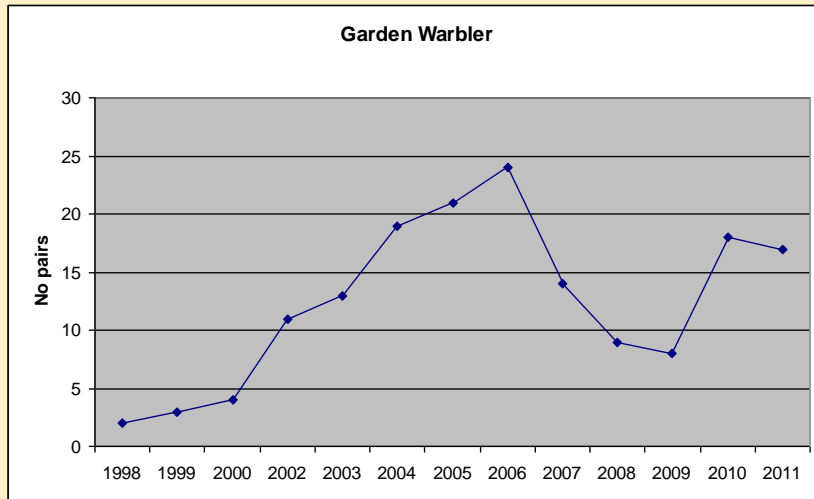
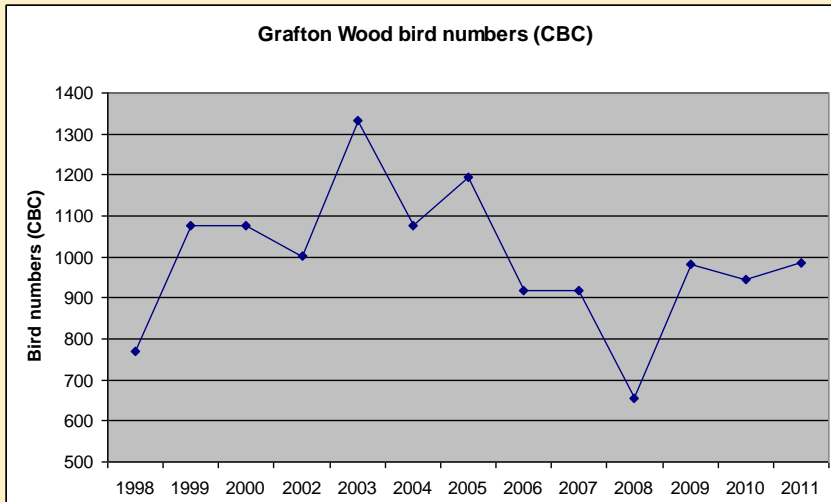


Argynnis paphia



Boloria euphrosyne

Bird numbers in Grafton Wood

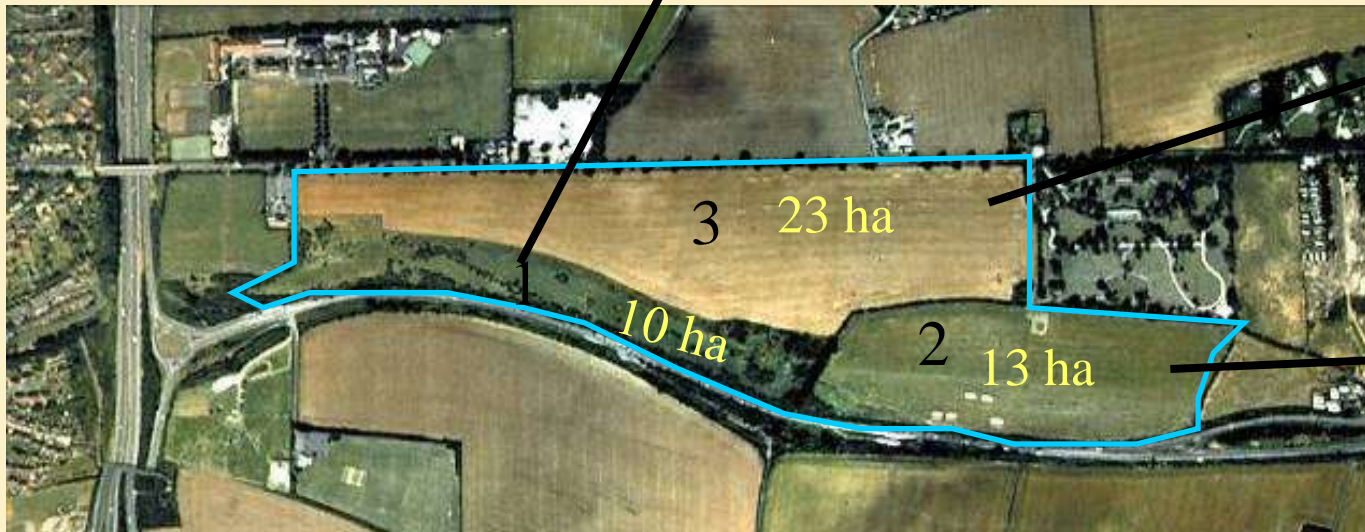


Wood warbler *Sylvia borin*

Magdalen Hill Down: restoration from arable



1991
Original
reserve



North
Extension
2005

Extension
1997

Magdalen Hill Down: restoration from arable

Rural Development Service Technical Advice Note 28

Sward enhancement: diversifying grassland by spreading species rich green hay

Sward enhancement refers to management techniques which aim to increase the 'natural diversity' (plants) the sward component of species poor grassland. Such work can be funded under agri-environment schemes. Spreading species rich green hay is one method of sward enhancement. Other techniques, of overseeding, and seeding and planting out green leys and pastures, are described in separate Advice Notes.

Key points:

- Both donor and receptor sites for green hay must be carefully selected.
- A short sward with sedge gaps is required prior to hay spreading, which will usually require preparation of the ground.
- Hay will be 'bedded' or after spreading by e.g. top dressing with slurry.

Introduction

Not all grassland is suitable for enhancement. The main requirements include that soil fertility and topography are suitable. Because enhancement methods usually involve disturbance to the sward, some sites may not be suitable e.g. where there is historical or old stone, or a risk of soil erosion. For more information see Technical Advice Notes 'Sward enhancement: selection of suitable sites' and 'Sward enhancement: choice of methods'.

The term 'green hay' refers to herbage cut at or just before the hay stage, which is collected without prior wilting or turning and spread immediately on the receptor site. If collected from species rich grassland and used correctly on the right site, it can be a very effective method of sward enhancement.

Effective method of sward enhancement

The main advantage of using green hay, is that it is usually cheaper than sowing commercial seed, and it is a good means of ensuring that hay seed, from a local source, is used. In addition, a wider range of species may be contained in green hay than is commercially available. Green hay, rather than conventional dry hay, is recommended because a much higher proportion of the seeds remains in the flower heads. Research has found that a broad range of species is present in green hay, including early flowering species such as clover (Trifolium spp.). There are also indications that using green hay is a good method of promoting colonisation by insects.

Herbage

Green hay

Herbage cut at or just before the hay stage, which is collected immediately without prior wilting or turning.

Donor site

Grassland used as the source of green hay.

Receptor site

Grassland on which the green hay is to be spread.

Rural Development Service Technical Advice Note 21

Arable reversion to species rich grassland: site selection and choice of methods

The reversion of arable land to permanent grassland is a major area of work funded through agri-environment schemes. The objective may be to create a species rich sward; that is, comprising species characteristic of semi-natural grassland, commercial, or a grass commercial sward, often comprising productive, agricultural species or varieties. This Note focuses on the creation of species rich grassland. Advice Notes 24 and 25 provide guidance on establishing a green sward and sward management of the sward.

Key points:

- Sites must be carefully selected, including landscape and archaeological considerations, to ensure that they provide environmental benefits.
- Knowledge of soil type, pH and nutrient status is very important. Where the aim is to establish species rich grassland it is essential.
- Reverted swards can be very different from conventional grass swards. There may be effects on productivity, and the impacts on the existing farming system could be carefully considered.

Why revert arable land?

Environmental benefits

Arable reversion can have a number of environmental benefits, including:

- It may provide opportunities for the re-creation of species rich grassland and other valuable habitats, such as wetlands and floodplain.
- Habitats can be created to benefit specific species, such as well as providing for wildlife, and can be linked to other habitats.
- Additional grazing can be provided which may be used for other purposes.



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Biological Conservation 119 (2004) 1–18

Review

BIOLOGICAL
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www.elsevier.com/locate/biocon

The restoration and re-creation of species-rich lowland grassland on land formerly managed for intensive agriculture in the UK

Kevin J. Walker ^{a,*}, Paul A. Stevens ^b, David P. Stevens ^c, J. Owen Mountford ^a, Sarah J. Manchester ^a, Richard F. Pywell ^a

Magdalen Hill Down extension: 1997



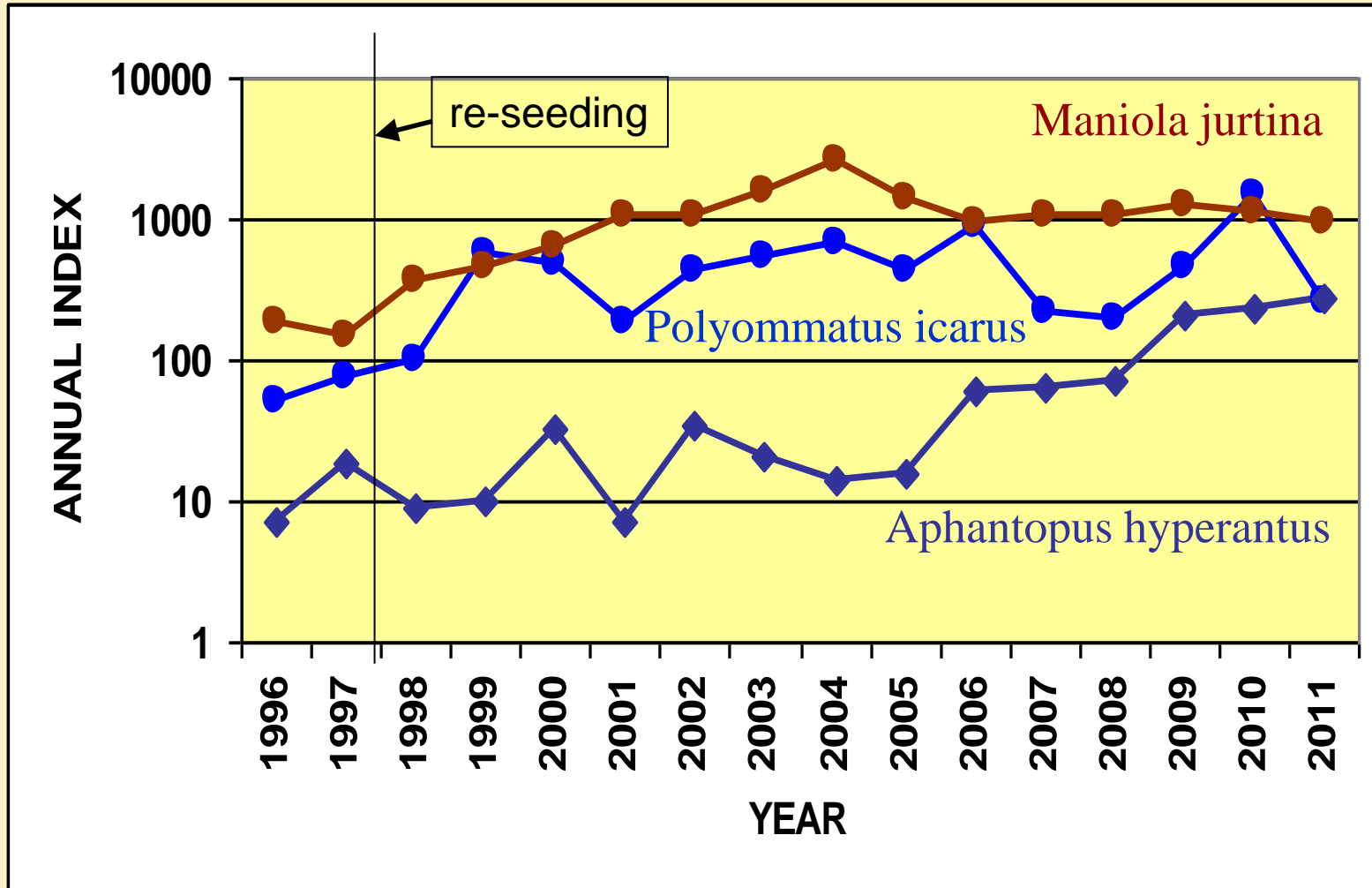
Magdalen Hill Down extension: Year 1-3



Magdalen Hill Down: 2010

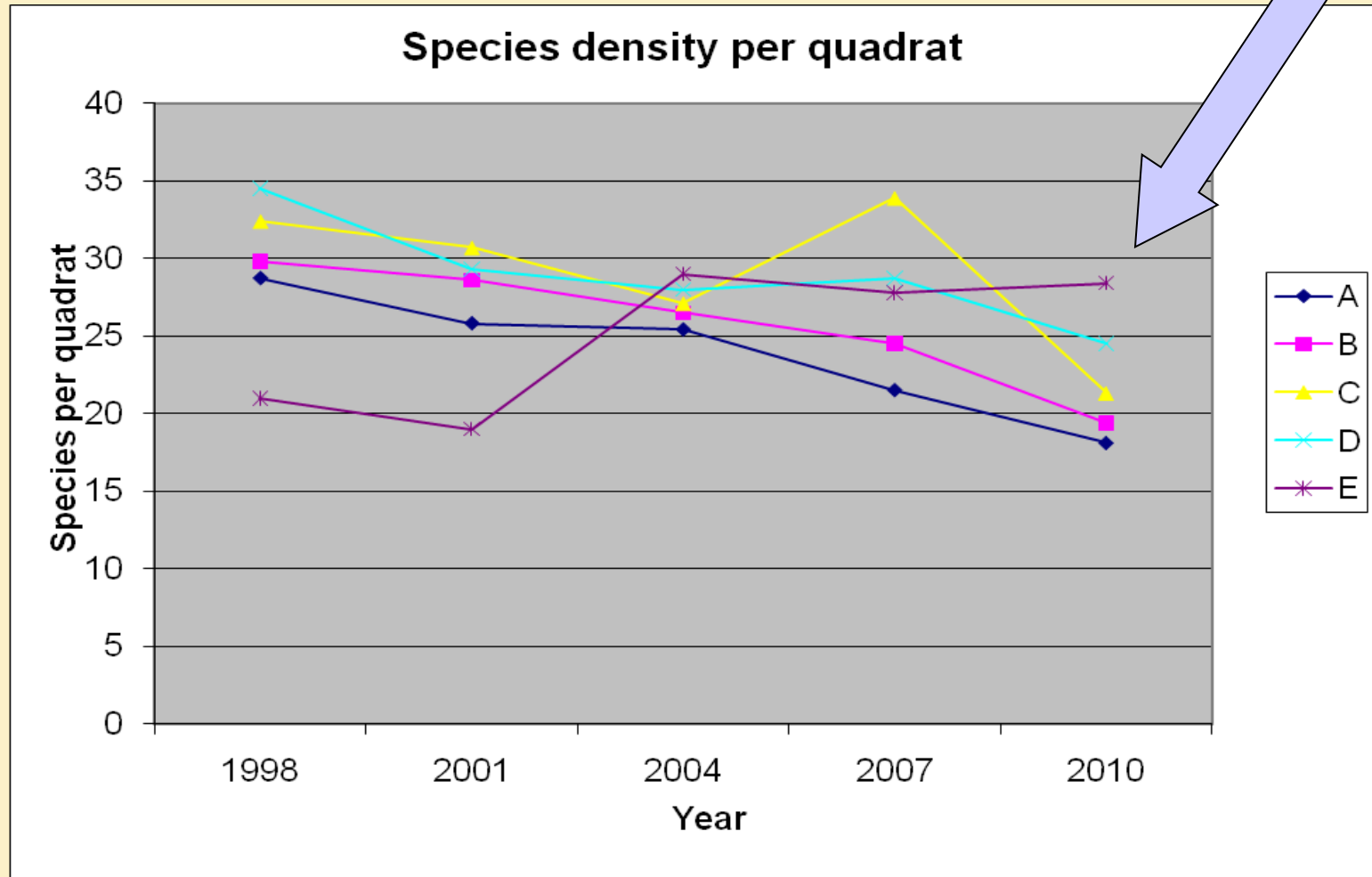


Magdalen Hill Down Extension: Butterfly response



Magdalen Hill Down: Plant diversity

Remnant downland



Magdalen Hill Down North: seeded 2005

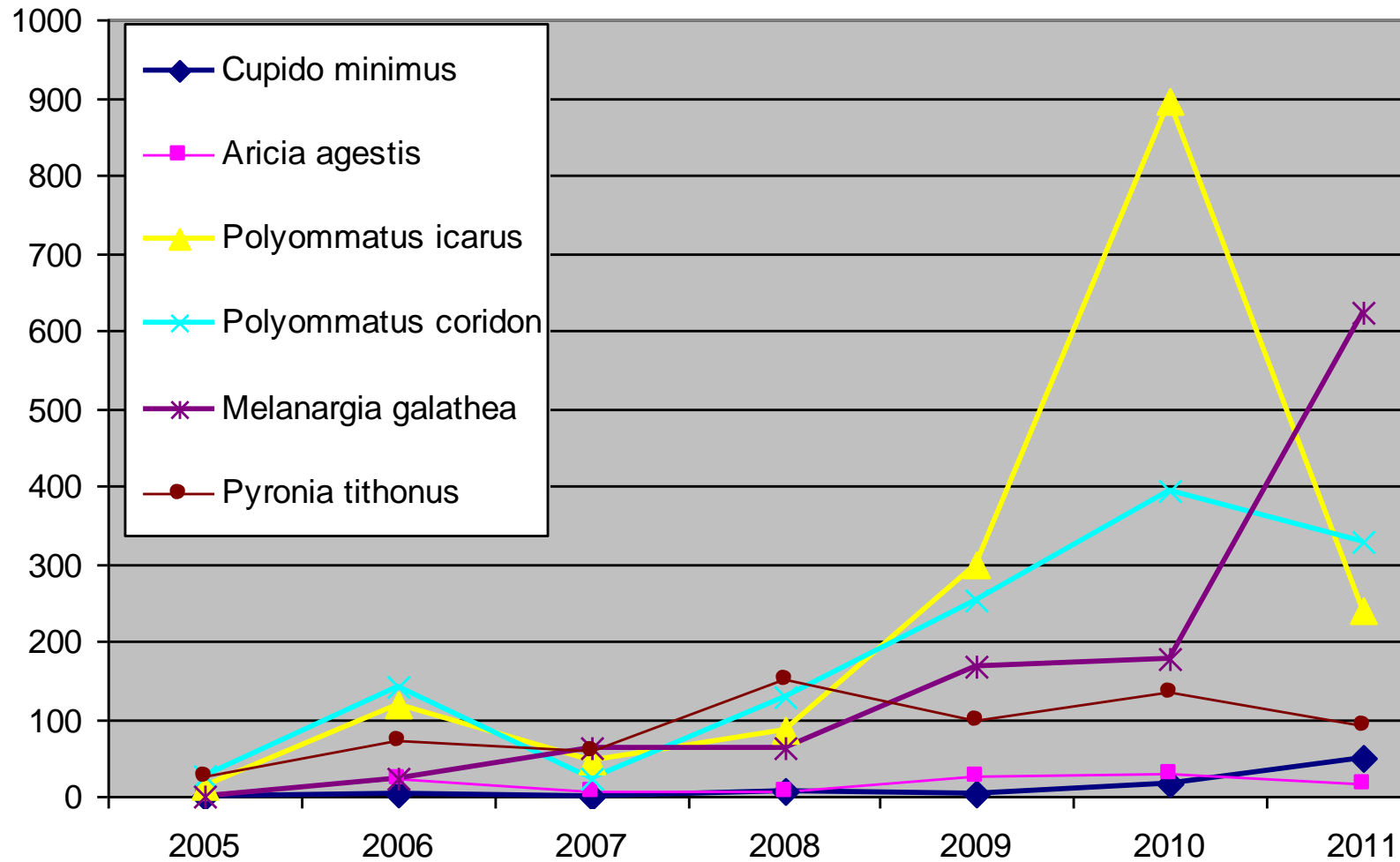
Topsoil removal & seeded 2005:
sward in 2008



Magdalen Hill Down North: seeded 2005



Magdalen Hill Down North: butterfly response



Magdalen Hill Down: successes



Downland area increased
from 10 ha to 34 ha



Original reserve:

New large population of
Pyrgus malvae



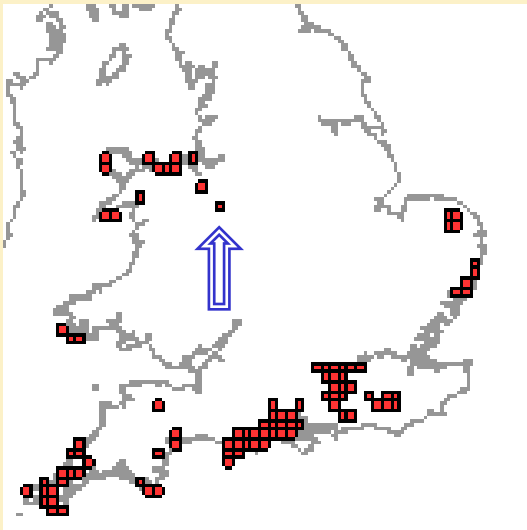
Restored habitats:

Over 30 species including
Cupido minimus

Prees Heath (60ha)



Last site for *Plebejus argus*
in Midlands



Prees Heath - History





URGENT APPEAL



Please help us to make
a Prees Heath Reserve

Prees Heath challenge (2006)



Prees Heath: Soil Analysis

- Very high nutrient levels
- Soil Ph = 7
- Target Ph = 3-4



Prees Heath: restoration from arable

Options

- Do nothing except mow and remove
- Cropping
- Soil stripping
- Soil inversion

Prees Heath: Deep Ploughing



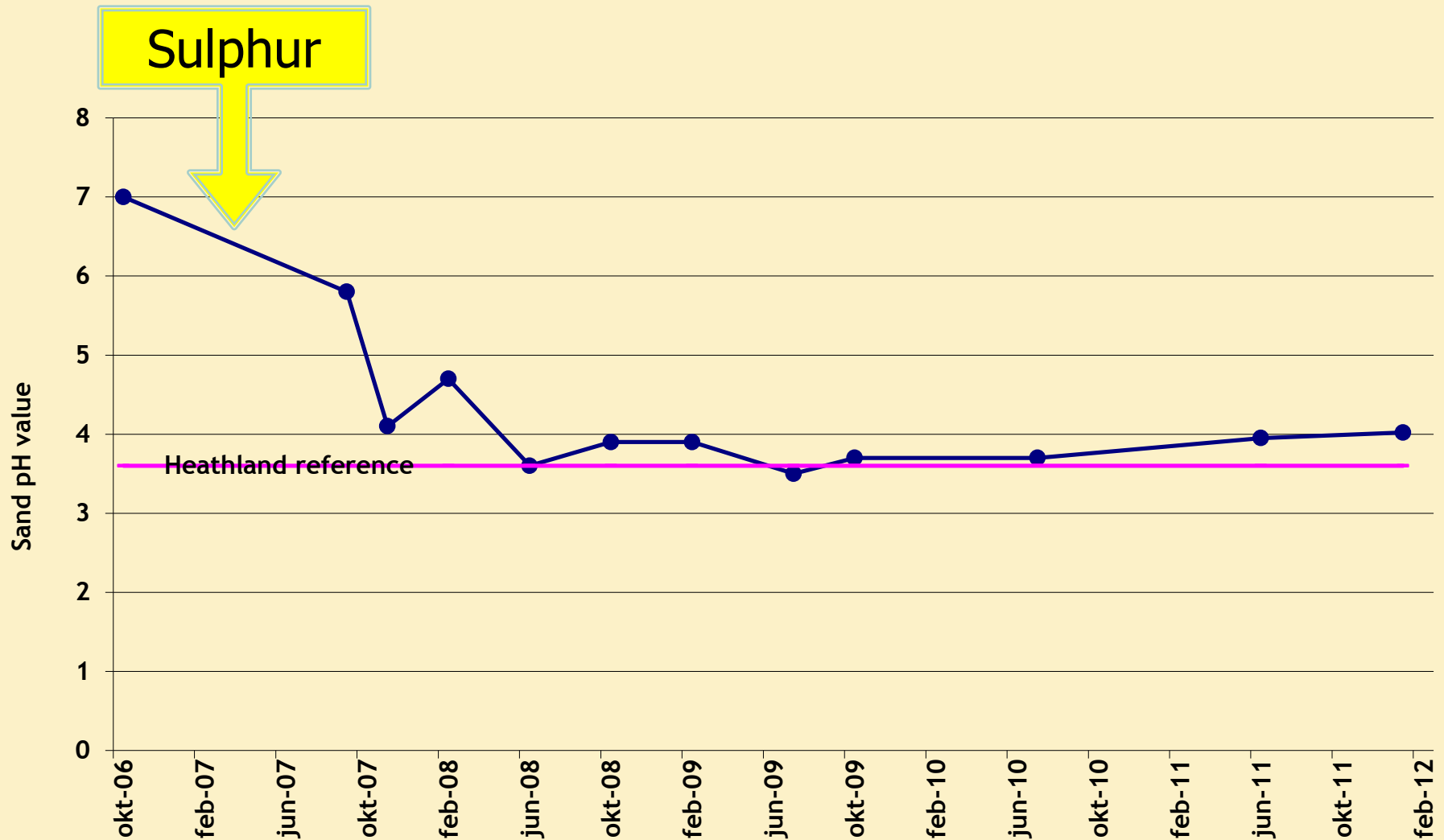
Prees Heath: restoration process 2007



Prees Heath: restoration process, 2007



Prees Heath: reducing soil Ph



Heather germination

August 2010 August 2011



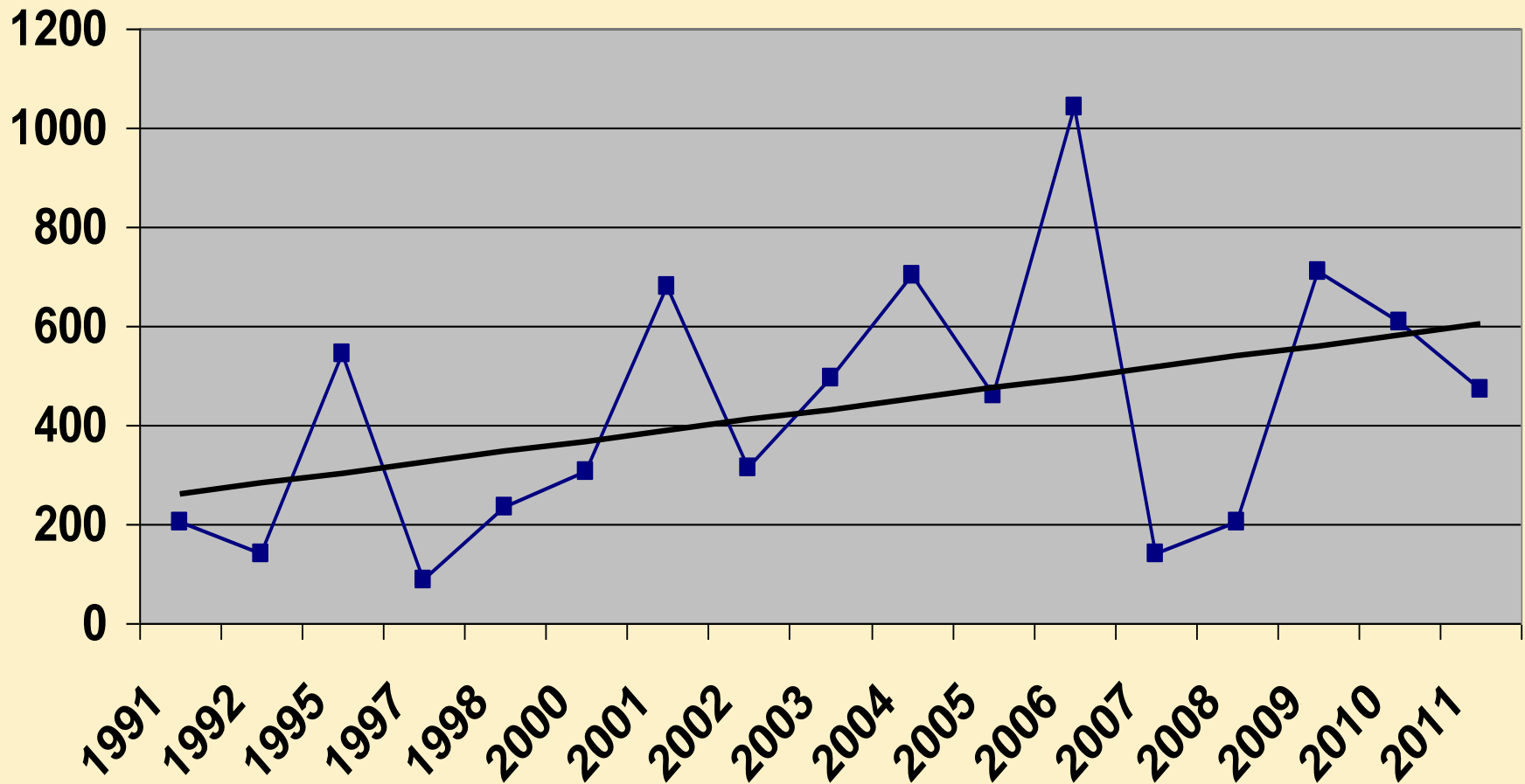
Plug planting of bell heather *Erica cinerea*



Plebejus argus and Lasius niger



Plebejus argus: Prees Heath Transect Counts



Prees Heath: soil analysis

Soil parameters	Before ploughing, Oct 2006	8 months after ploughing, June 2007	31 months after ploughing, Oct 2009
Percentage organic matter	4.3	0.12	0.97
Phosphorus mg L ⁻¹	58	11.8	23.3
Calcium mg L ⁻¹	1588	118.5	32.7
Ammonium – nitrogen mg kg ⁻¹	3.8	0.21	3.3

Davis et al (2011) Aspects Appl Biol 108, 247-254

Habitat restoration costs

Chalk grassland = c. £2,000/ha (~ € 2,400)

Prees heath = £3,120/ha (~ € 3,700)

+ Staff costs.....

- These costs can sometimes be provided by developers or even by agri-environment grants

Conclusions

- Habitat recreation is possible for several habitats
- It is expensive and takes a lot of time
- It needs specific techniques and expertise
- We have a lot of experience now to draw on
- The results are unpredictable`
- It is an important tool to achieve 2020 targets, especially in regions with highly fragmented/degraded habitats
- **It is always better – and cheaper - to conserve existing habitats**

Thanks

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Invitation



Seventh International Symposium

Southampton University, UK

3-6 April 2014