



MONITORING the ODONATA of CYPRUS

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Quick facts on Odonates

- Odonata (Greek: “toothed one”): one of the oldest orders of flying insects
- Two suborders : Anisoptera (“true dragonflies”) & Zygoptera (“damselflies”)



Anisoptera (“not-equal wings”)
Selysiothemis nigra: Black Pennant



Zygoptera (“paired wings”)
Ischnura elegans: Common Bluetail

Quick facts on Odonates



*Sympetrum
striolatum*
(Common Darter)



- Undergo an incomplete metamorphosis (hemimetabolous)
 - first part of their lives spent as aquatic larvae (extract oxygen via gills)
 - second stage as air-breathing adult flying insects
- After emergence go away from water to mature sexually (ca 1 week)
- Males then return to water to select and defend a territory
 - females come to the water when they are ready to mate
- Immediately after copulation, eggs deposited either into the water or into vegetation floating on or near the water

Quick facts on Odonates

- Reproduce in either standing water (lentic species) or flowing water (lotic species)



Trithemis festiva
(Indigo Dropwing)



Epallage fatime
(Odalisque)



Onychogomphus forcipatus
(Small Pincertail)



Calopteryx splendens
(Banded Demoiselle)

- Lotic species (above) more or less restricted to streams of the Troodos range



Trithemis annulata
(Violet Dropwing)



Orthetrum cancellatum
(Black-tailed Skimmer)



Orthetrum sabina
(Slender Skimmer)



Crocothemis erythraea
(Broad Scarlet)

- Lentic species found on reservoirs, freshwater lakes and pools along the side of streams

Odonates as Important Freshwater Bio-indicators

- Freshwater is the most threatened habitat on the planet
 - dragonflies potentially one of the best invertebrate freshwater bio-indicators because
- ✓ one of best known orders & receive most public attention after butterflies (“birders’ insect”)
- ✓ adults are conspicuous over water and relatively easy to identify at the species level
- ✓ sensitive to conditions at the breeding site and surrounding terrestrial area
 - react quickly to changes in environmental quality via active dispersal
- ✓ powerful indicators of the effects of climatic changes on different levels
 - (single waters, landscape or national / European level)
- ✓ can rapidly recolonise habitats if favourable conditions restored

.

For more information see: Kulijer D., Odonata as indicator species of freshwater ecosystem health. mio-ecsde.org/wp-content/uploads/2016/05/Kulijer_Odonata.pdf

History of Odonatology in Cyprus

- Lopau & Adena (2002) - first overview
 - all published data (literature), museum collections, pers. data from 1994, and data from 5 visitors
 - 933 records / 33 species
 - 31 observed and *C. virgo* and *I. pumilio* from literature
 - most observations from visitors in June to the south
- Very little attention in period 2002 - 2012
 - 2004: *Erythromma viridulum* (Flint, unpublished data)
 - 2007: *Brachythemis impartita* (Cottle)
 - 2007: *Trithemis arteriosa* (overlooked in the past?)
- Boudot et al. (2009) – Mediterranean Atlas: 36 spp.



Cyprus Dragonfly Study Group (CDSG)

- 2012 – established Cyprus Dragonfly Study Group
 - undertook systematic dragonfly recording
 - ten active members do regular monthly or twice monthly monitoring at over 50 selected sites all over the island
 - sites selected for geographical spread, all habitat types and main species
- First priorities:
 - set up a database
 - establish the phenology (flight season) of dragonflies



Monitoring fauna

- **Types of monitoring schemes**

- several schemes with different intensities of monitoring

- ✓ **Abundance monitoring**

- most intense following strict rules
- defined transects, defined monitoring times (e.g. monthly, twice monthly etc), conducted only under suitable weather conditions, walk speed etc
- precise rules vary with different animal groups

- ✓ **Distribution monitoring**

- more opportunistic monitoring, conducted fewer times per year, but recording area of monitoring and number of individuals

- ✓ **Opportunistic monitoring**

- presence / absence monitoring, just recording species seen in a particular locality without a count of the individuals

Discovery of a new species on Cyprus



- April 2013 : an unidentified *Ischnura* female in the aurantiaca phase
- at first believed to be *I. pumilio* (only one dubious record from 1894)
 - considered to be extinct on Cyprus by Lopau & Adena (2002)

Discovery of a new species on Cyprus



Two weeks later found a male

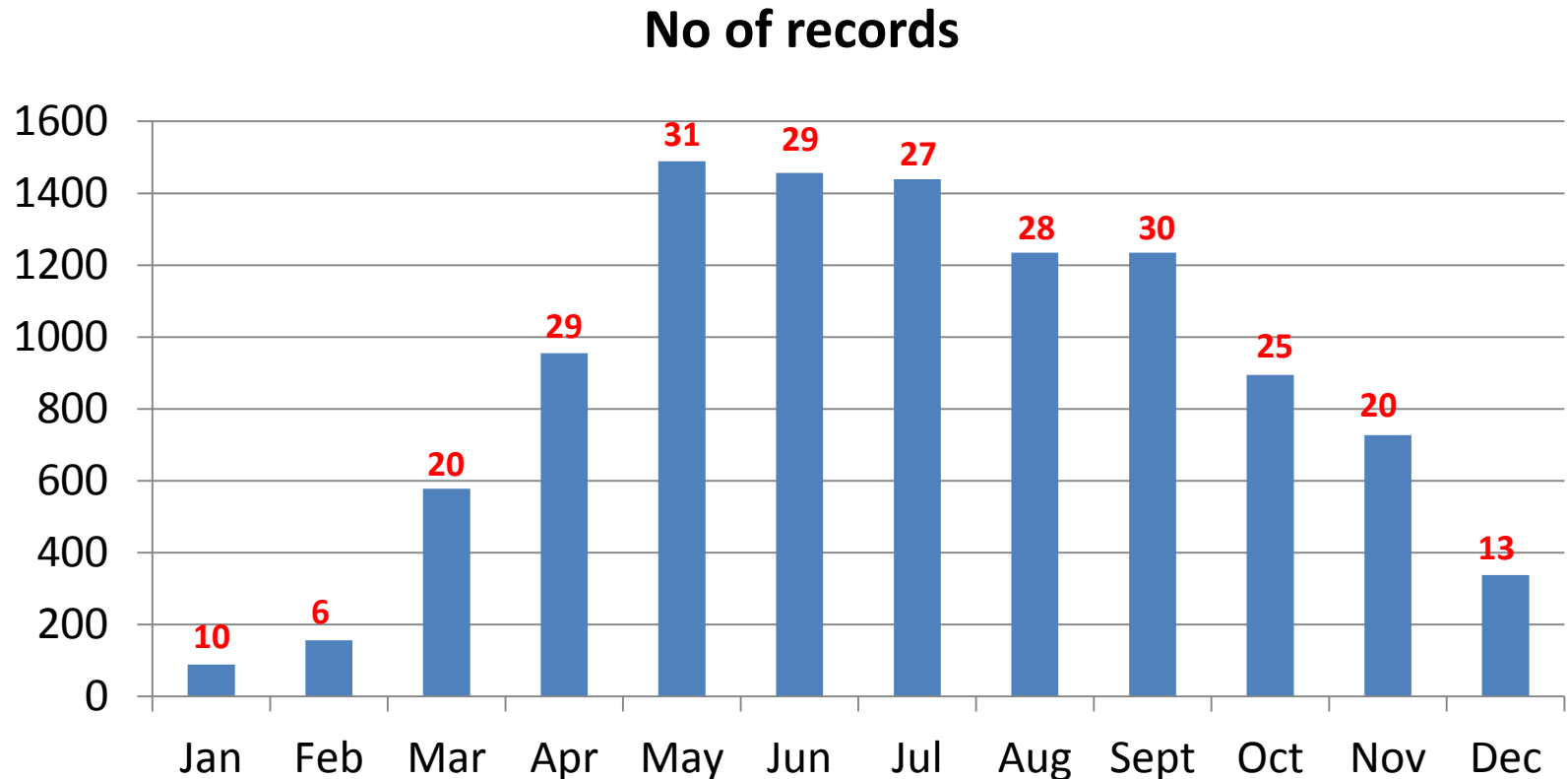
- identified as *Ischnura intermedia* – new to Cyprus & Europe

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- April 2013 : discovered a new species for Cyprus
 - *Ischnura intermedia* Dumont, 1974
- Brings the checklist to 37 species
 - as reported in the European Atlas, 2015



Records: 2003 - 2015



State of Dragonfly records for Cyprus in 2003-2015

No of **records** and **species** recorded monthly

- ca 17,000 records
- 32 species- 23 anisopterans : 9 zygopterans
- 5 on checklist not observed

Missing species

- ***Calopteryx virgo***

- one record 1932
- misidentification
- doubtful if suitable habitats exist



C. virgo

- ***Ischnura pumilio***

- 1894 doubtful record
- 1948 museum collection
- extinct



C. splendens

- ***Brachythemis impartita***

- only one set of records - August 2006
- accidental visitor??

- ***Lestes barbarus***

- last published sighting 1948
- CDSG unable to find the species

- ***Aeshna affinis***

- Last records 1994
- CDSG unable to find it

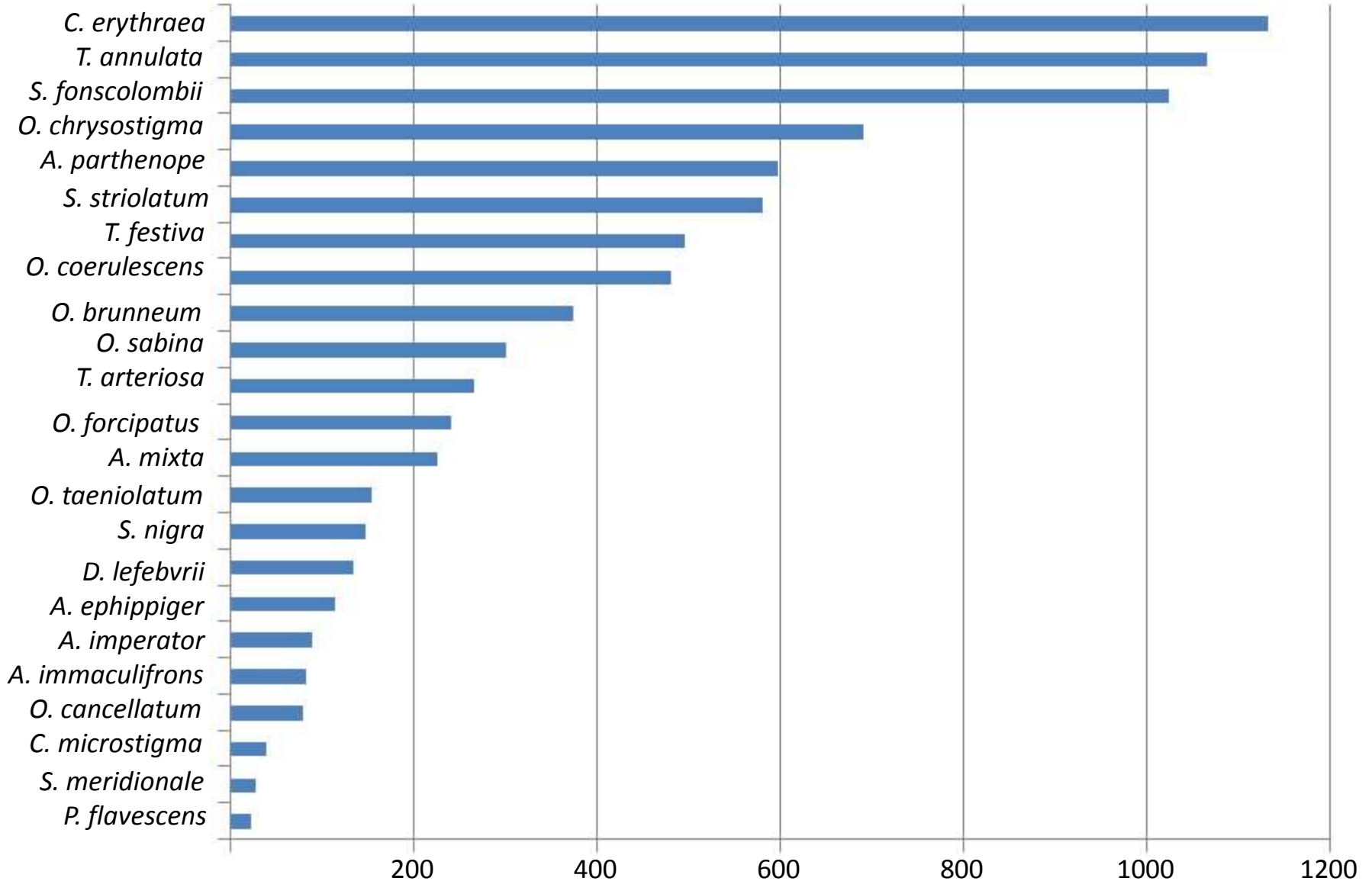


B. impartita: Achna Dam Aug 2006 (C. Makris)

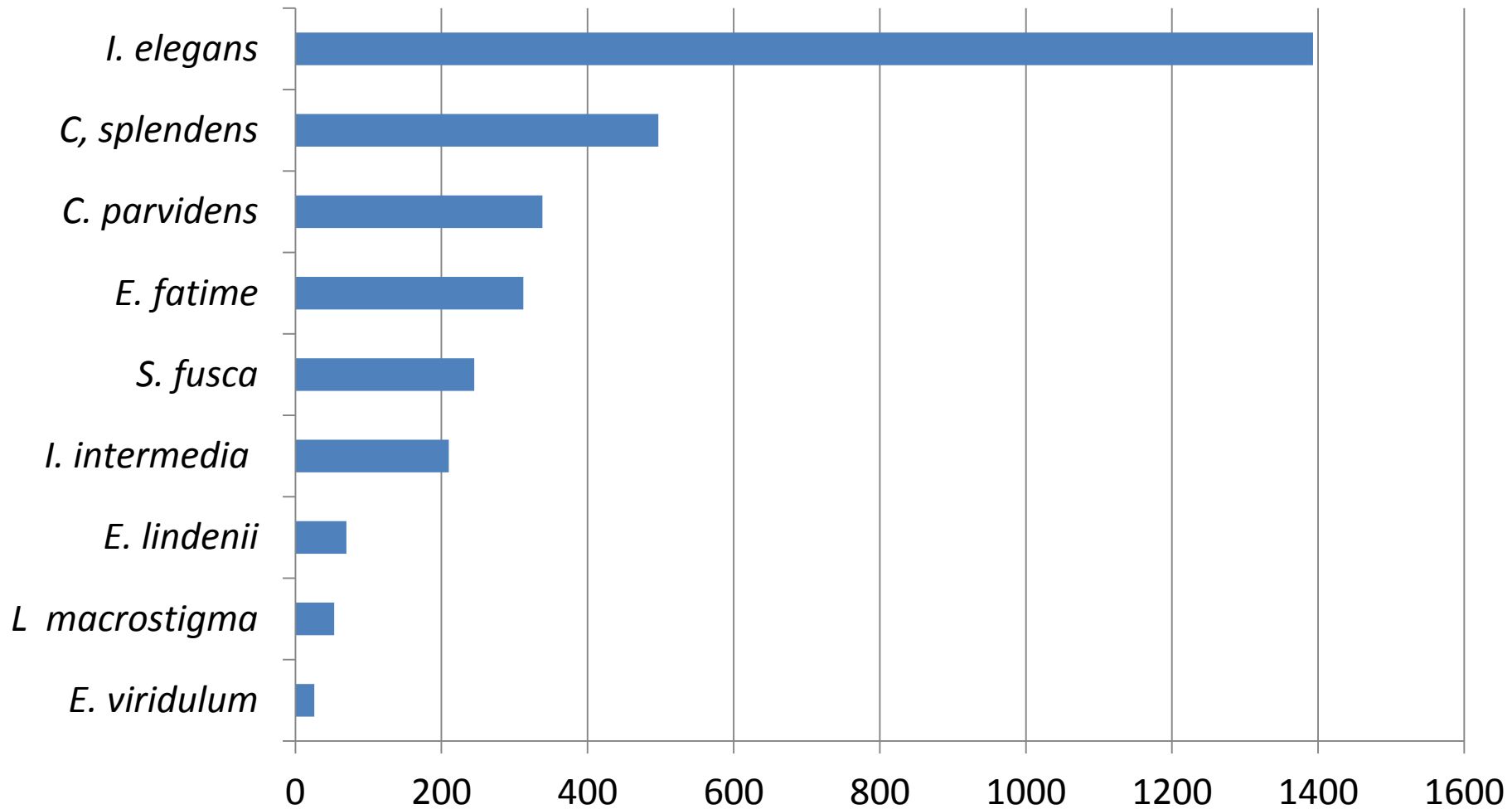
Flight period in Cyprus

- No significant data previously available and only limited information from neighbouring countries
- Quotation from the European Atlas, page 13:
‘ The information of the flight period in the Meghreb, Turkey and Greece is largely based on records made by people holidaying in these countries. Due to this records from the summer period are over-represented. Fieldwork at other times of year will probably show the flight period of many Mediterranean species to be longer than currently known’
- Developed robust phenology data for 28 of the 32 species observed on Cyprus
 - flight season for most is indeed longer than previously known

Anisoptera: Number of records



Zygoptera: Number of records



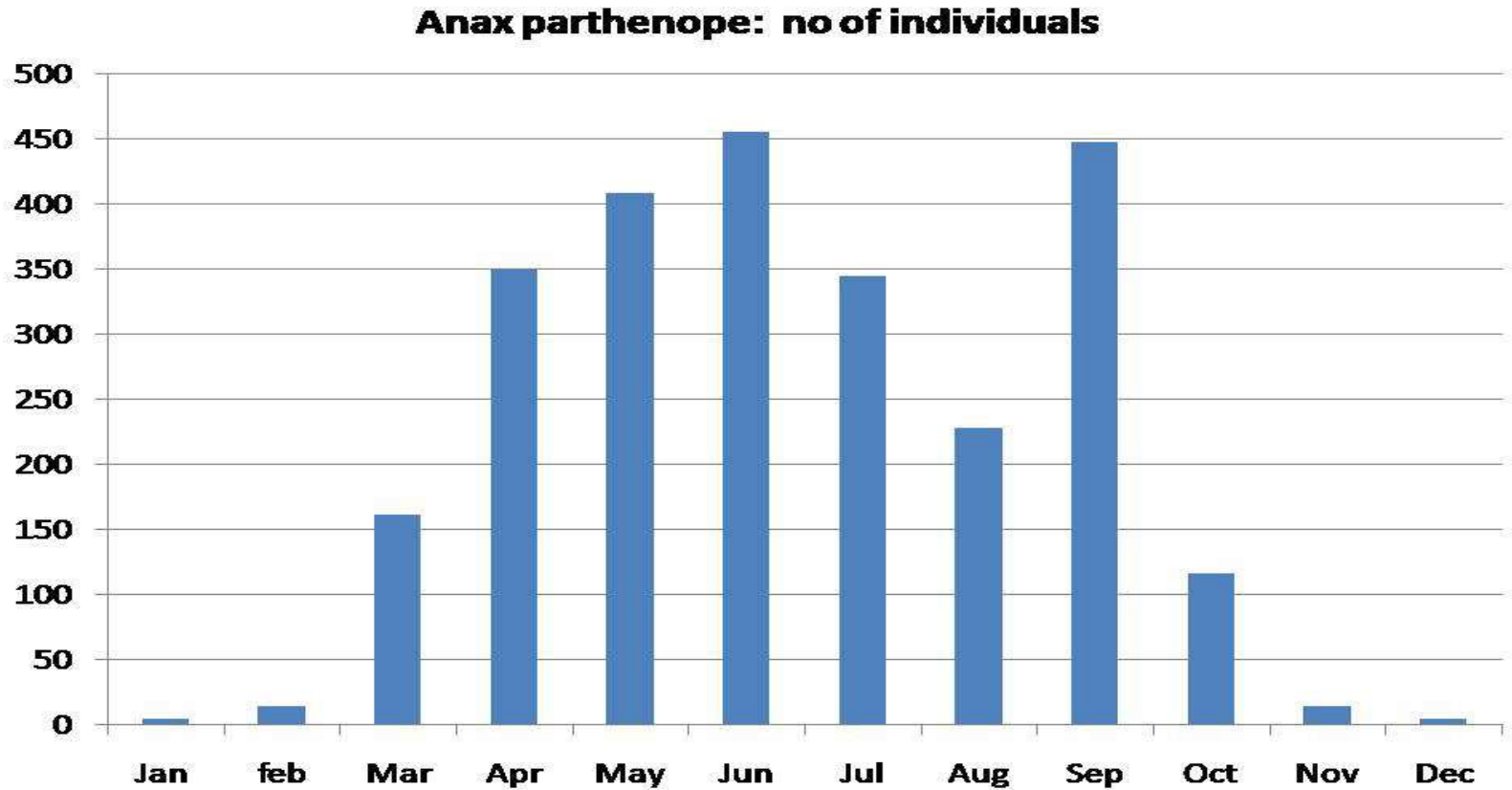
Flight season examples



⁰	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
France, south												
Bulgaria & Greece												
Cyprus												

Anax parthenope: 593 records, 9th March (2015) – 19th December (2013)

Flight season examples



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France, south												
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***Anax parthenope*: 2710 individuals, 9th March (2015) – 19th December (2013)**

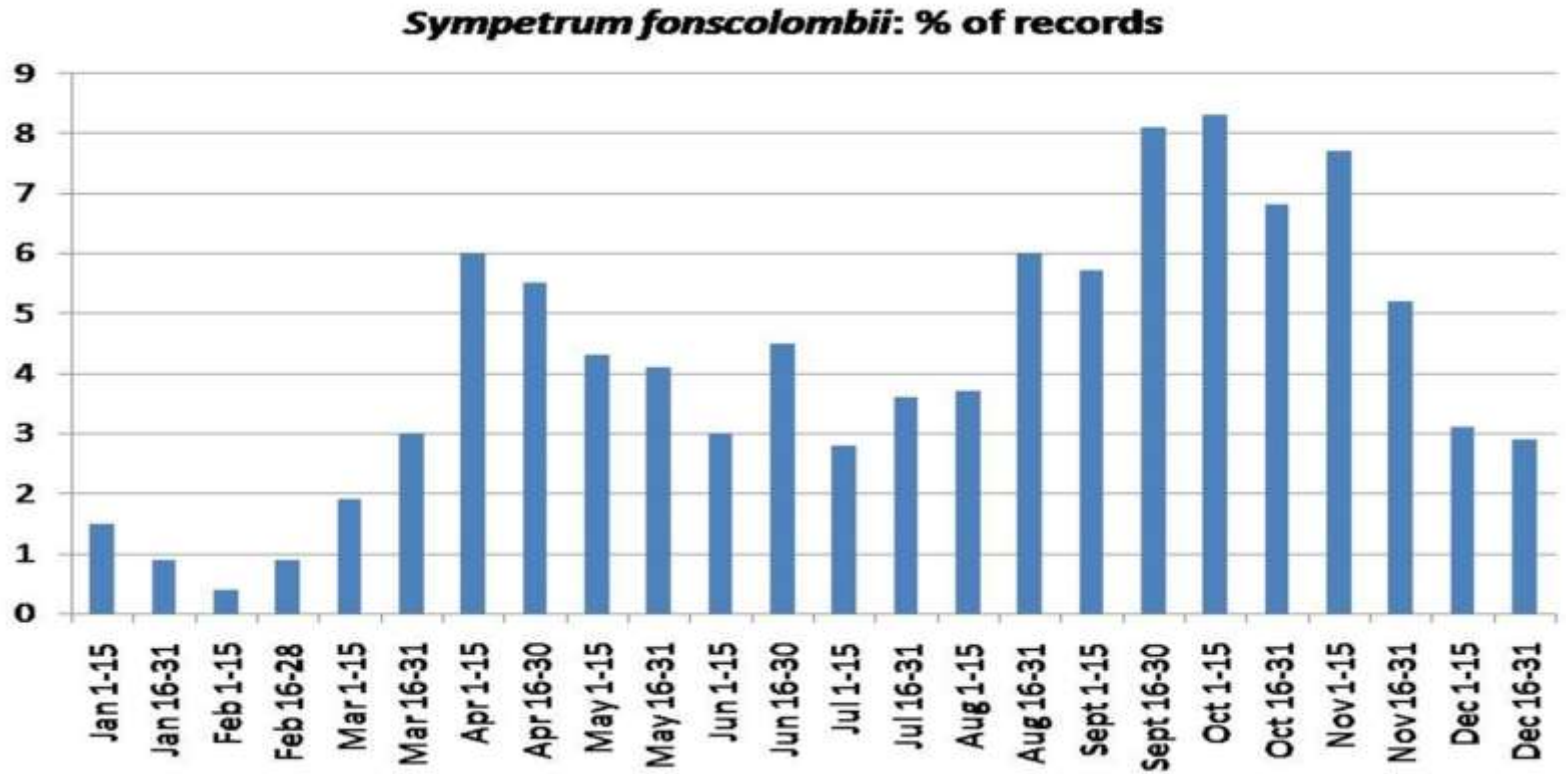
Flight season examples



	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
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Sympetrum fonscolombii: 927 records, recorded in every month

Flight season examples



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***Sympetrum fonscolombii*: 927 records, recorded in every month**

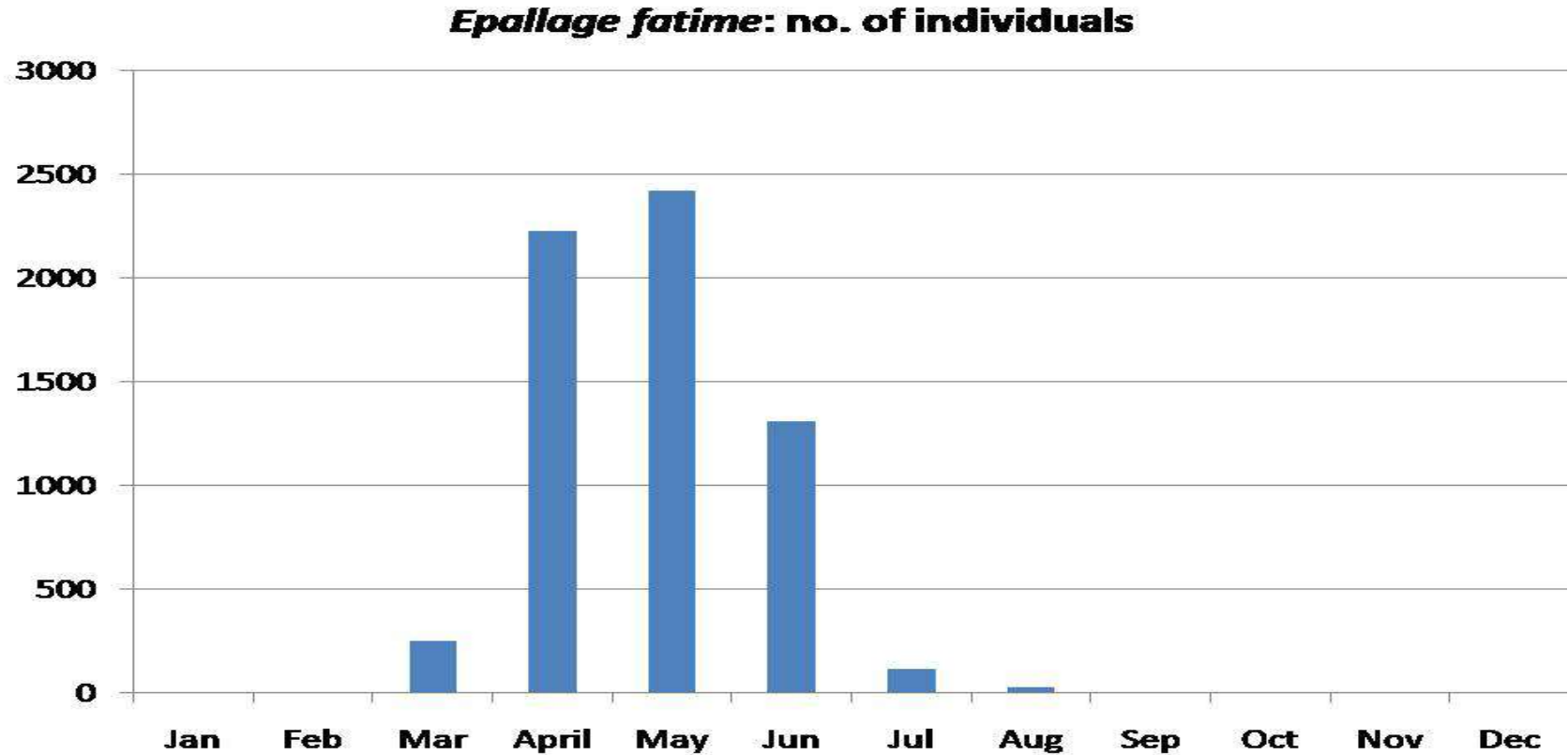
Flight season examples



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Turkey																																				
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Epallage fatime: 448 records, 7th March (2014) – 20th August (2013)

Flight season examples



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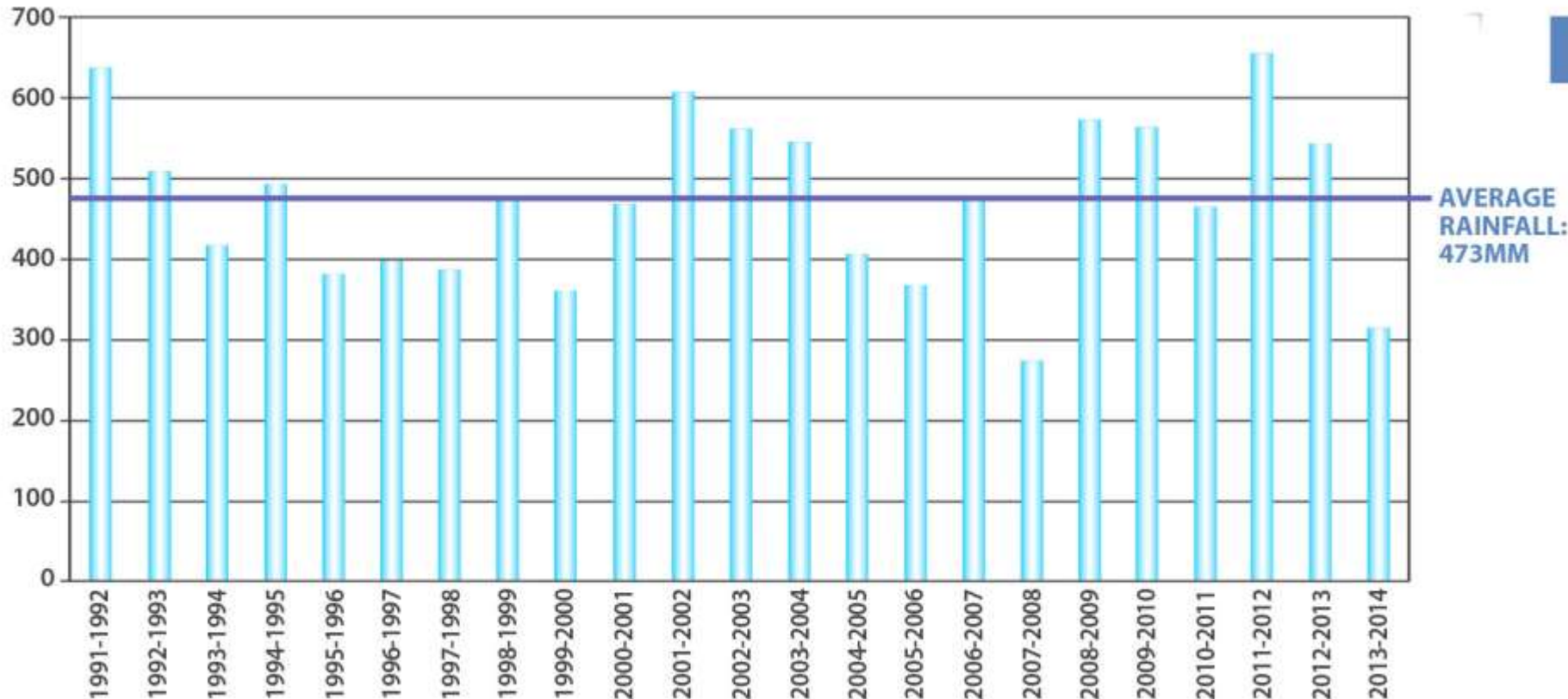
***Epallage fatime*: 448 records, 7th March (2014) – 20th August (2013)**

Status



- 5 years of solid data
 - phenology of most species resolved
 - habitat preferences understood
- Considerable changes observed in many of the sites monitored
 - impacted by large variation in annual rainfall
 - low rainfall: sites dry up or become choked with reeds
 - tanks: provided good habitats but impacted by water management policies
 - water management below the dams an issue

Climate change in Cyprus



- Temperatures getting hotter: 0.01 deg per year / rainfall decreasing by 1 mm per year
- Significant variation in annual rainfall
- Likely to be challenging for dragonflies – lower oxygen levels in water, less water bodies

Invasive species



Goldfish in an agricultural tank near Farmakas

- For dragonflies, main problem: introduction of fish esp. goldfish into tanks and reservoirs

Way forward

Experienced recorders

‘Priority Sites’

Counts, breeding evidence

Systematic visits
to important sites

Good adult ID skills

‘Site lists’

Complete species lists

A few visits to
adopted sites

New recorders,
with limited skills
& experience

‘Dragonfly Spot’

Basic records

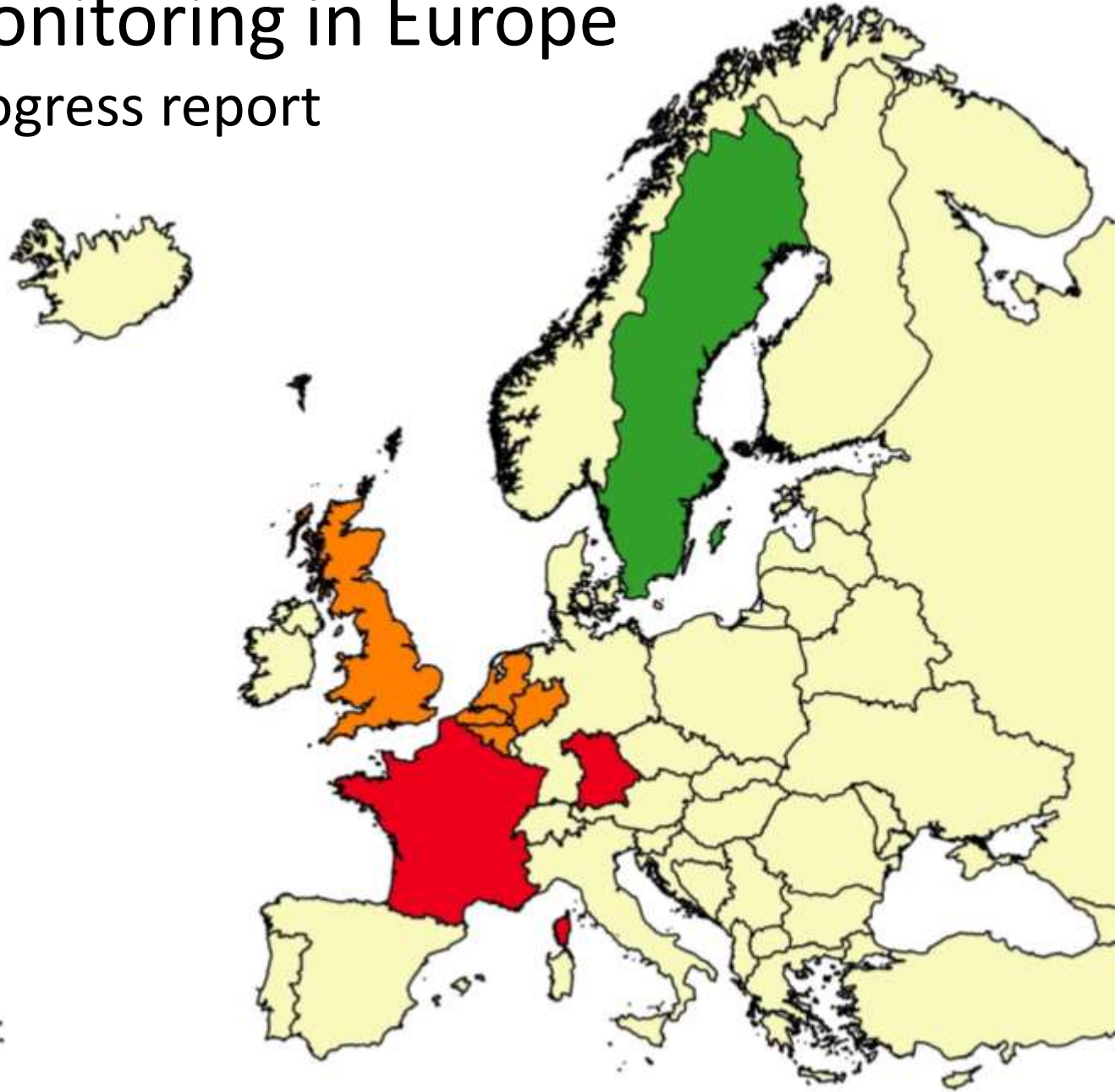
Ad hoc sightings
including photographs,
BTO/BC surveys

Dragonfly monitoring in Europe

a progress report

Tim Termaat
Geert De Knijf
Arco van Strien

Tyringe, July 14th 2016



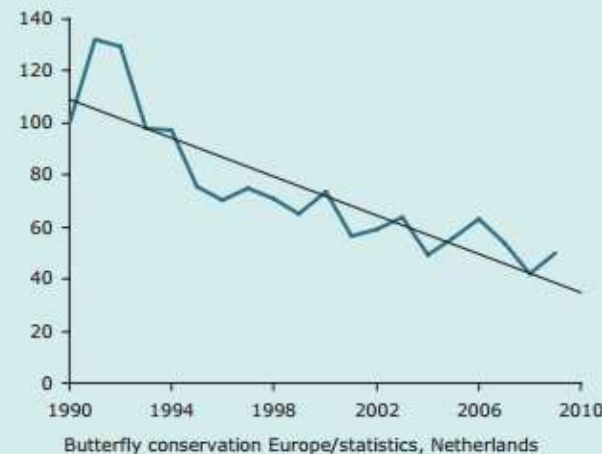
Why?

- Dragonfly trends differ per country: how are they doing on a larger scale?
- Valuable addition to existing EU Biodiversity Indicators
 - Common birds
 - Grassland butterflies
 - Hibernating bats



Grassland butterfly
indicator

SEBI indicator 01: Grassland butterflies (¹³)



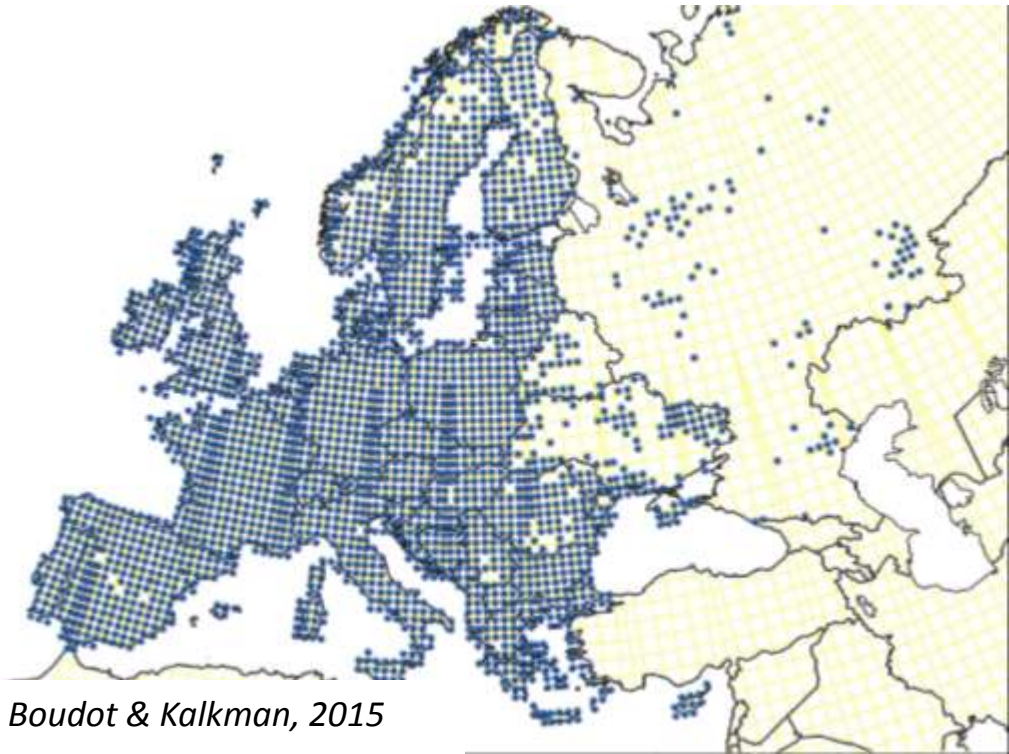
Geographical coverage



The indicator shows that since 1990, butterfly populations have declined by more than half, indicating a dramatic loss of grassland biodiversity.

How?

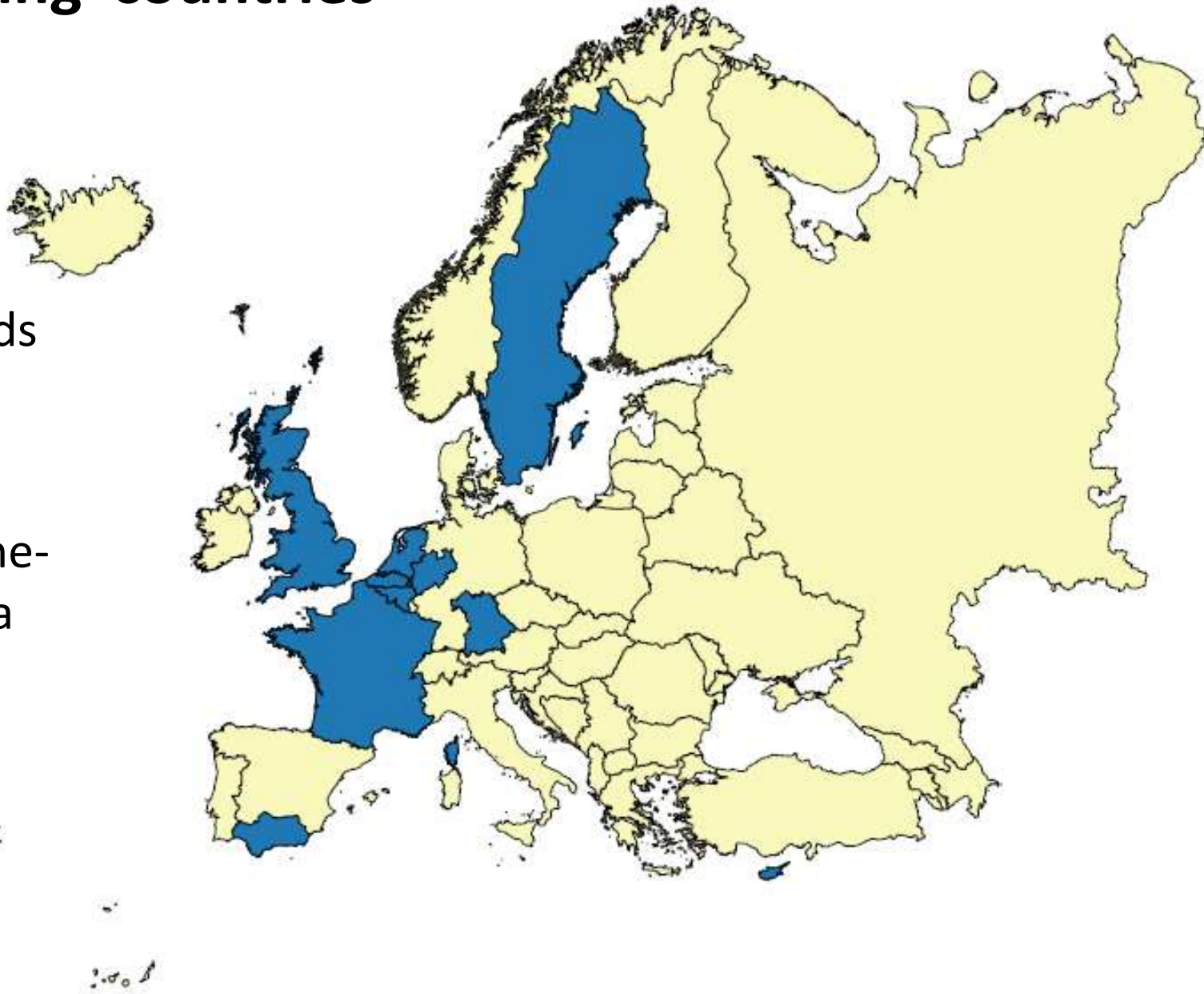
- Too few countries with standardised schemes to monitor species **abundance**
- But a lot of 'opportunistic' records available to monitor species **distribution**
- Records can be 'standardised' in retrospect with **occupancy models**



Boudot & Kalkman, 2015

Participating 'countries'

- Sweden
- Britain
- Netherlands
- Flanders
- Wallonia
- North Rhine-Westphalia
- Bavaria
- France
- Andalusia
- Cyprus



European Goals

- It is possible!
- Large datasets needed (sampling period Andalusia & Cyprus too short at present)
- Datasets in most countries grow rapidly!
- With some funding more countries will be able to participate

-> Advocate the potential & importance of dragonflies as a new EU biodiversity indicator



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