



Nature's Calendar

Visualising climate change ecological impacts

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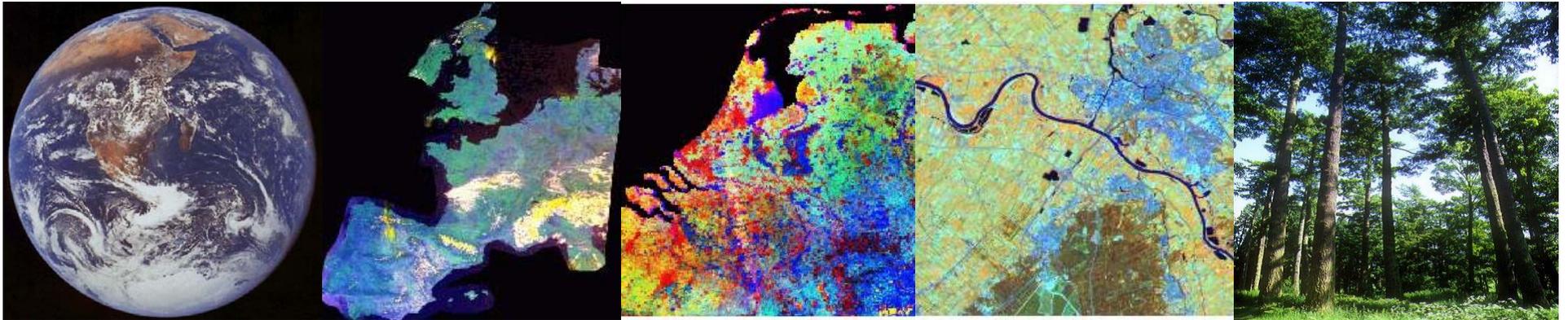
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Our challenge: how to get from global to local

Climate change is a global issue but impact are visible at local scales



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Indicators of climate change impacts



- ▶ **Productivity**
- ▶ **Geographic distribution**
- ▶ **Extreme events**
- ▶ **Phenology**



Definition of phenology

Study of the times of recurring natural phenomena especially in relation to climate change



Plants:

- Flowering
- Leaf unfolding
- Fruits ripe
- Leaf fall

Animals:

Appearance of:

- Butterflies
- Dragonflies
- Migratory birds
- Singing birds
- Frog spawn



Spring



Summer



Autumn

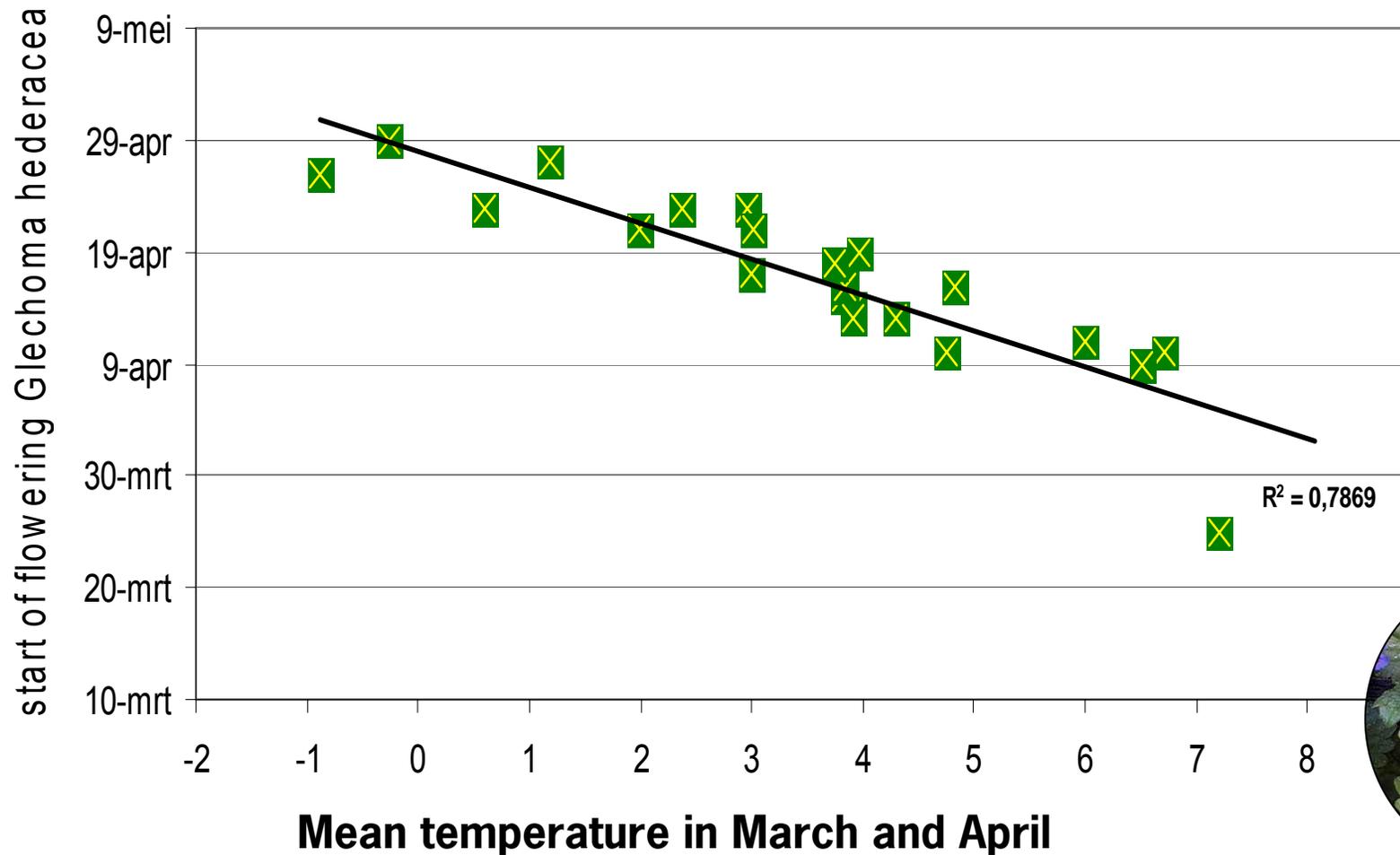


Winter



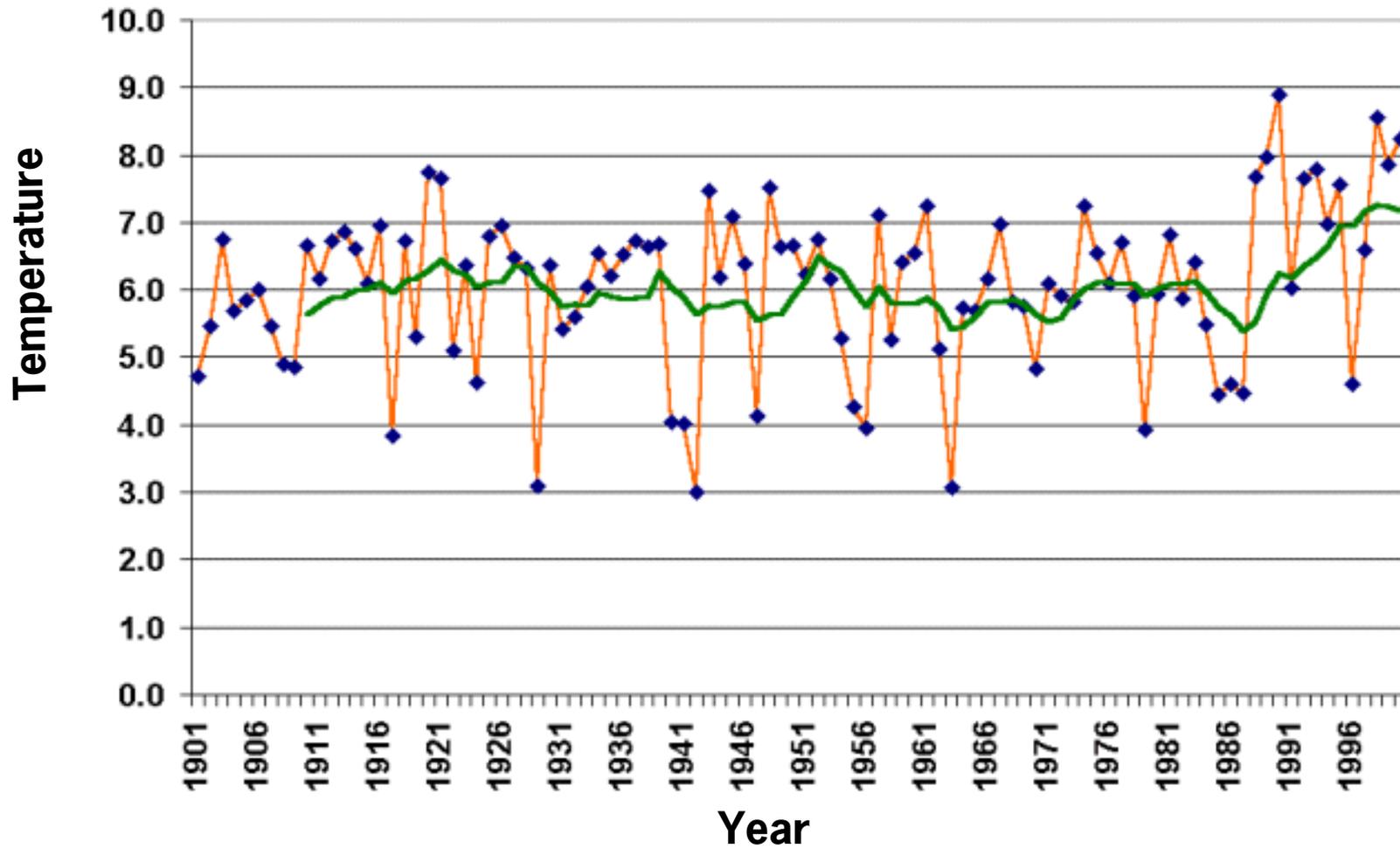
Phenology: Why a good indicator?

Ground ivy flowering date in relation with temperature in spring



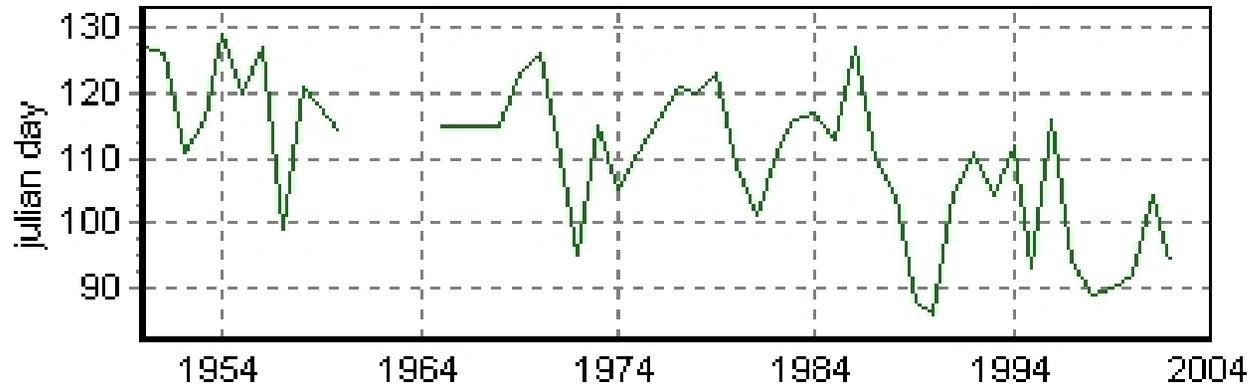
Climate change in The Netherlands & NW Europe

Temperature jump since end 1980s

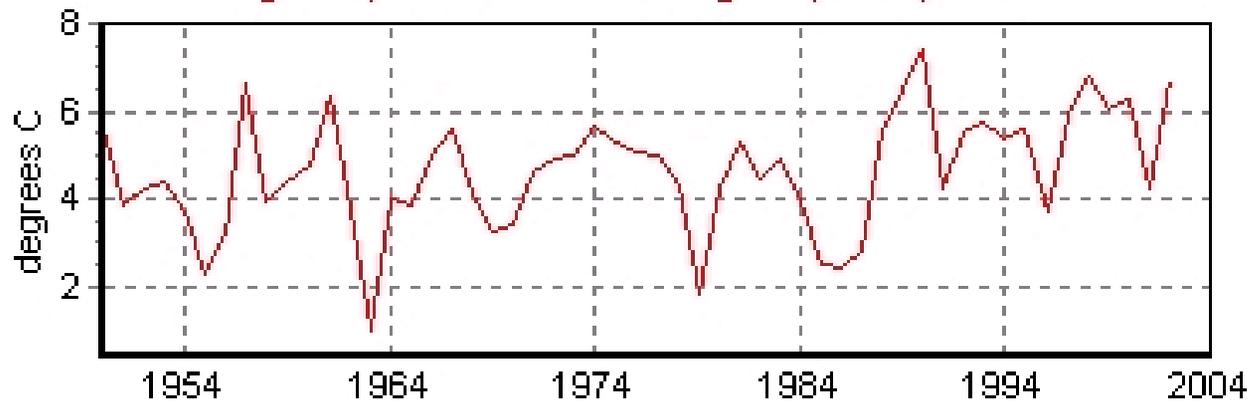


Visible impacts: Leaf unfolding Oak

Spring date on which oaks came into leaf

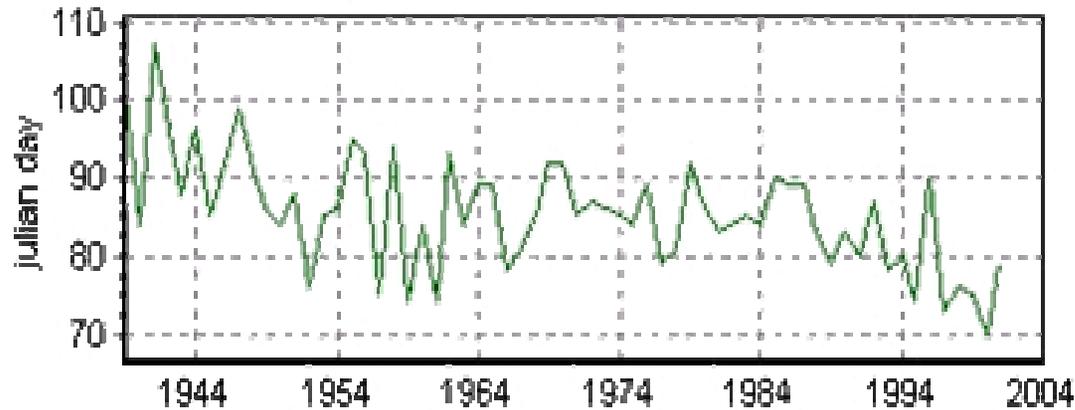


Average temperature in central England January-March

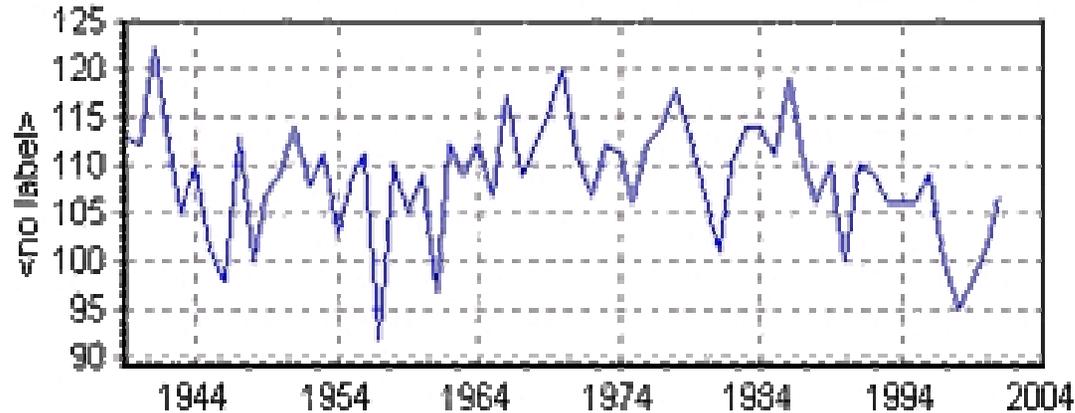


Visible impacts: Egg-laying date

Date on which at least 5% of robins have started egg-laying

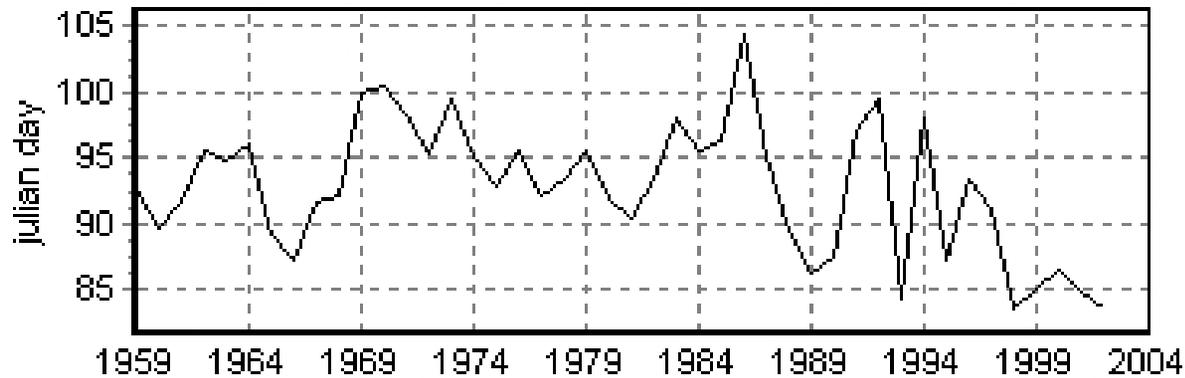


Date on which at least 5% of chaffinches have started egg-laying

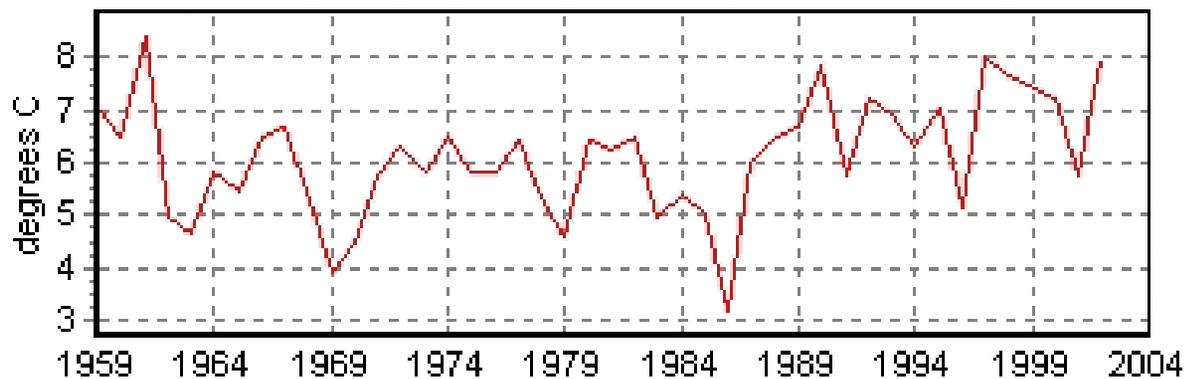


Visible impacts: Arrival date Swallow

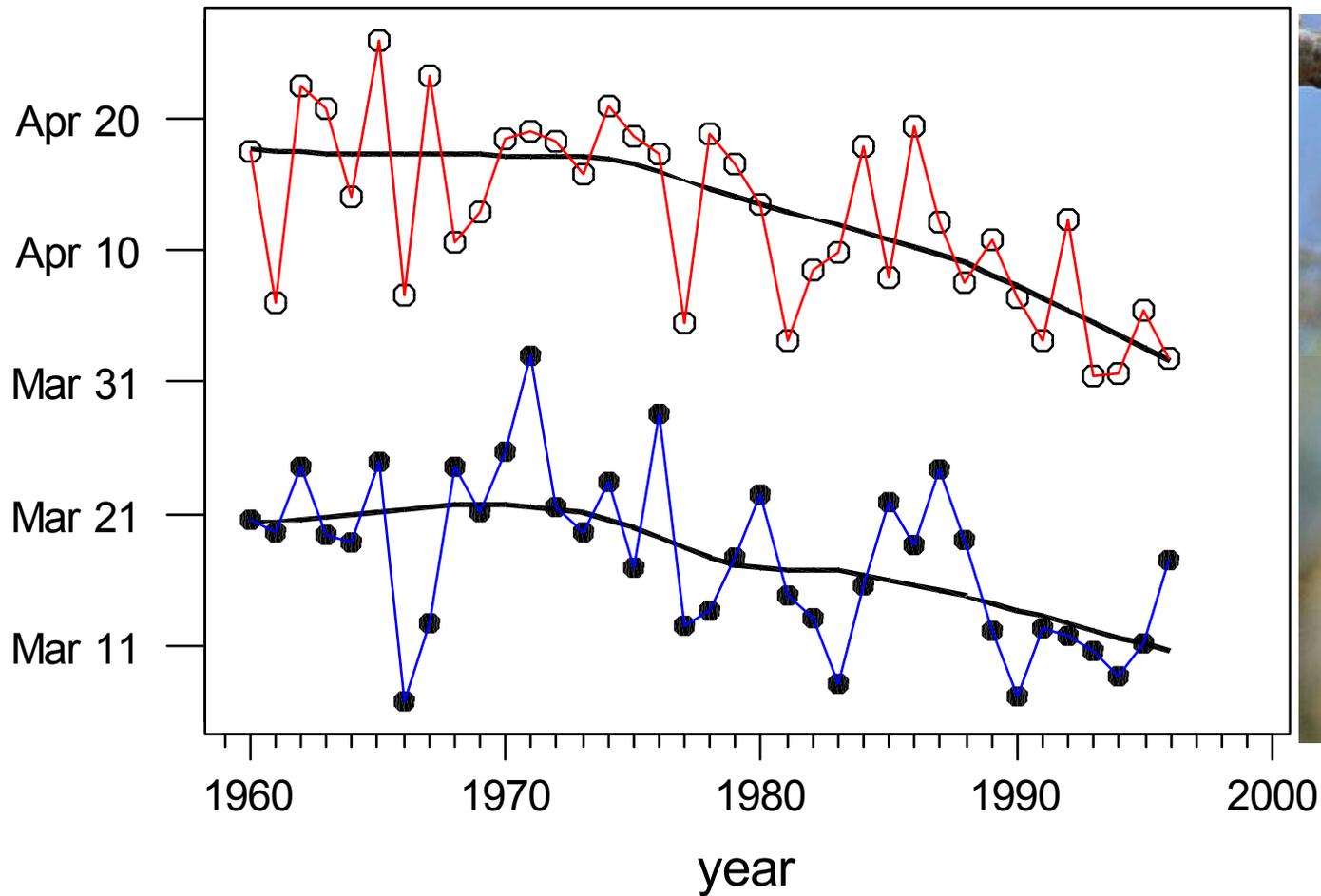
Date when the swallow was first seen at coastal observatories in Britain



mean temperatures in February-April in Central England

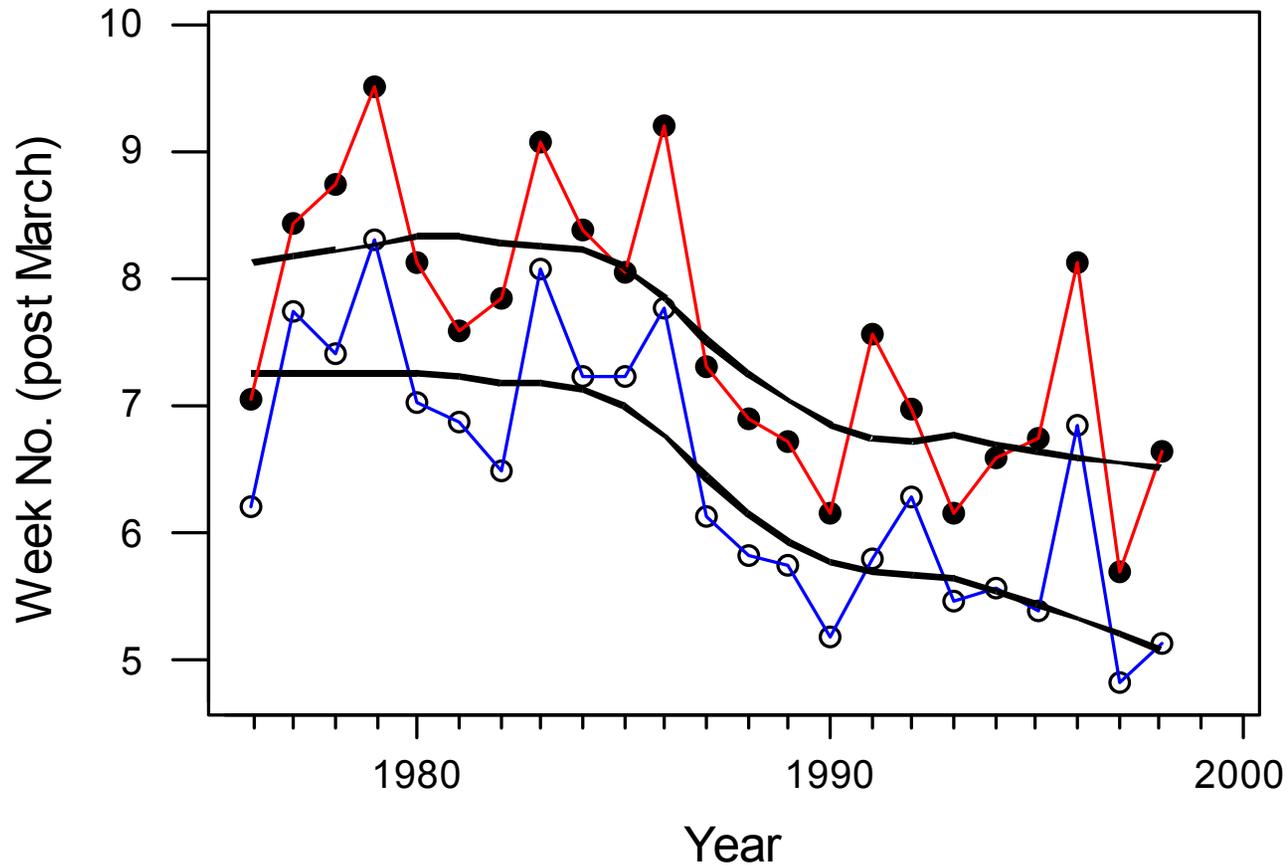


Visible impacts: Migration Chiffchaff and Blackcap



Visible impacts: Butterfly appearance

Appearance of Orange tip in Surrey, UK



Peak

First



Start of Nature's Calendar in 2001

Climate change in your backyard

 **VARA**



European Phenology Network



Nature's Calendar



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De Natuurkalender: partners



De Natuurkalender

Almost 4000 volunteers and school children

Indes vlies
Koperwiek

Wanneer voor het eerst gezien of gehoord (aankomst)

leeftijd

beschrijving

grootte

zangtype

habitat

Meer informatie: met speciale vermeldingskaart, gedrupte kaart en meldingskaartjes. Rekenen en afrekenen.

19 - 23 cm

Reep veldje die trek een langere trek, zingend en vlieg, vlieg in kleine veldjes die nachtkonink in veldjes.

In Noord-Europa's kan de koperwiek ook veldjes, maar ook van berkeboom.

Oris gras
Kraanvogel

leeftijd

beschrijving

grootte

zangtype

habitat

Wanneer voor het eerst gezien (aankomst)

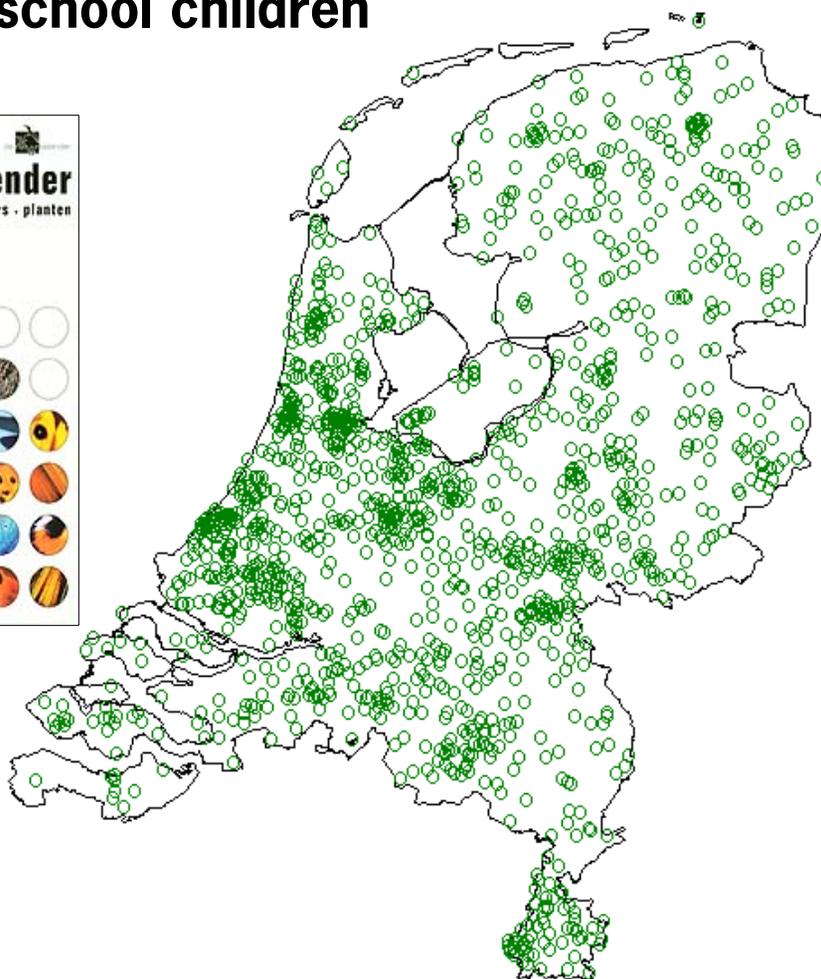
Groene Europese oevervogel. Overwegend gras met zwart lichte kops en rode been.

90 - 190 cm

Zijn karakteristiek, het kranenroep. Het is of naar een veldje horen.

Breedt in uitgestrekte bossen, maar ook in uitgestrekte gebieden.

de natuurkalender
vogels - vlinders - planten



Birds



Plants



Butterflies



Dragonflies



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De Natuurkalender: Website

<http://www.natuurkalender.nl/>

Welkom bij de Natuurkalender - Microsoft Internet Explorer

de NATUURKALENDER

Hoofdmenu

Selecteer een groep

Selecteer een kaartje

Selecteer een jaartal

argusvlinder
atalanta
bont zandooie
boomblauwje
bruin zandooie
utroevenvlinder
daapruoog
distelvlinder
gaelsprietdikkopje
gehakelde aurelia
groentje
groot dikkopje
groot koolwitje
haavlinder
hooibeestje
icarusblauwje
klein geandert witje
klein koolwitje
kleine vos
kleine vuurvinder
koevinkje
landkaartje
oranje zandooie
zwartsprietdikkopje

gehakelde aurelia, vlinder, 2003

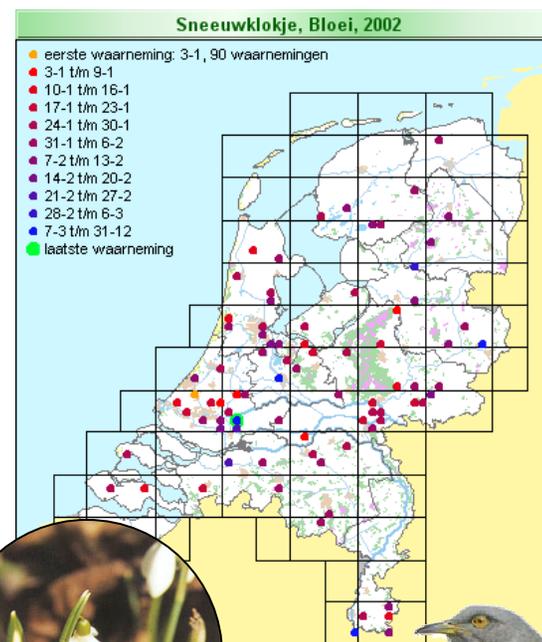
uitleg

Aantal waarnemingen

Gemiddelde vliegtijd (1960-2001)

de natuurkalender

DE VLINDERSTICHTING



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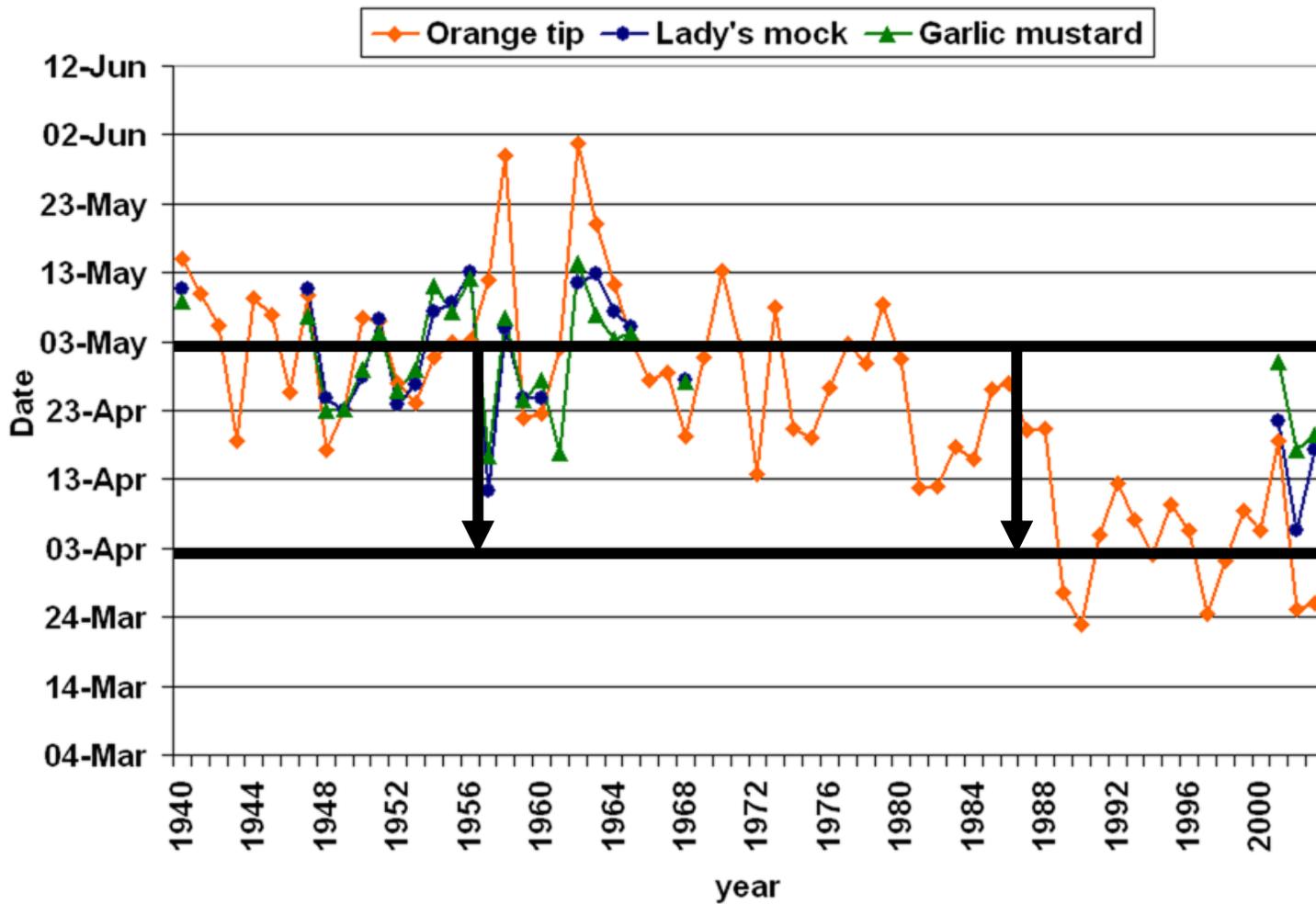


De Natuurkalender: Results

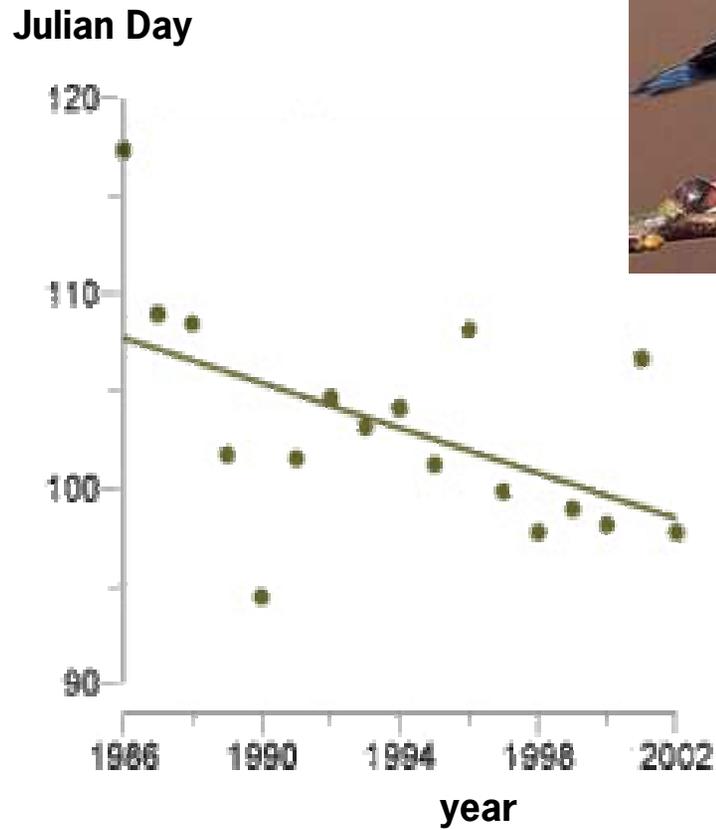
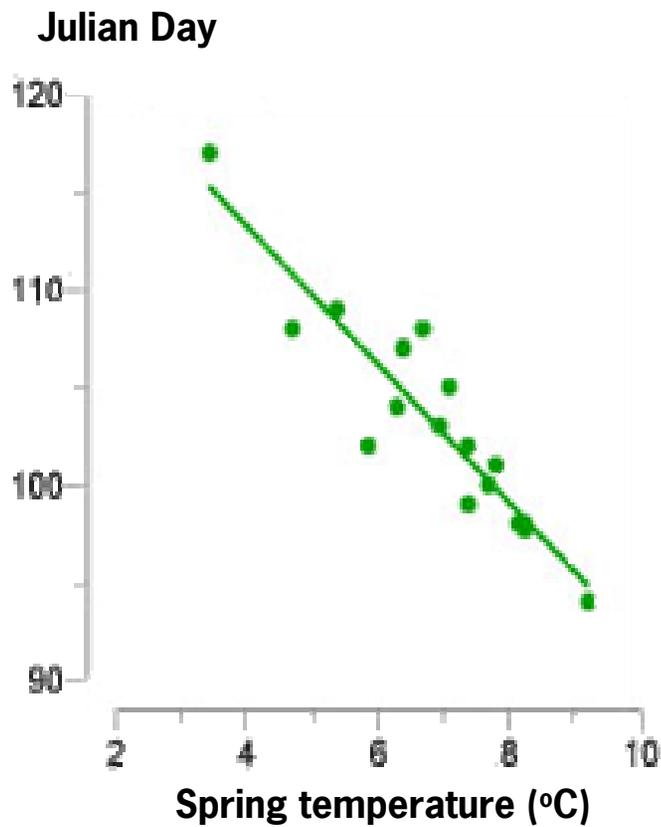
Soort	1940-1968	2001	2002	2003	2002-2001	2001-normaal	2002-normaal
Sneeuwkllokje	23-Feb	30-Jan	27-Jan	28-Jan	-3	-23	-26
Klein hoefblad	18-Mar	7-Mar	25-Feb	9 -Mar	-11	-10	-21
Maarts viooltje	03-Apr	22-Mar	1-Mar	19-Mar	-21	-11	-33
Speenkruid	30-Mar	7-Mar	1-Mar	6-Mar	-6	-22	-28
Bosanemoon	06-Apr	26-Mar	17-Mar	22-Mar	-9	-11	-19
Dotterbloem	14-Apr	4-Apr	24-Mar	2 ĀApr	-11	-10	-21
Hondsdrif	16-Apr	11-Apr	25-Mar	31-Mar	-16	-5	-21
Pinksterbloem	20-Apr	14-Apr	30-Mar	5-Apr	-15	-6	-21
Witte dovenetel	26-Apr	21-Apr	4-Apr	15-Apr	-17	-4	-22
Fluitenkruid	02-Mei	22-Apr	5-Apr	18-Apr	-17	-9	-27
Brem	11-Mei	26-Apr	8-Apr	19-Apr	-17	-15	-32
Akkerhoornbloem	29-Apr	30-Apr	14-Apr	21-Apr	-16	2	-15
Scherpe boterbloem	03-Mei	30-Apr	15-Apr	26-Apr	-15	-2	-18
Look-zonder-look	02-Mei	01-Mei	17-Apr	20-Apr	-13	-1	-14
Kruipende boterbloem	06-Mei	4-Mei	25-Apr	26-Apr	-9	-1	-11
Koekoeksbloem	14-Mei	10-Mei	2-Mei	6-Mei	-8	-3	-11
Gewone margriet	23-Mei	22-Mei	13-Mei	7-Mei	-9	-1	-10
Gele lis	25-Mei	22-Mei	17-Mei	17-Mei	-5	-3	-8
Gele plomp	28-Mei	25-Mei	23-Mei	21-Mei	-3	-2	-5
Waterlelie	31-Mei	04-Jun	31-Mei	27-Mei	-4	4	0



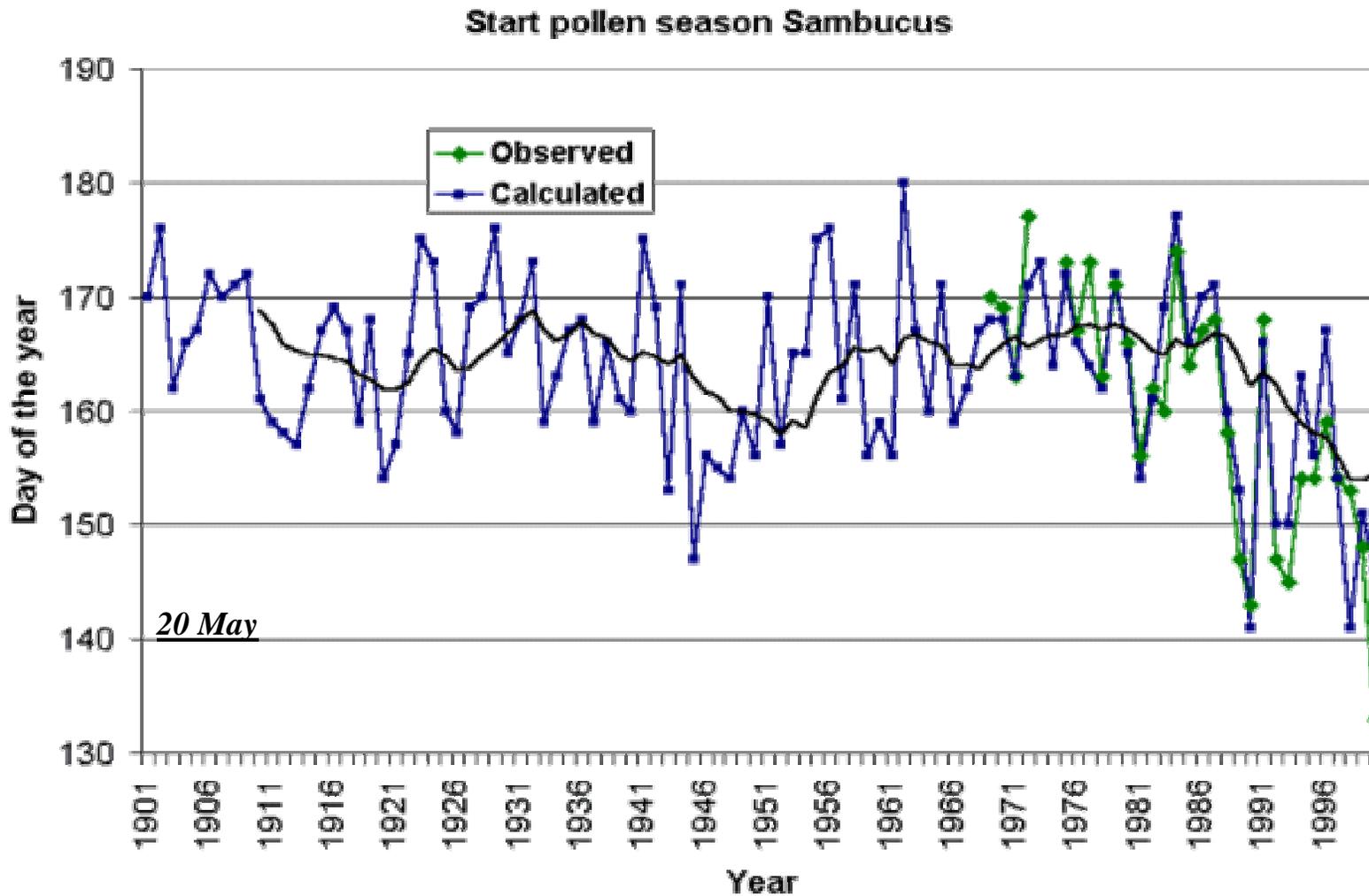
Visible impacts: timing of appearance and flowering



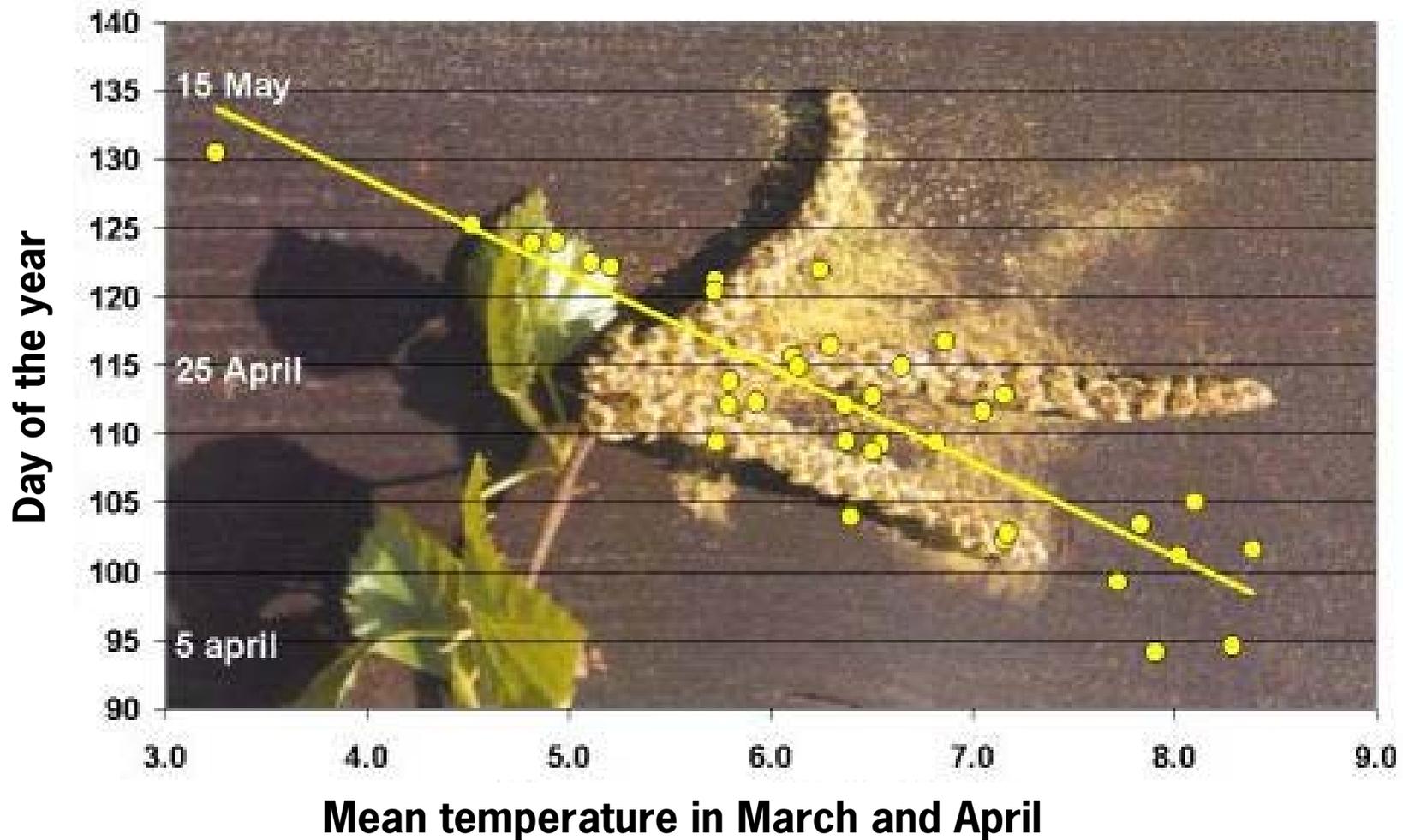
Visible impacts: egg-laying Blue tit



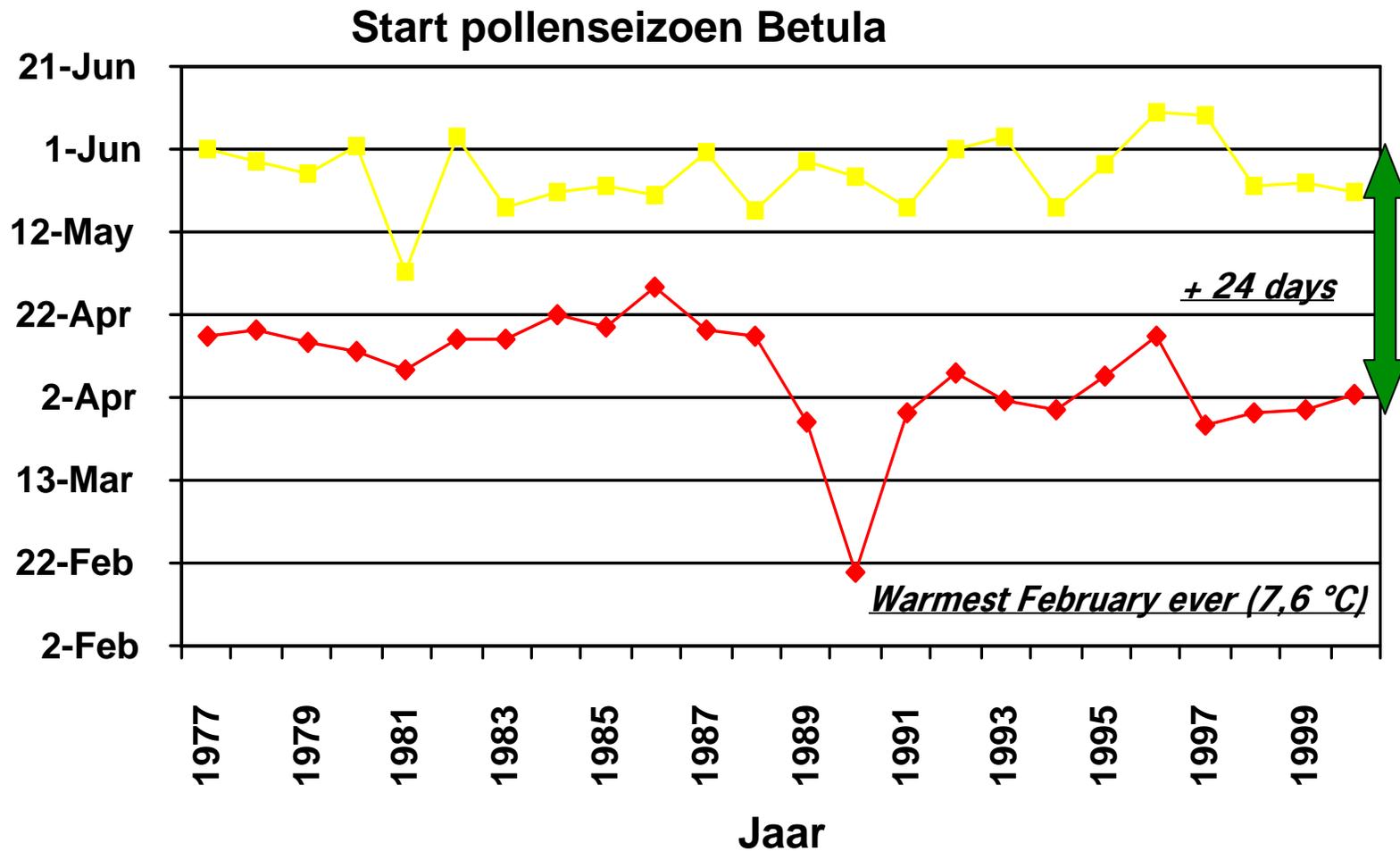
Phenology: Start of flowering of Elder



Phenology: start & end pollen season

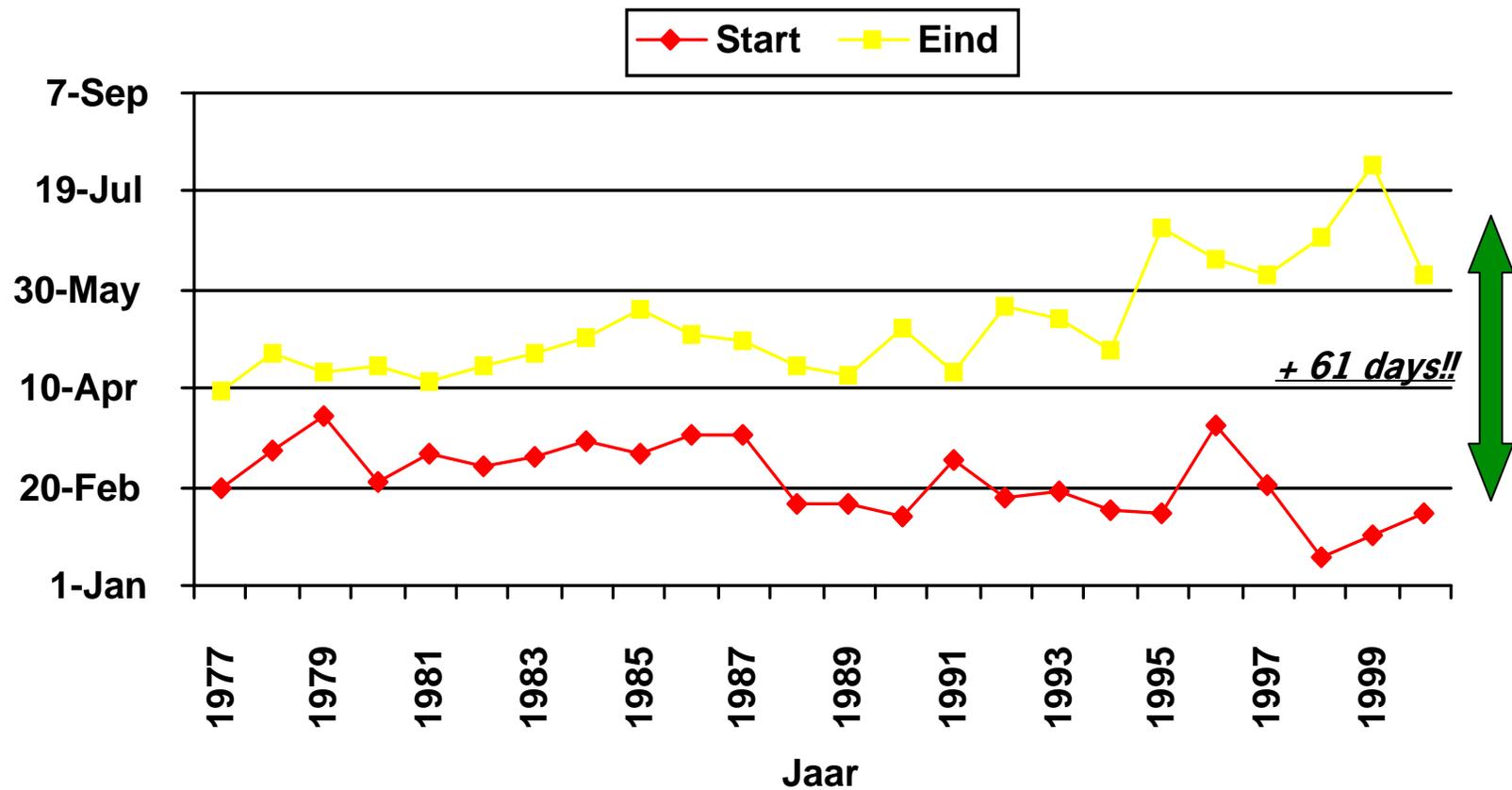


Phenology: start & end pollen season

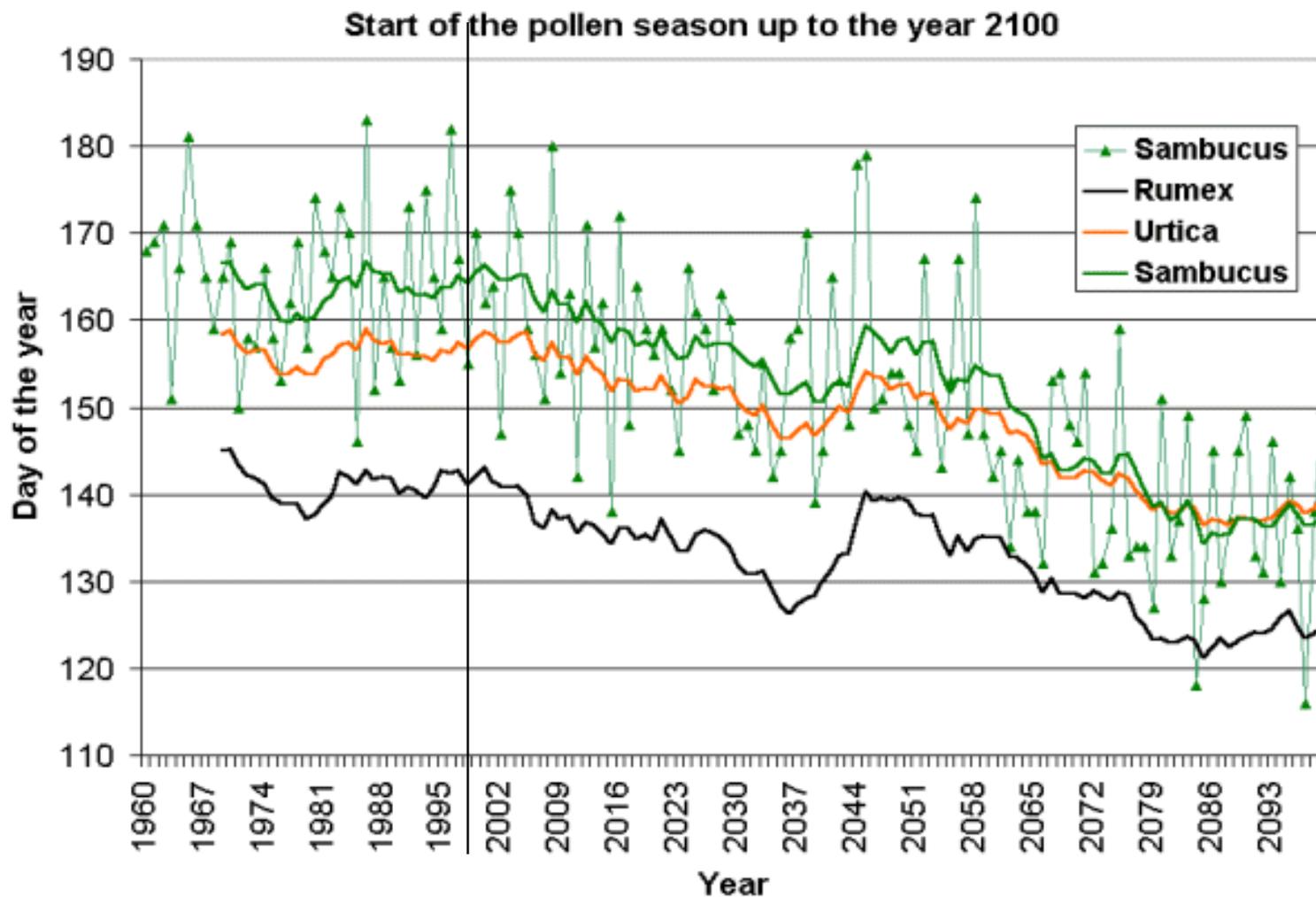


Phenology: start & end pollen season

Start en eind pollenseizoen Cupressaceae

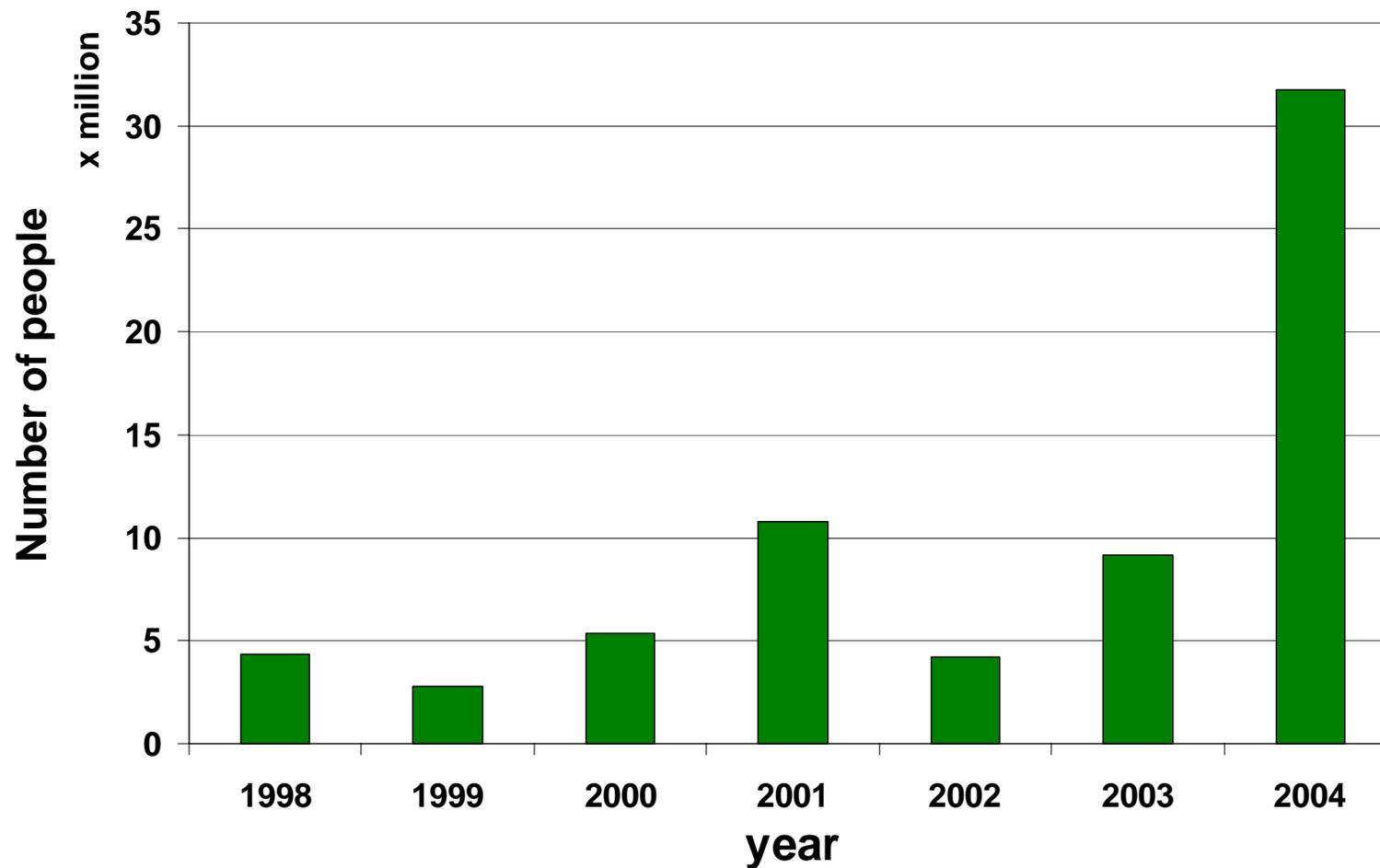


Potential future changes?



Results: media-attention

Number of people reached by newspaper articles





Socio-economic consequences

Ecology

- * Length of the growing season
 - Carbon sequestration
 - Ecosystem productivity
- * Species interactions
 - Pests and diseases
 - Pollination
 - Competition

Agriculture

- * Length of the growing season
- * Food quality
- * Frost damage
- * Pests and diseases
- * Biomass production

Health

- * Hay fever
- * Distribution of vector-borne diseases

Transport

- * Bird migration, collision with airplanes
- * Leaf fall (railways)
- * Toad migration (road blocks)





Conclusions

- ▶ **The observed changes in climate have had a direct and significant impact on plants, birds and butterflies.**
- ▶ **The climate extremes result in the large impact and impacts will become much larger with the expected increase in temperature.**
- ▶ **Nature's Calendar Networks have been able to involve the public in visualising the impact because:**
 - * **Changes are easy to observe**
 - * **Changes are visible in their own backyard.**
 - * **Changes affect their live (e.g. hay fever, agriculture).**
- ▶ **Phenological changes will result in many socio-economic impacts**



Thank you for your attention!

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