Insect Decline: The causes and the role of agriculture in mitigation

40 years of insect monitoring on farmland: winners and losers in the cereal ecosystem

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Game & Wildlife Conservation Trust

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My co-authors
a.k.a. the people doing the work

Picture of Nicholas Aebischer ©Hugh Nutt

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Q1 Why count insects?

Q2 Why count insects in cereal crops?

Q3 Why count insects in cereal crops in Sussex?

A1 What we found

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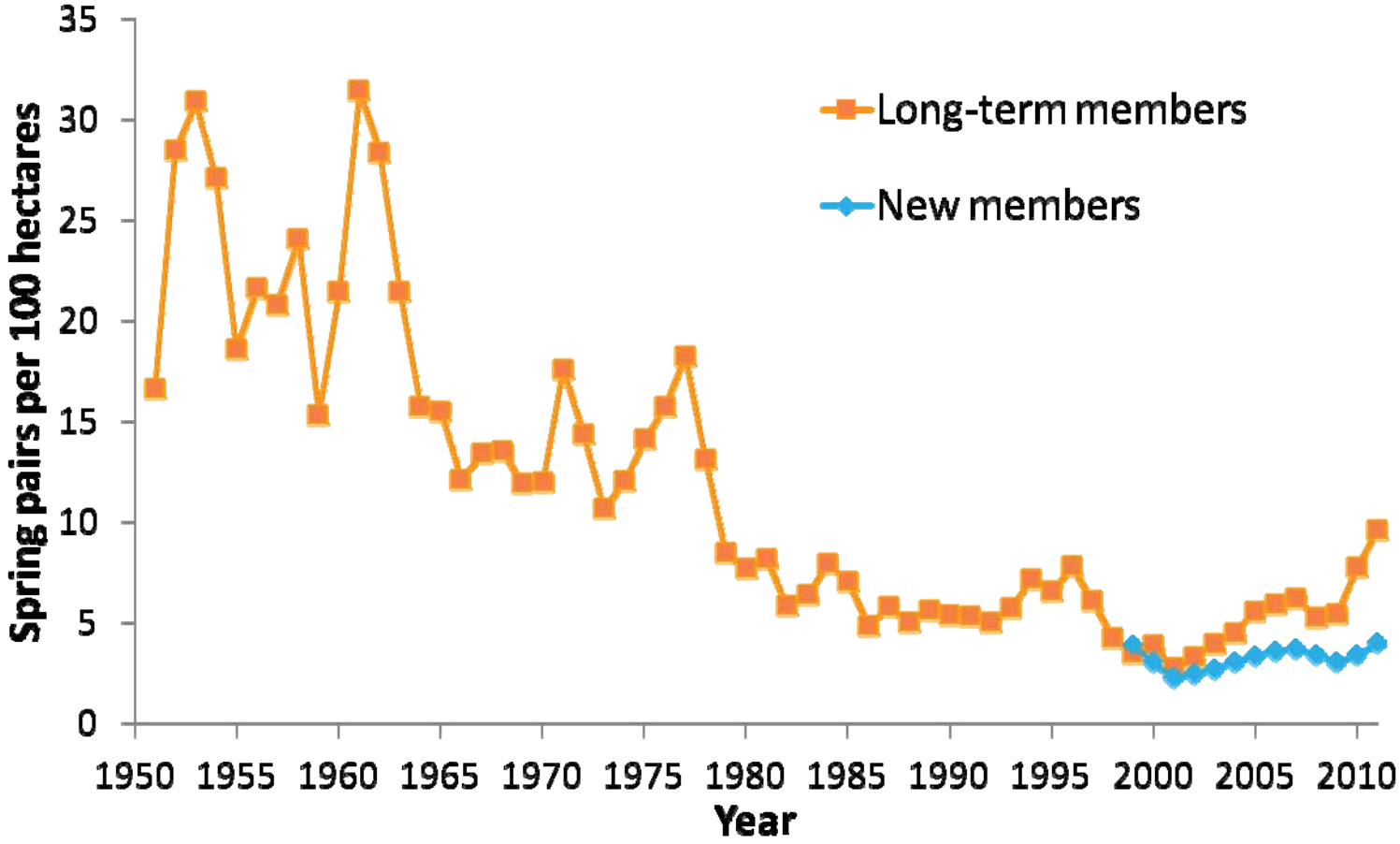
Q1 Answer: Grey partridge conservation

UK decline = 90% (1967-2008)
BAP species
Red list (BoCC)
SPEC3 (Europe)

PCS: spring pair densities



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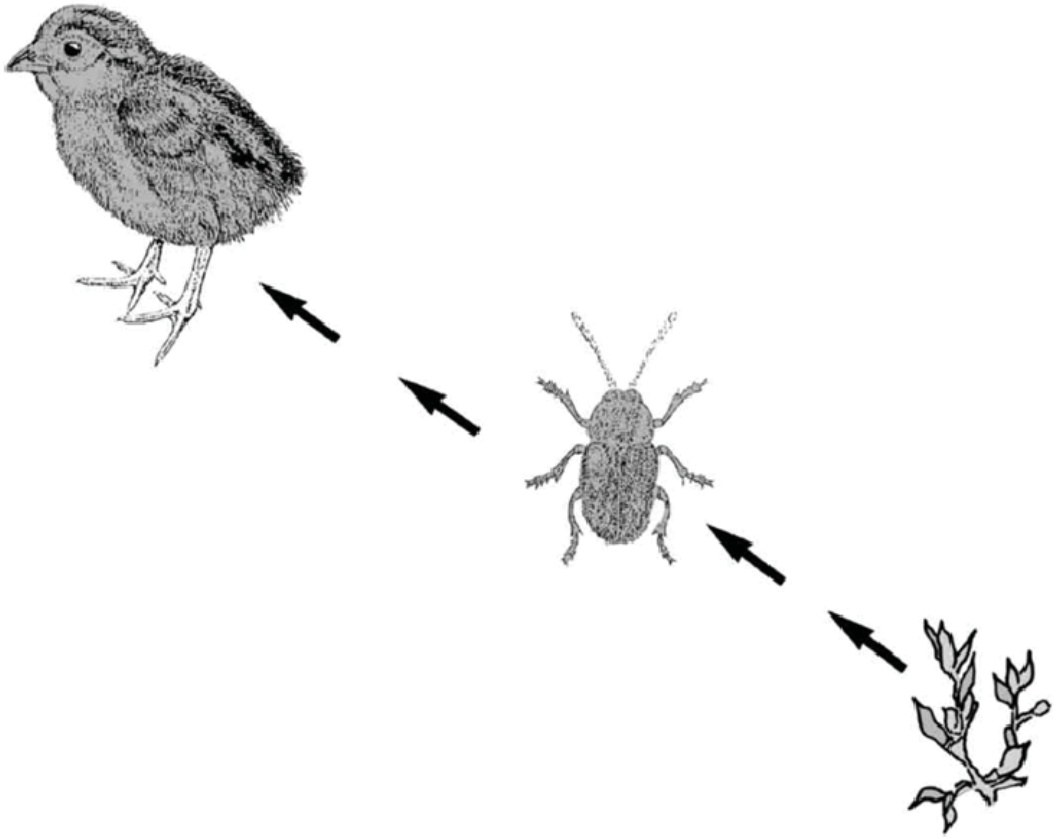
Insect abundance... the key to partridge chick survival

Pesticides break the vital food chain



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Grey partridge chick diet

First week

- **95% insects**

First & second week

- **80% insects**

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Q2 – This is where partridge chicks are taken to feed

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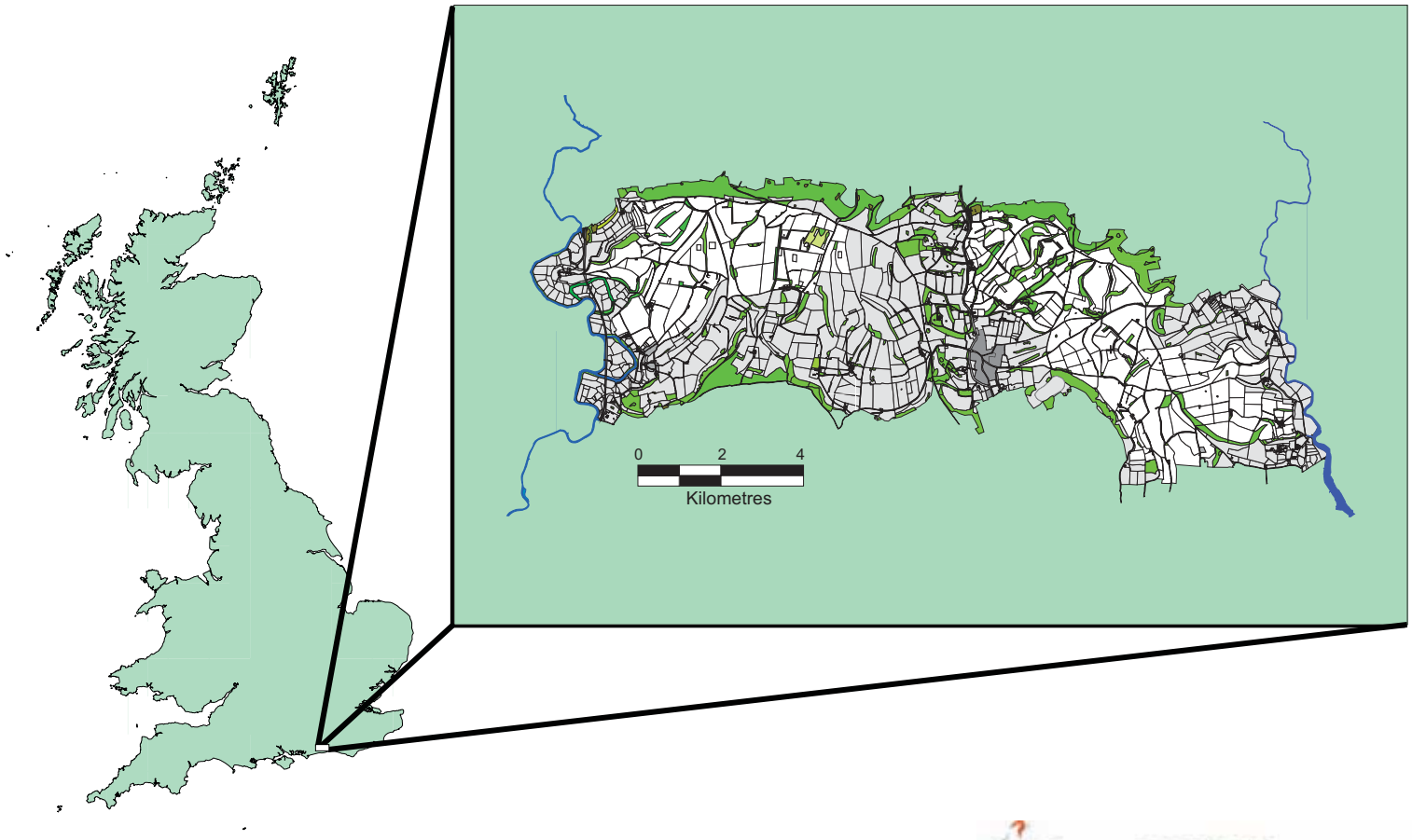
Q3 – this is where we study chick survival
The Sussex study: 1970 to present



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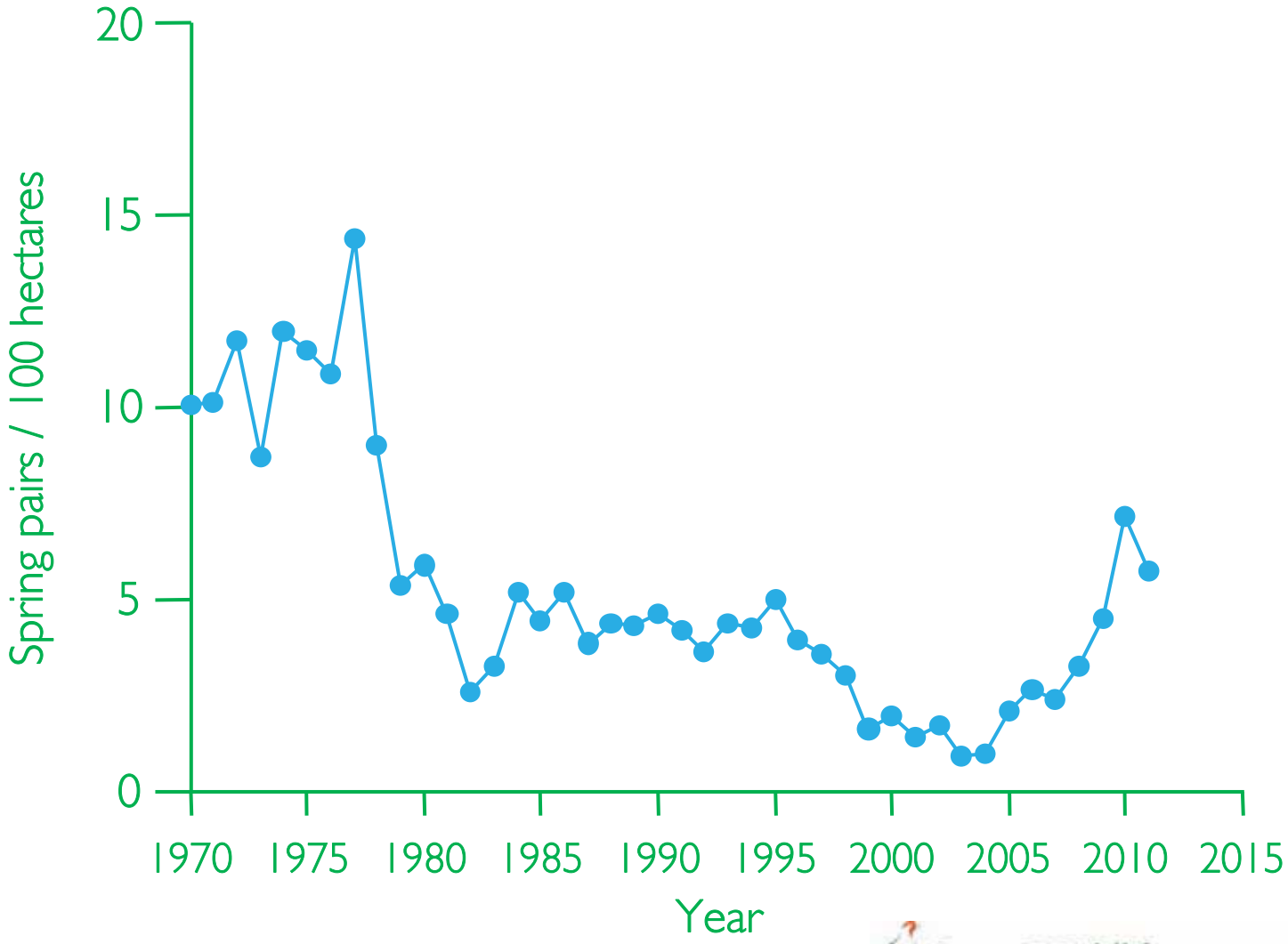
Sussex: Grey Partridge breeding density



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Sussex: sampling invertebrates

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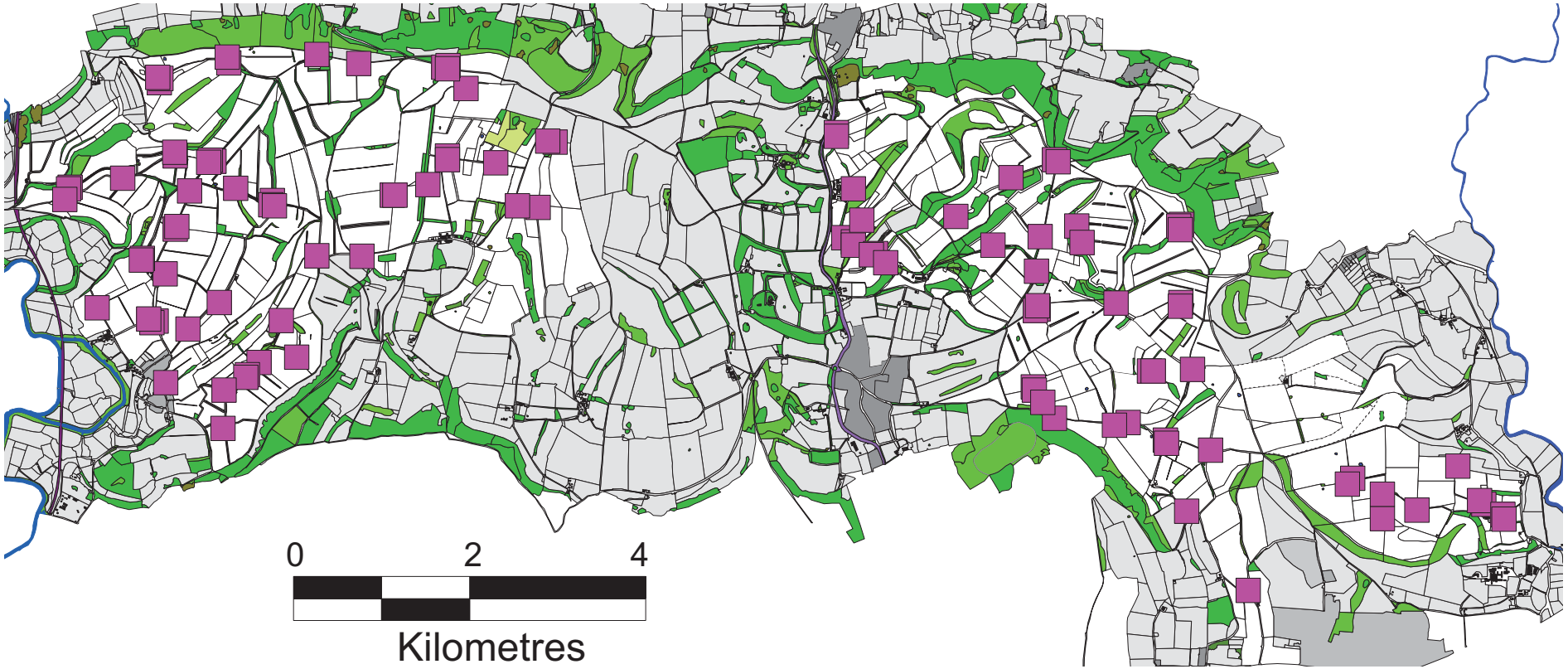
Sussex: insect sampling sites 2011



- At least100 sites per year
- Cereal fields
- Identified to mainly family level

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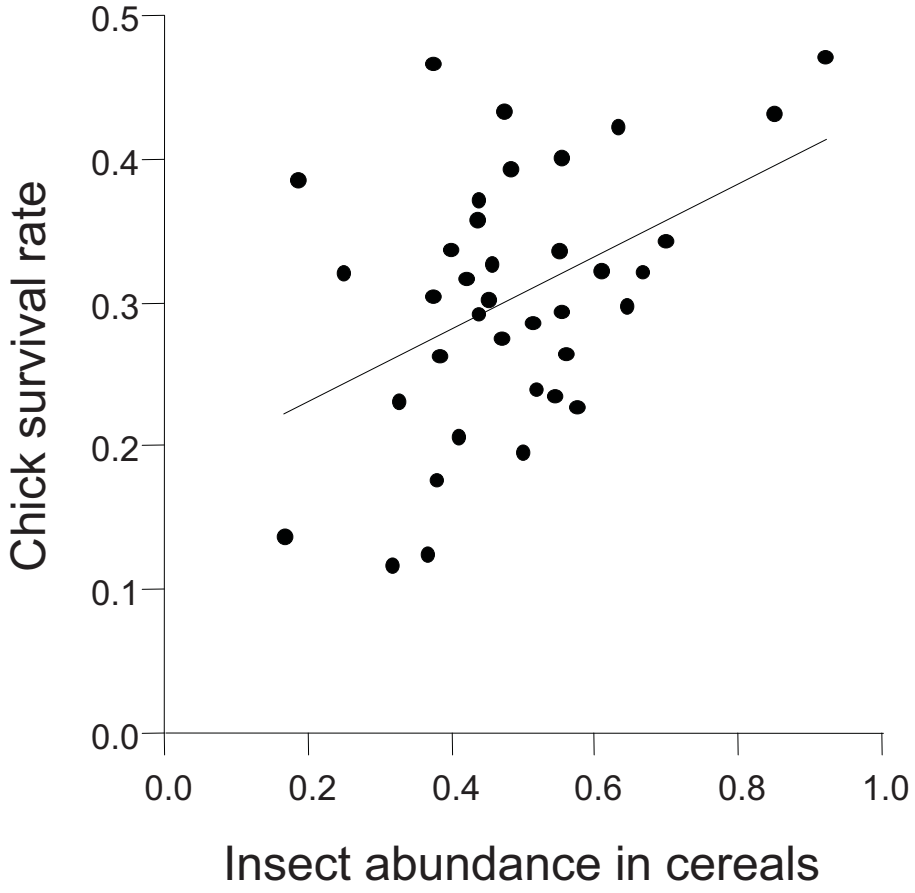
Grey Partridge Chick Survival & Insects (each point = 1 year)



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Cereal invertebrates in June

Invertebrate food items for chicks of farmland birds

For each cereal field:

- **Spiders and harvestman (Araneae & Opiliones)**
- **Ground & click beetles (Carabidae & Elateridae)**
- **Leaf beetles and weevils (Chryomelidae & Curculionidae)**
- **Sawflies, butterflies and moths (Symphyta & Lepidoptera)**
- **Bugs and hoppers (Non-aphid Hemiptera)**
- **Aphids (Aphididae)**

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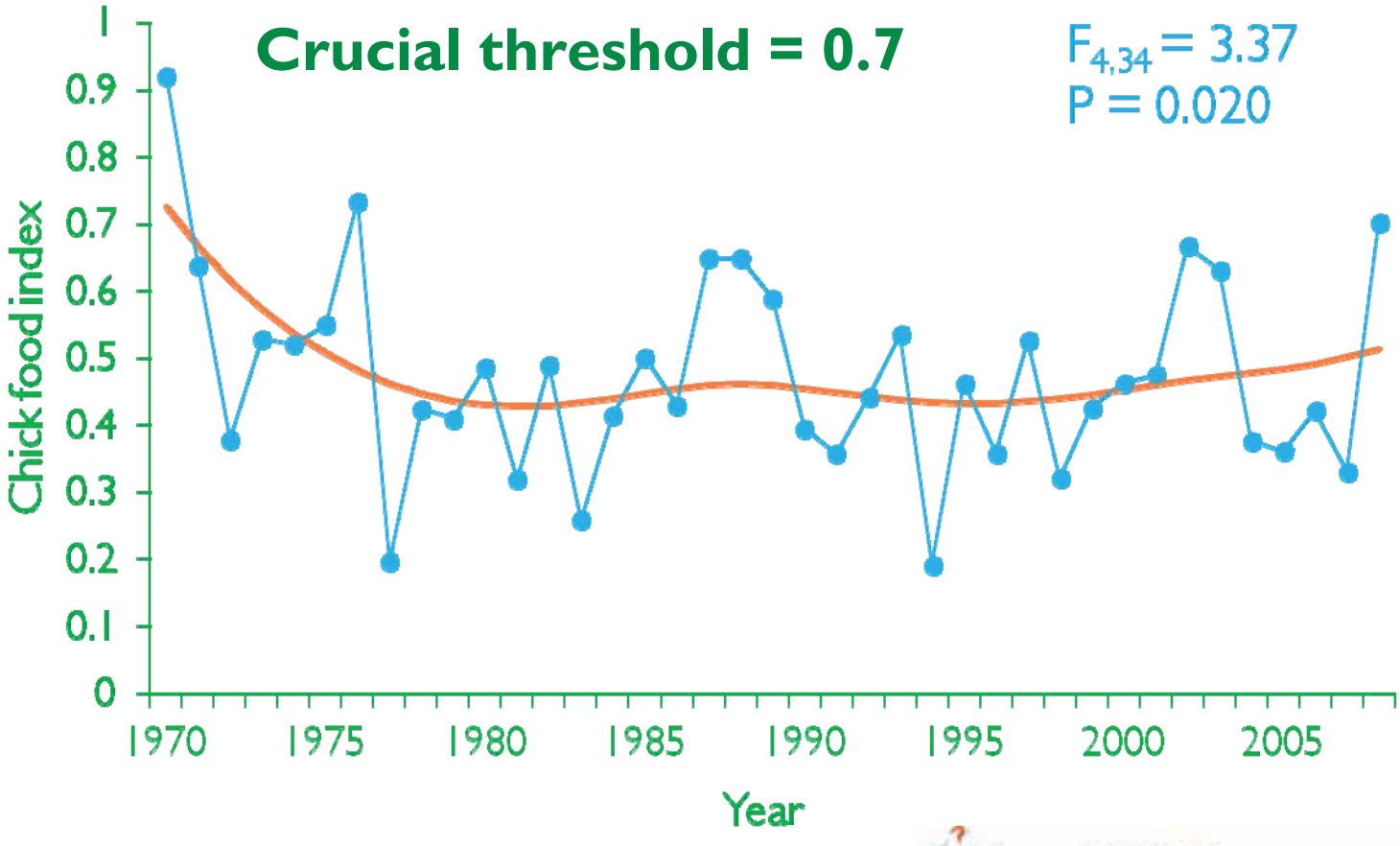
Sussex: Grey Partridge chick food index



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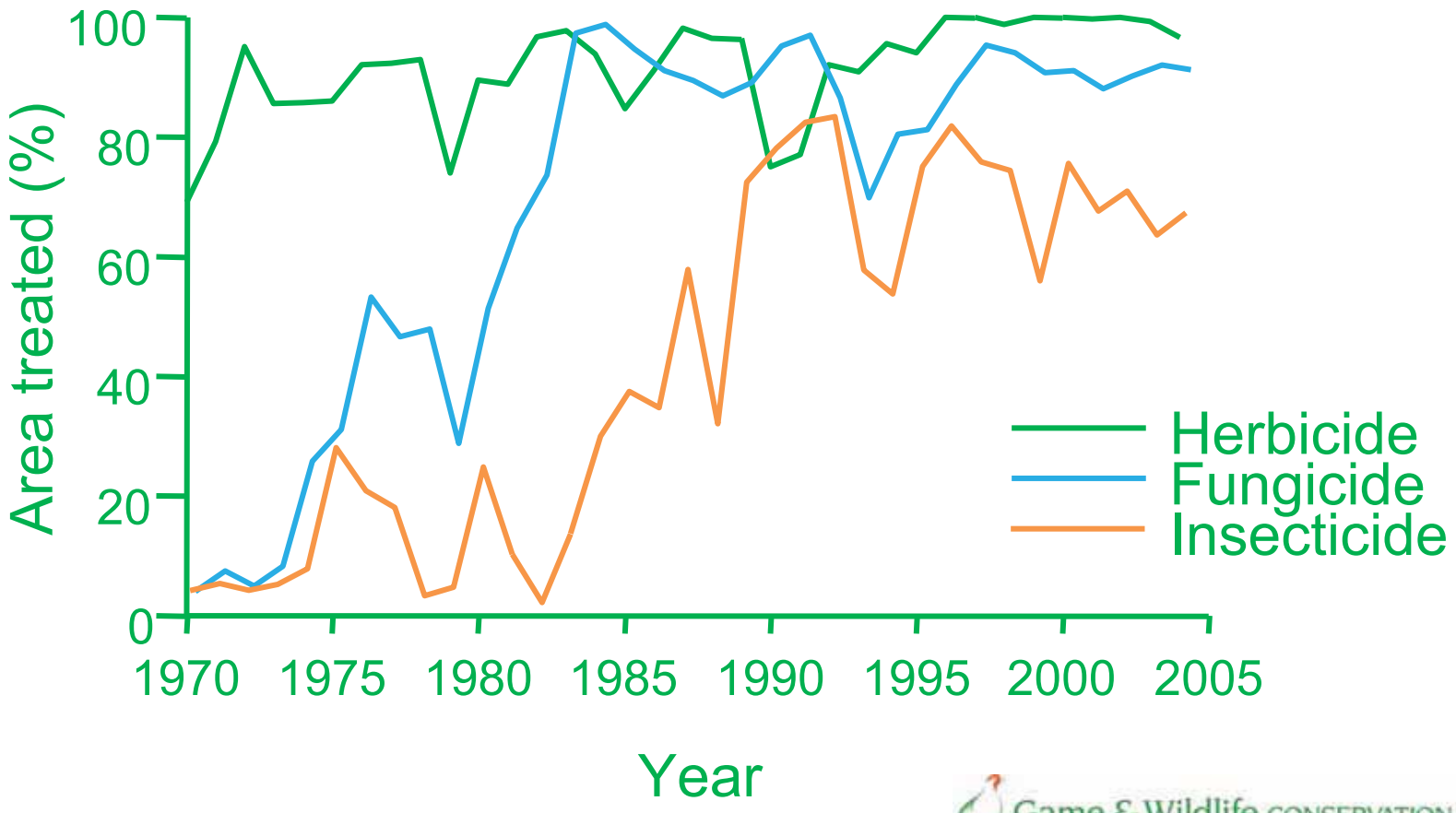
Management of individual fields: we also record.....

- **Crop**
- **Other land use e.g. set-aside, agri-environment schemes**
- **Fertiliser use**
- **Non-cropped habitats**
- **Pesticide use**

Trends in pesticide use, Sussex



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Sussex: Flora trends: we also measure the weeds!

- **No trend in overall abundance of dicotyledons, although monocotyledons decreased by 13% relative to the early 1970s**
- **Of 66 flora taxa monitored, 18 increased, 38 varied (humped trends - increases/decreases) and 10 showed no trend**
- **Annuals increased until the early 1980s, before declining as herbicide regimes increased in efficacy**

Potts, Ewald & Aebischer, 2010: Journal of Applied Ecology, 47: 215-226.

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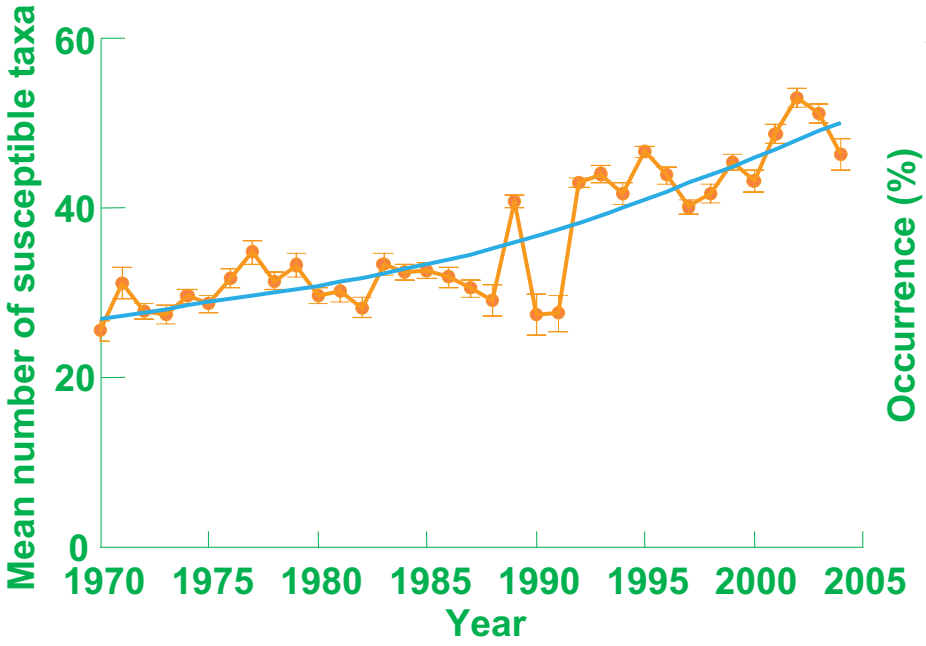
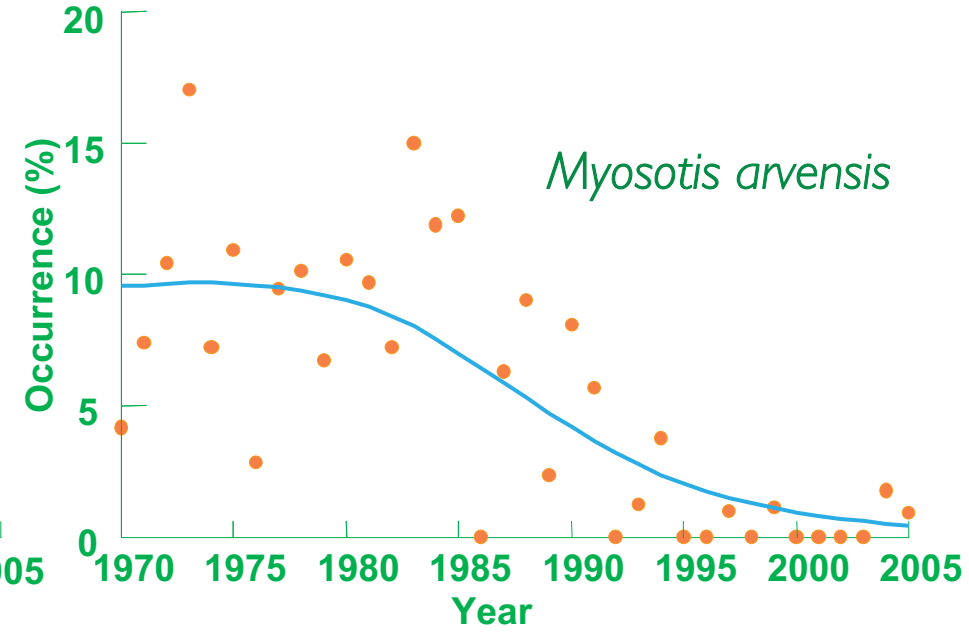
Sussex: Flora trends & herbicide efficacy

Herbicide efficacy: annual dicots



Annual dicot occurrence



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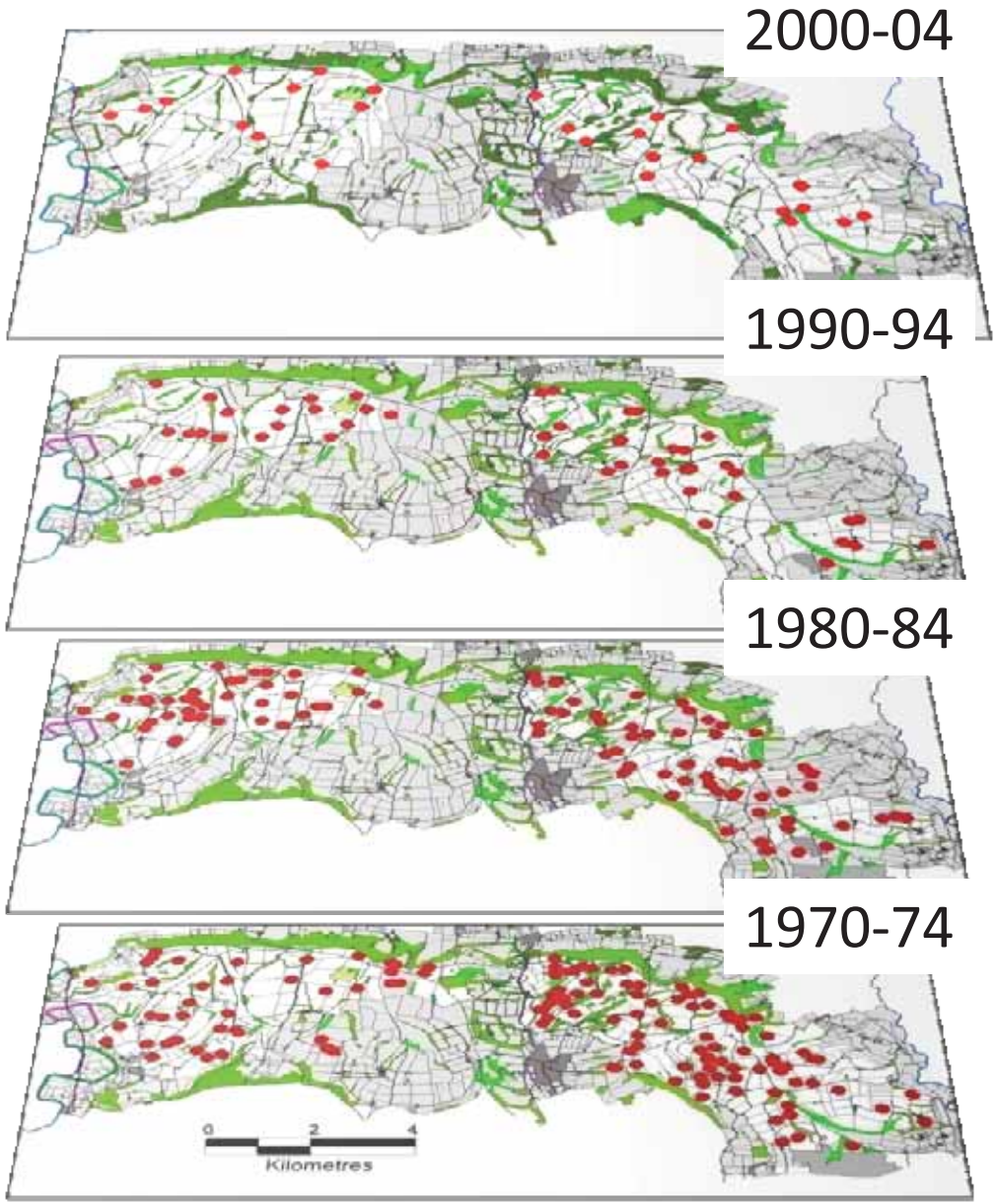
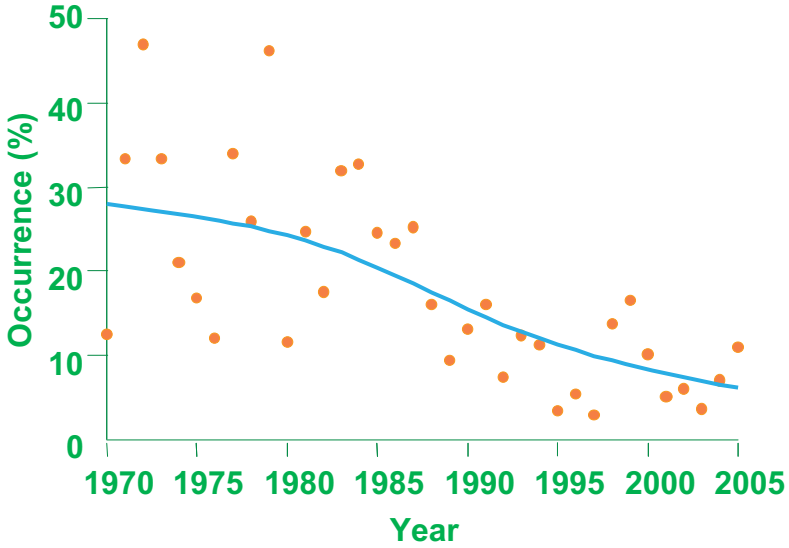


Chickweed (*Stellaria media*)



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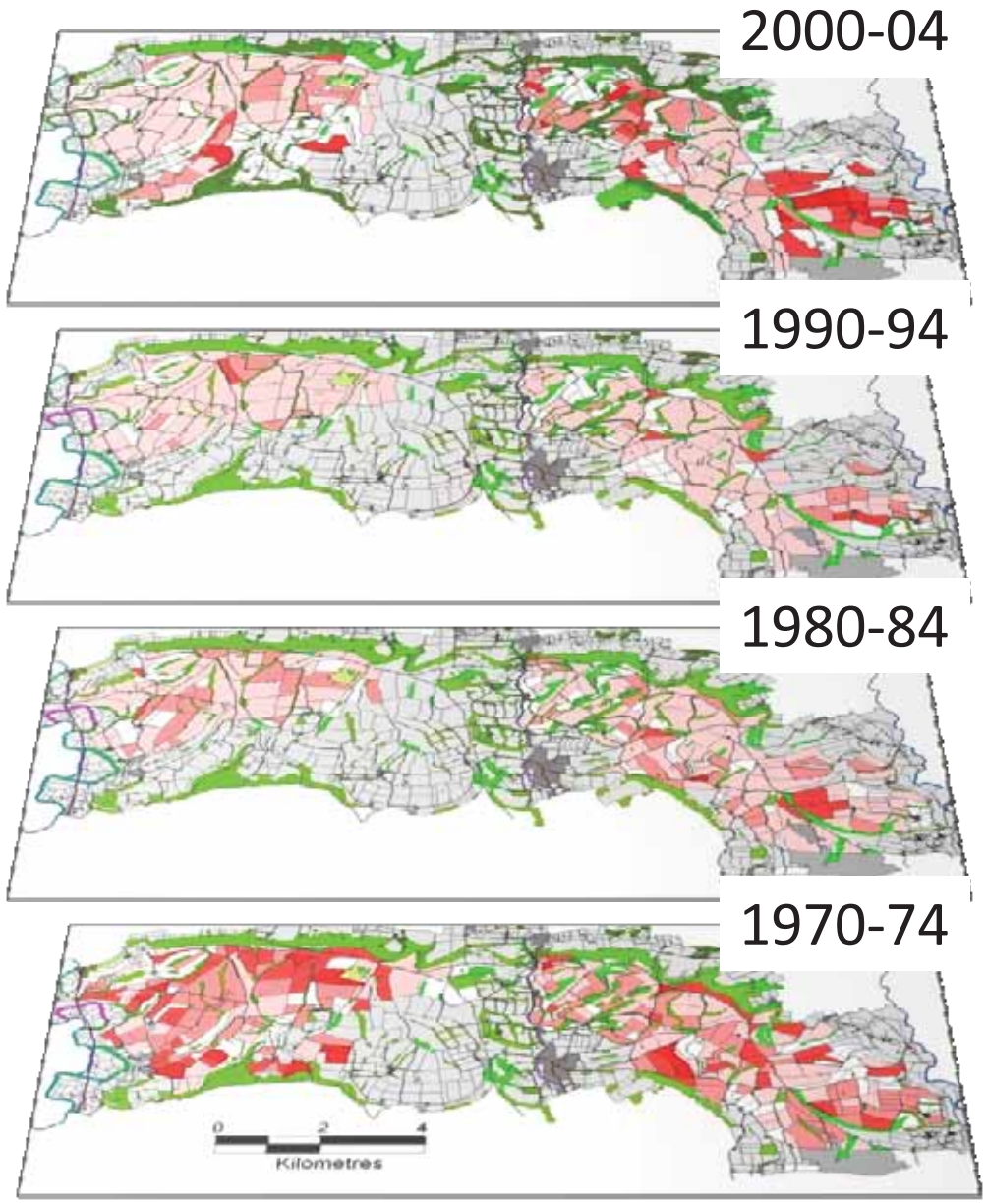
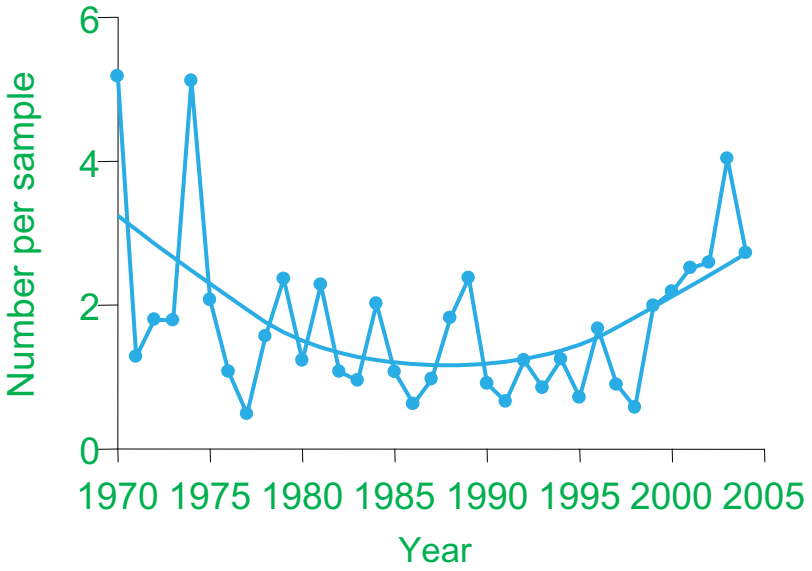


Caterpillars

(Symphyta & Lepidoptera)



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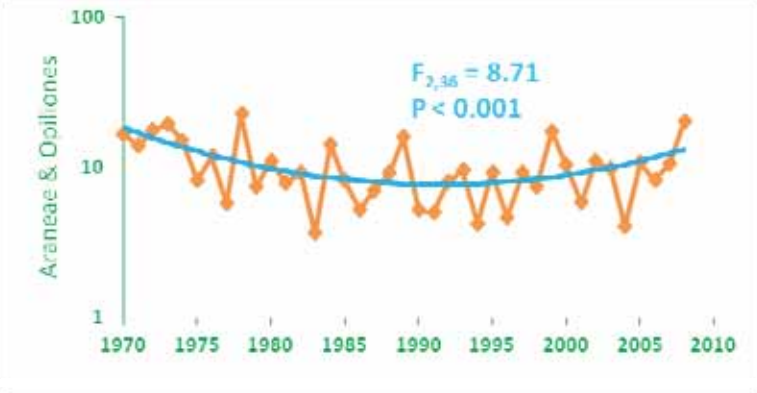
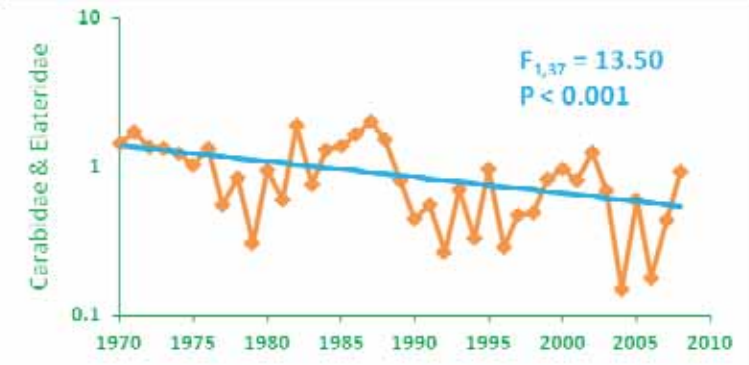
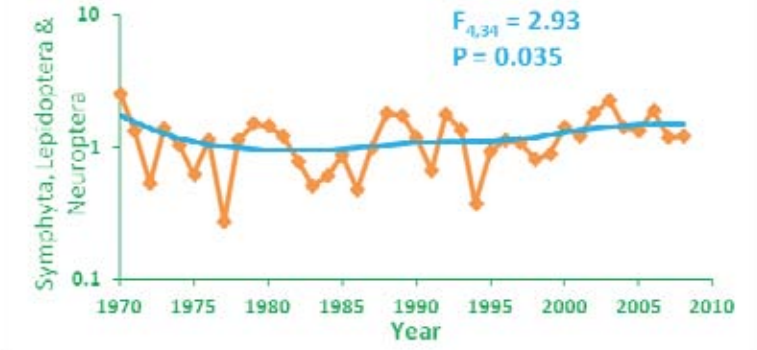
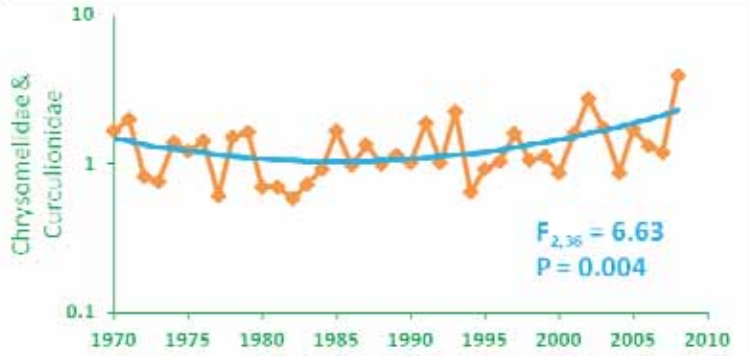
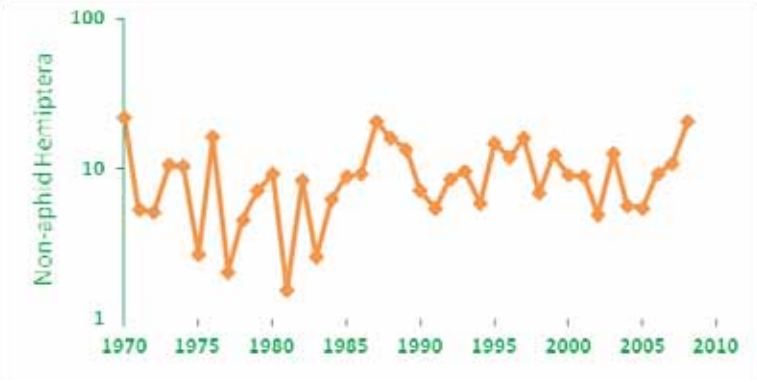
Sussex: Trends in bird food

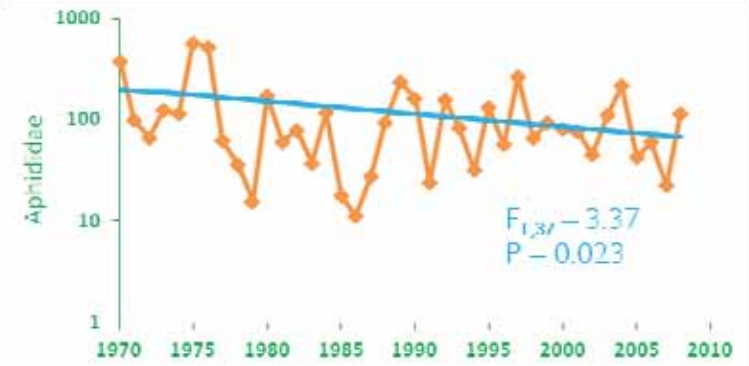




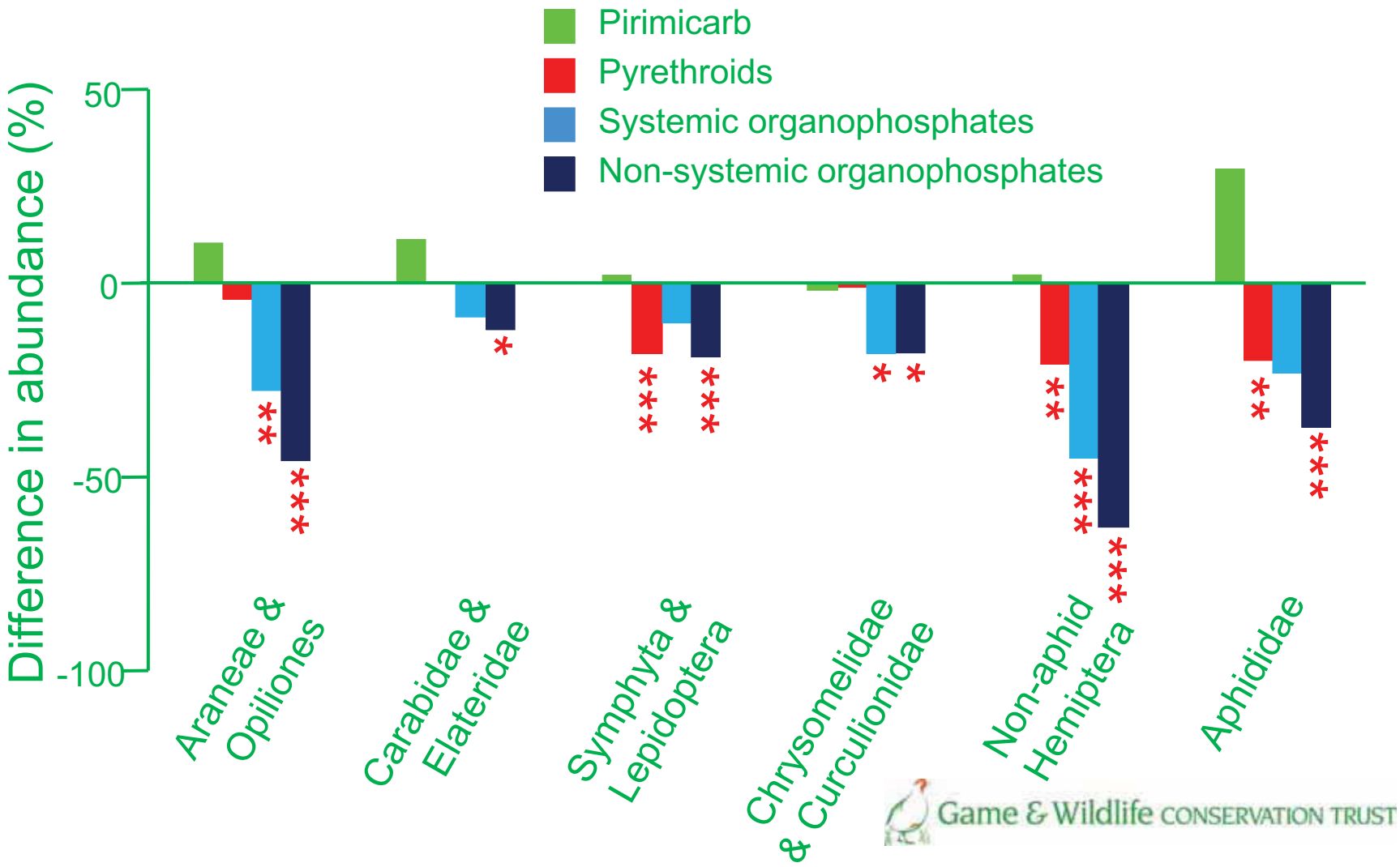








Invertebrates *v.* insecticide type



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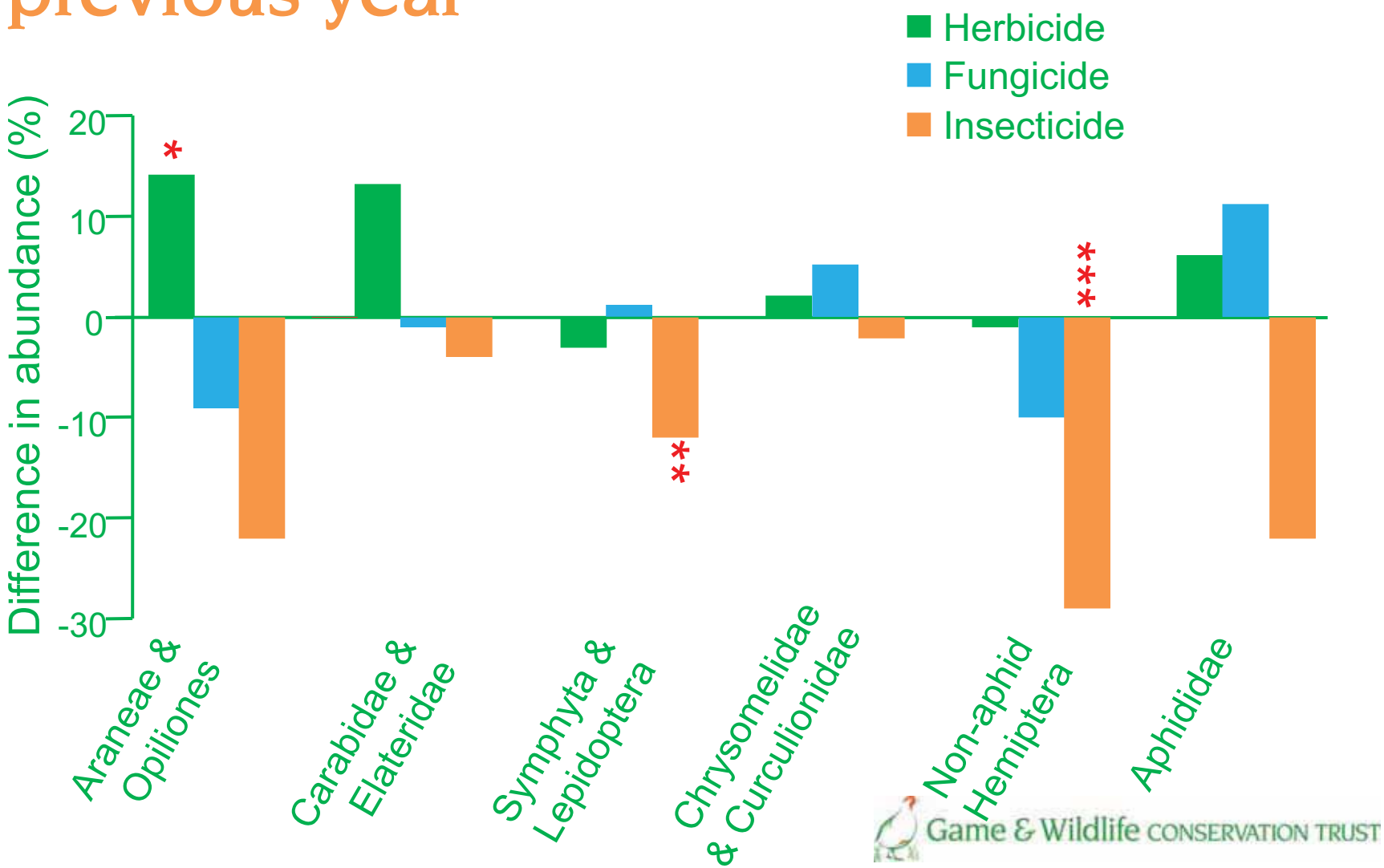
Invertebrates *v.* pesticide use in previous year



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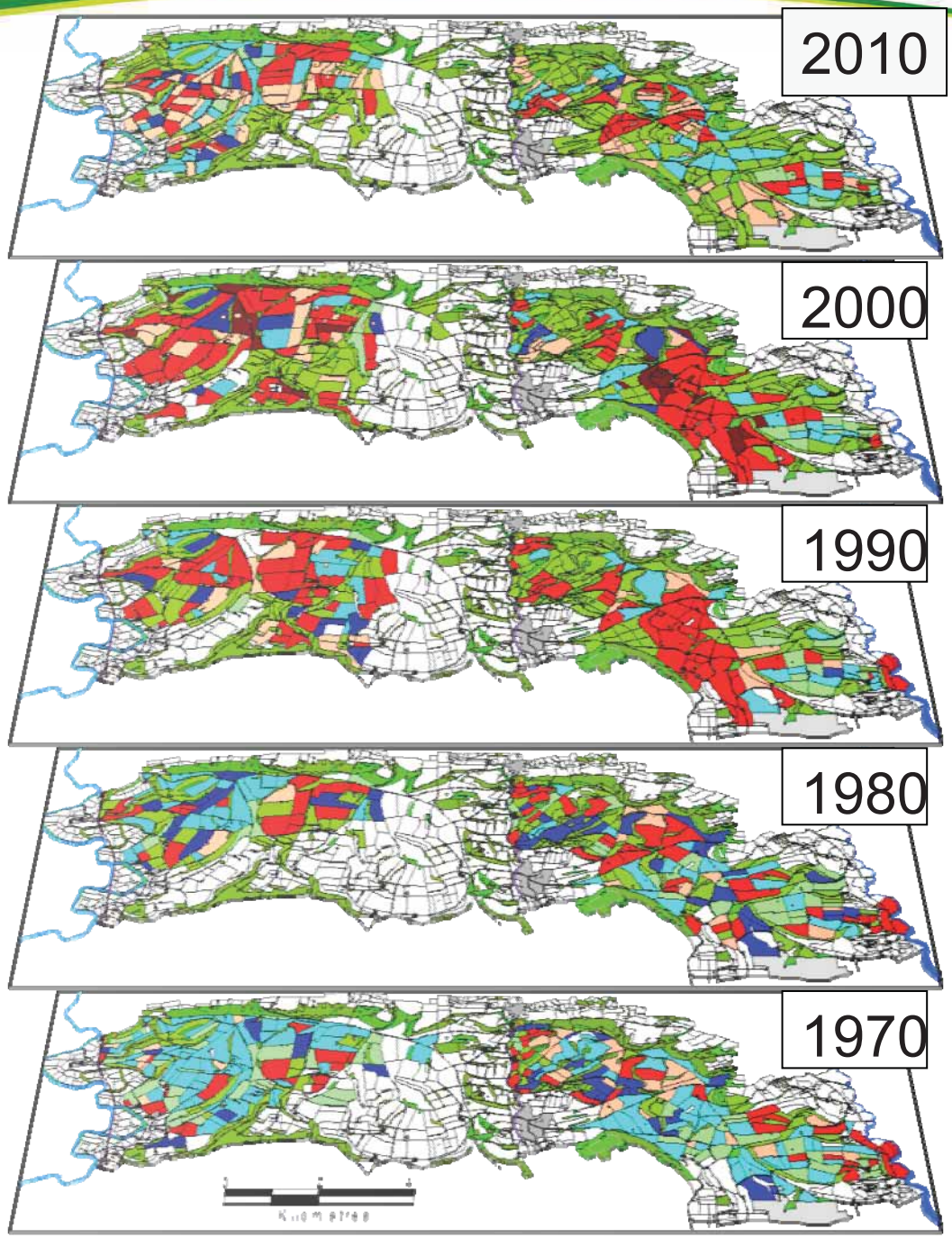

Management change

Addition of Set Aside then loss

ESA-Blocks of grass

Patchwork to block cropping

Loss of undersowing

Increase in field size

Spring barley to winter wheat

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Sussex: Farming & mitigation

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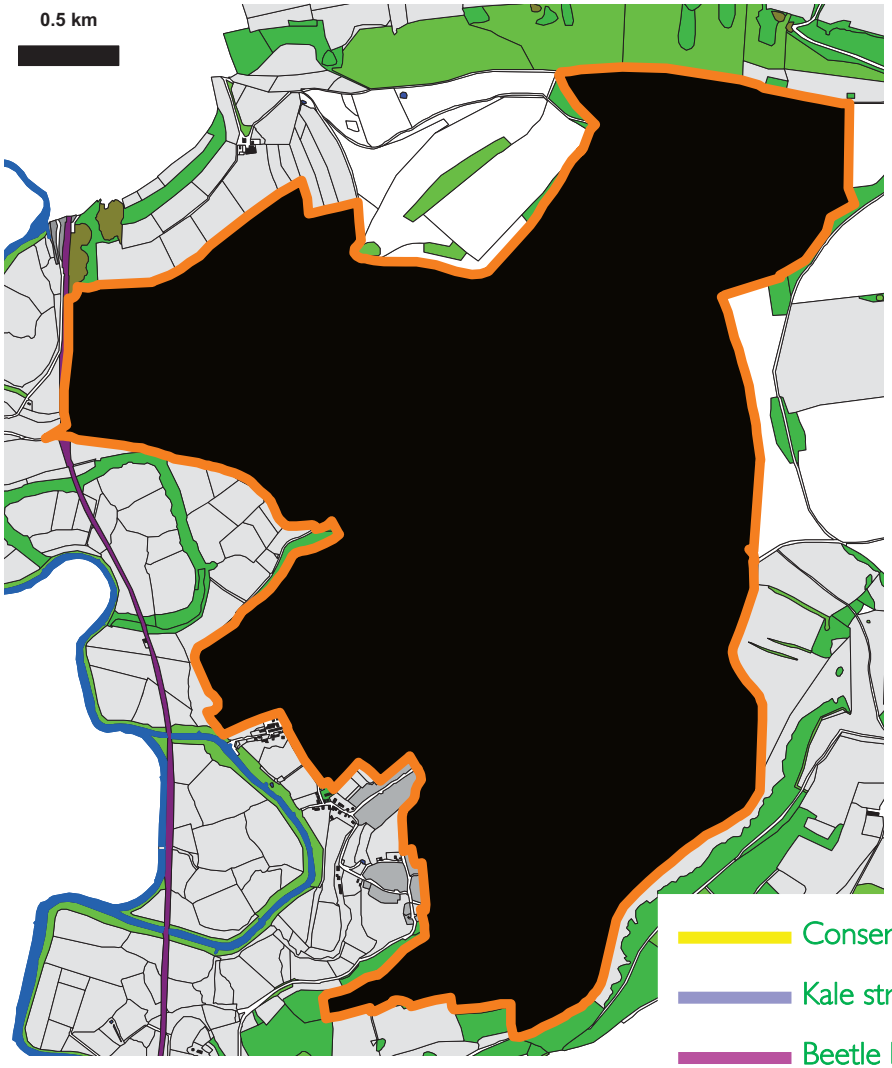
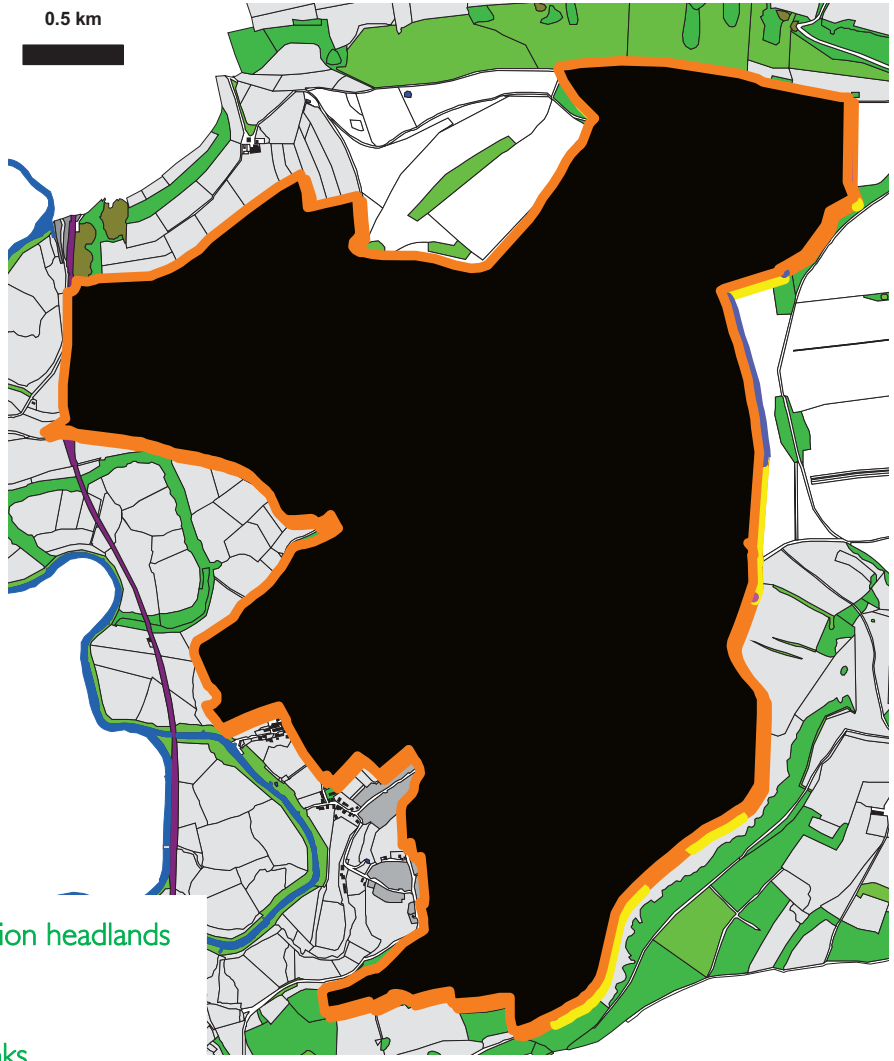
2003 – pre management



2010



Conservation headlands

Kale strips

Beetle banks

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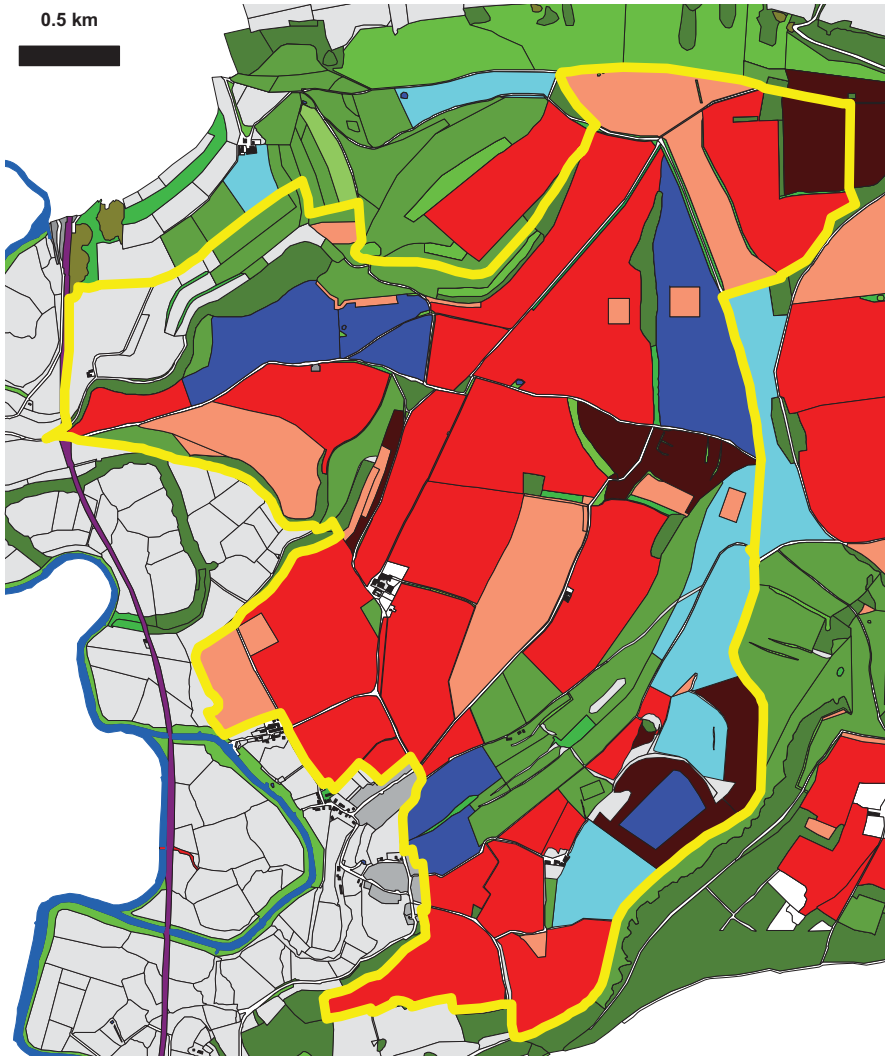
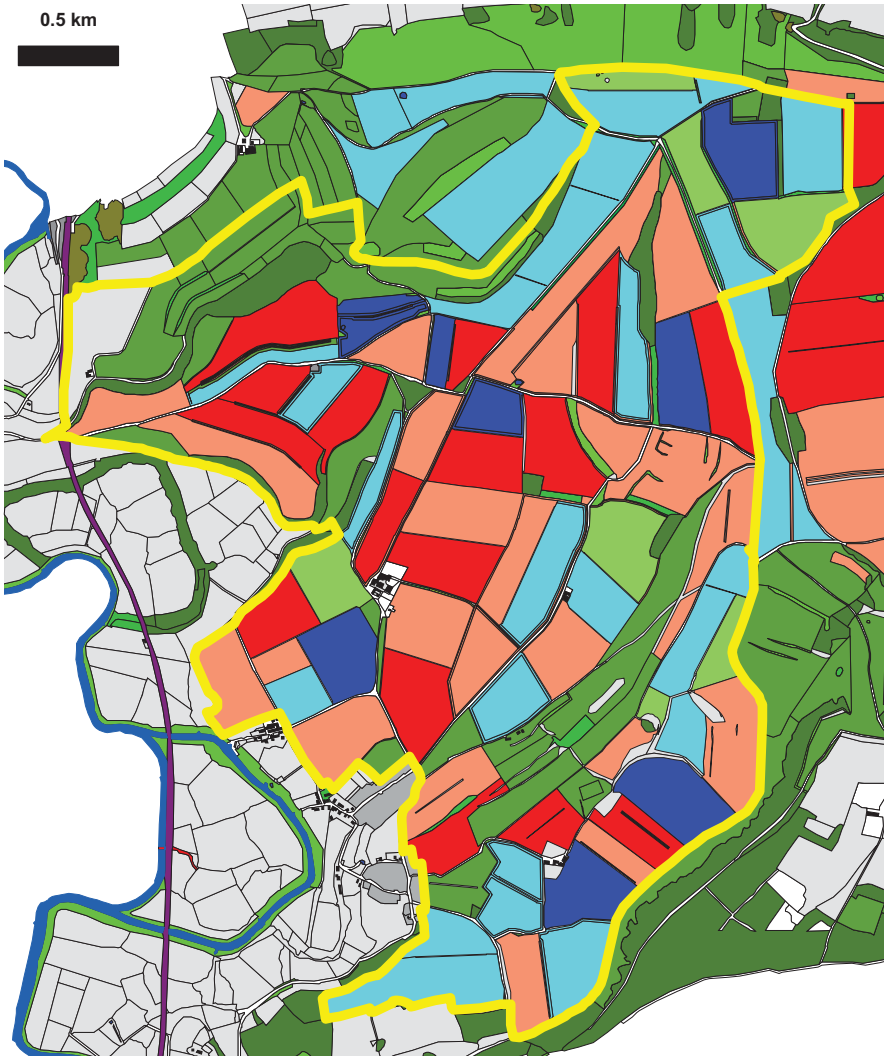
2003 – pre management



2010



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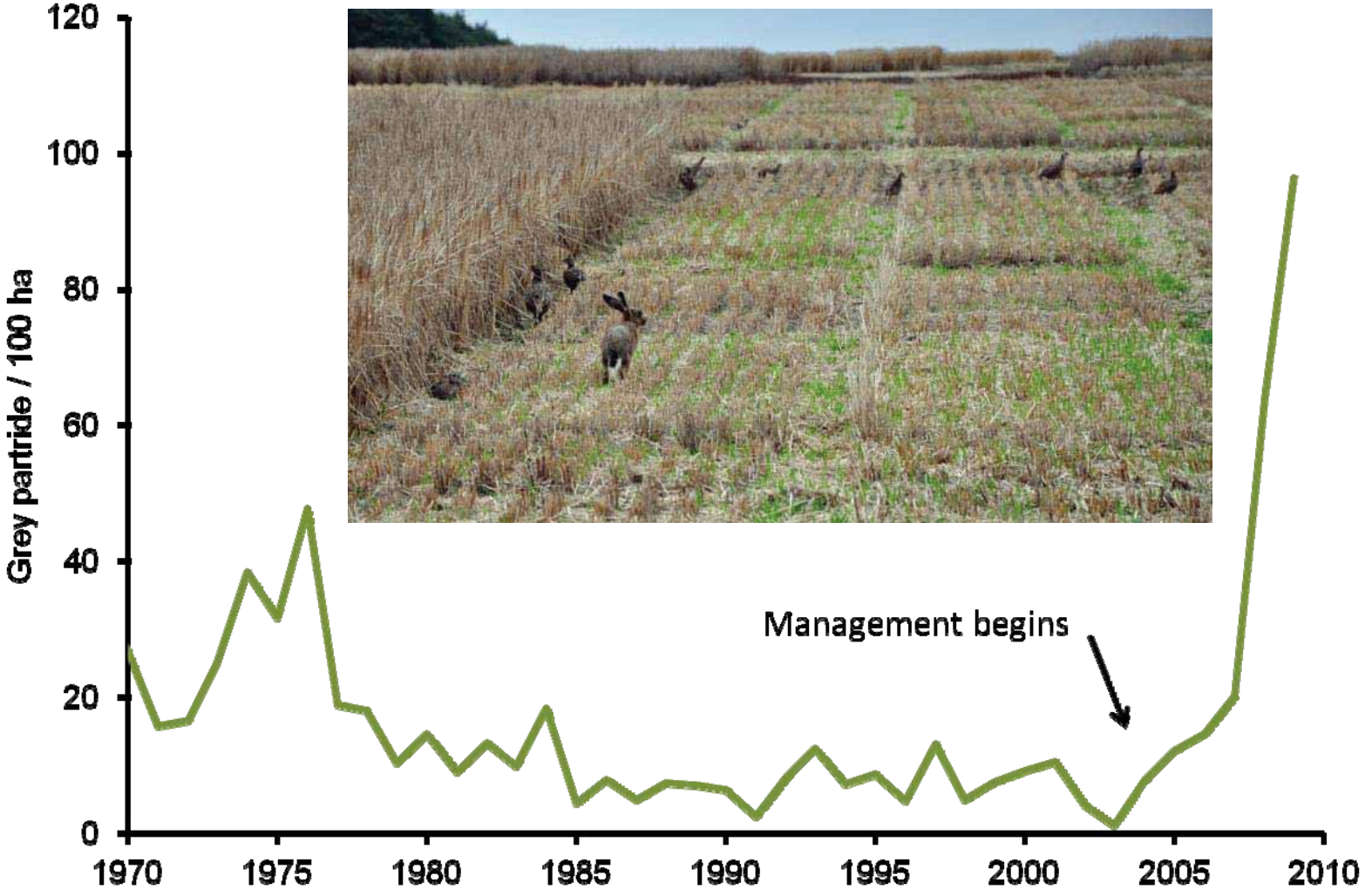
Grey partridges - Sussex downs



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www.gwct.org.uk/sussex

Thank you for your attention

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