

# Monitoring Amphibians and Reptiles in Europe



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# EUMon...

**EU-wide monitoring methods and systems of surveillance for species and habitats of Community interest**

A Policy Support Project



# Aims of EuMon

Detecting deficiencies in achieving the 2010 target

Streamlining methods in a comparable, consistent, and cost-efficient way across Europe

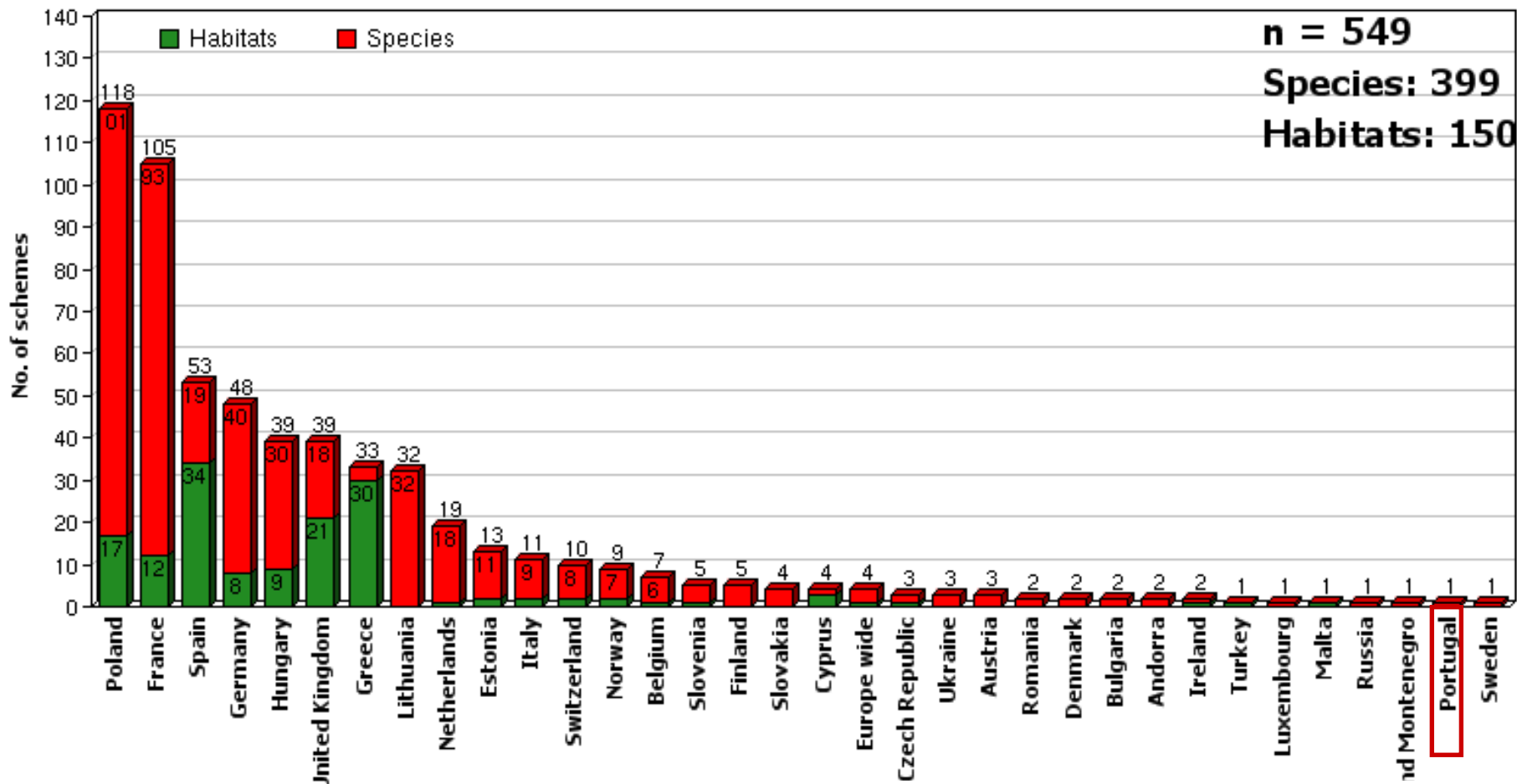
Providing tools to assess the status of and trends in Biodiversity

## Posters

- Roles of **volunteers** in biodiversity monitoring
- **Improvement & optimization** of monitoring methods
- National **responsibilities** and conservation **priorities**



# Database



⇒ Many schemes are still missing (Natl. Platforms?)

⇒ **your contribution is welcome** to increase the usefulness of DaEuMon for monitoring integration !



# Database

## **Database of existing monitoring schemes (DaEuMon)**

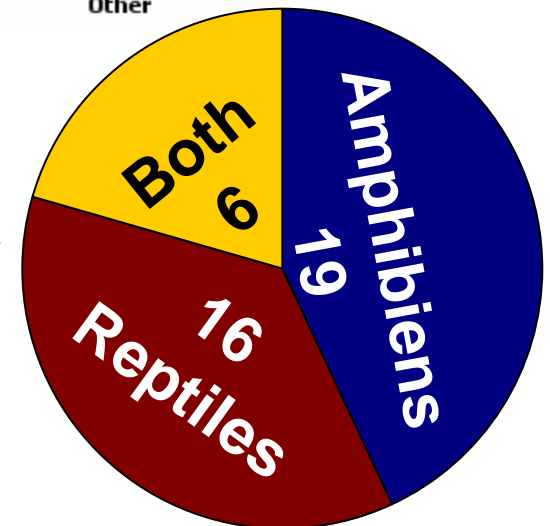
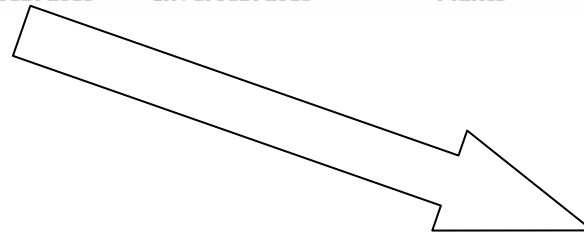
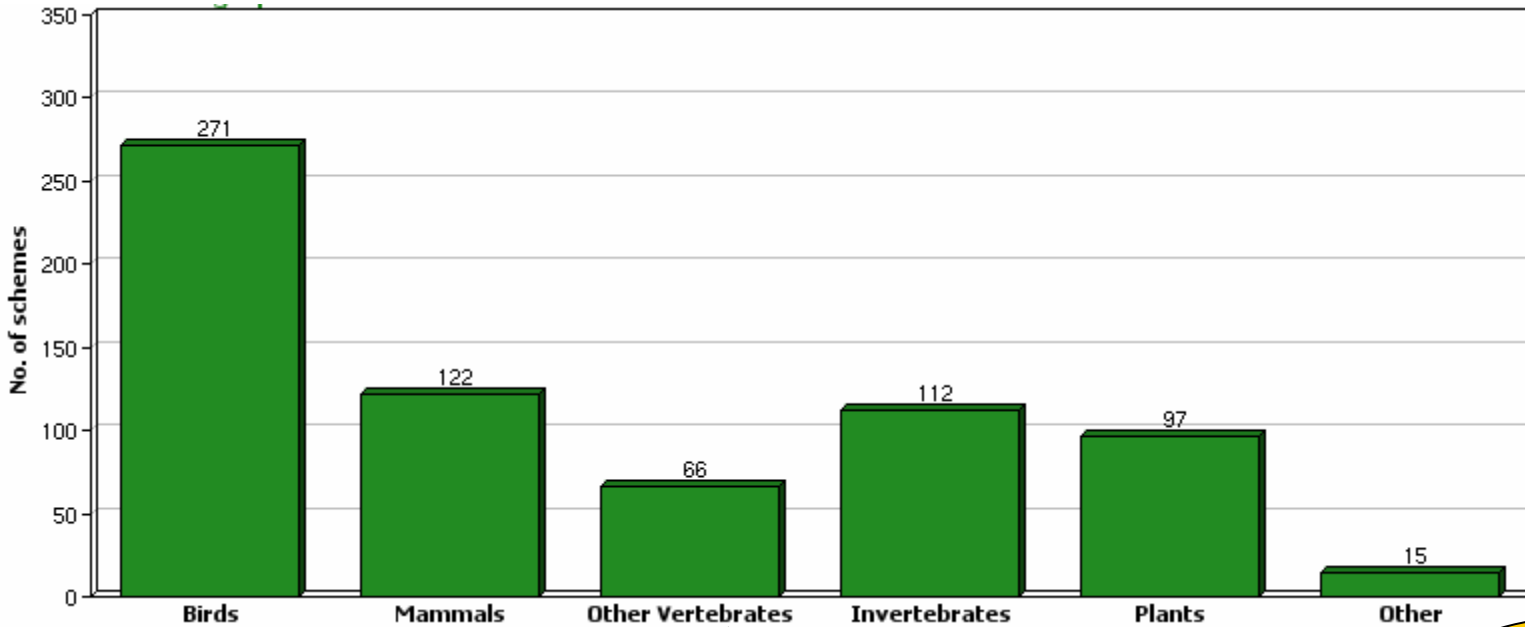
- Search Interface is available to identify schemes monitoring specific taxa (explicit entry)
- database as tool for integration of monitoring schemes

## **Information available in the database per scheme, e.g.:**

- pressures
- species and countries covered
- coordinator contacts
- methods



# Biodiversity Monitoring





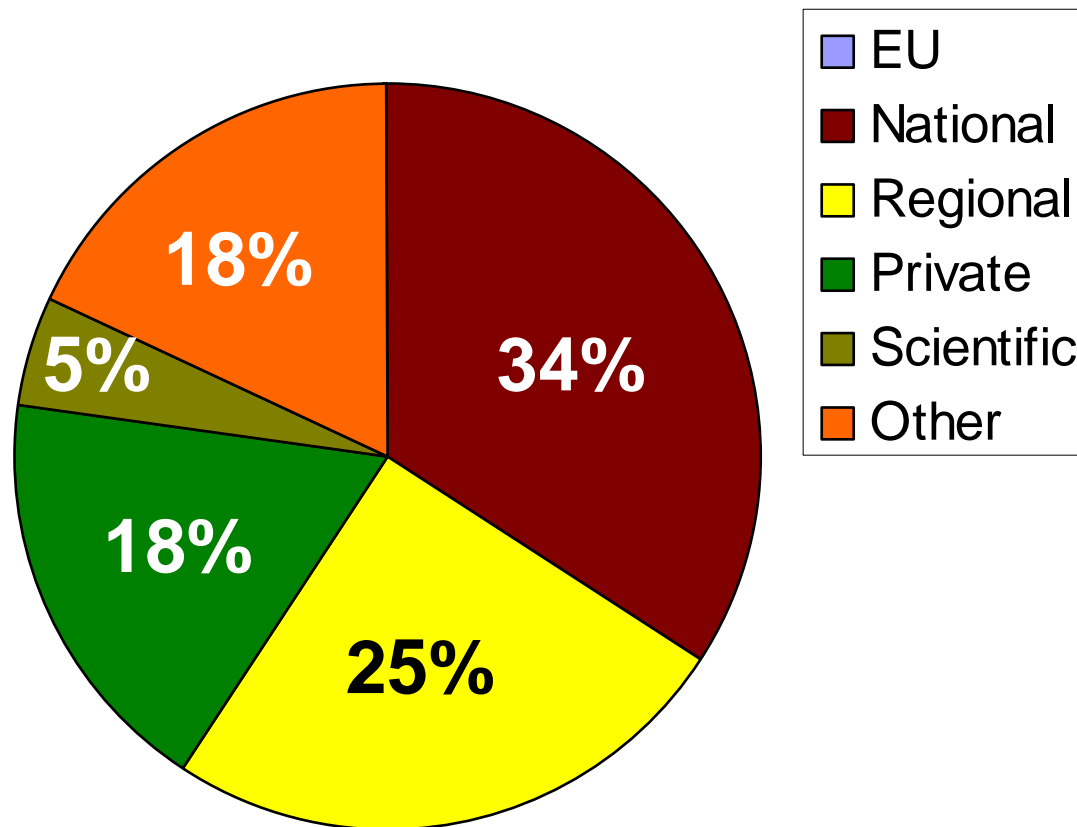
# Monitoring Herpetofauna

- Species per scheme
  - 37% in single species schemes
  - 14% monitor up to 5 species
  - 18% between 6 and 10 species
  - 37% are embedded in a multispecies scheme with more than 10 species monitored



# Monitoring Herpetofauna

- Funding source



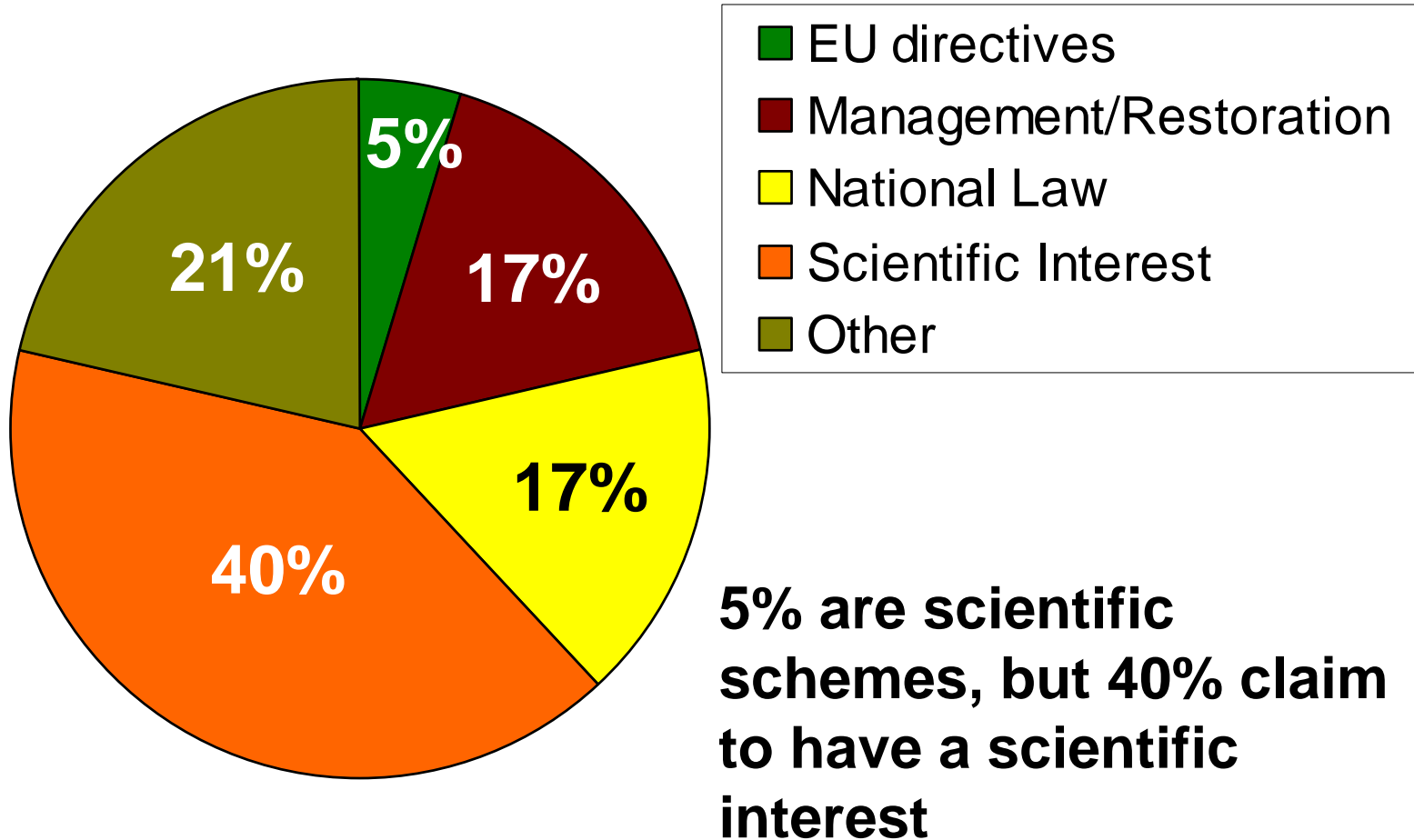
**NO EU-Funding!**





# Monitoring Herpetofauna

- Reason for launching





## ***Important criteria when designing a monitoring scheme***

### **Representativity of data**

- sampling design (stratification, method for choosing sites to be monitored)
- choice of species to be monitored
- accounting for the probability of detecting the species (nb. of visits/year)

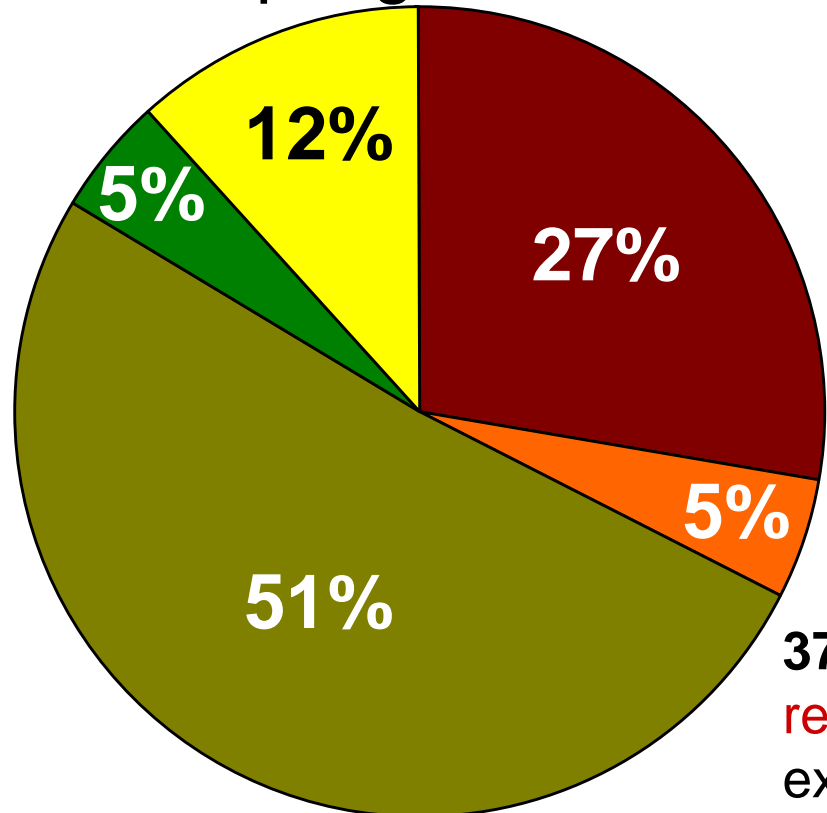
„Report on basic principles for biodiversity monitoring“ *available at*

[http://eumon.ckff.si/d2\\_fin.pdf](http://eumon.ckff.si/d2_fin.pdf)



# Monitoring Herpetofauna

- Sampling



exhaustive sampling	X
random sampling	X
sampling expert	
systematic sampling	X
other	

37% use a **sampling design ensuring representativity** of data (systematic, exhaustive or random choice of sites to be monitored)

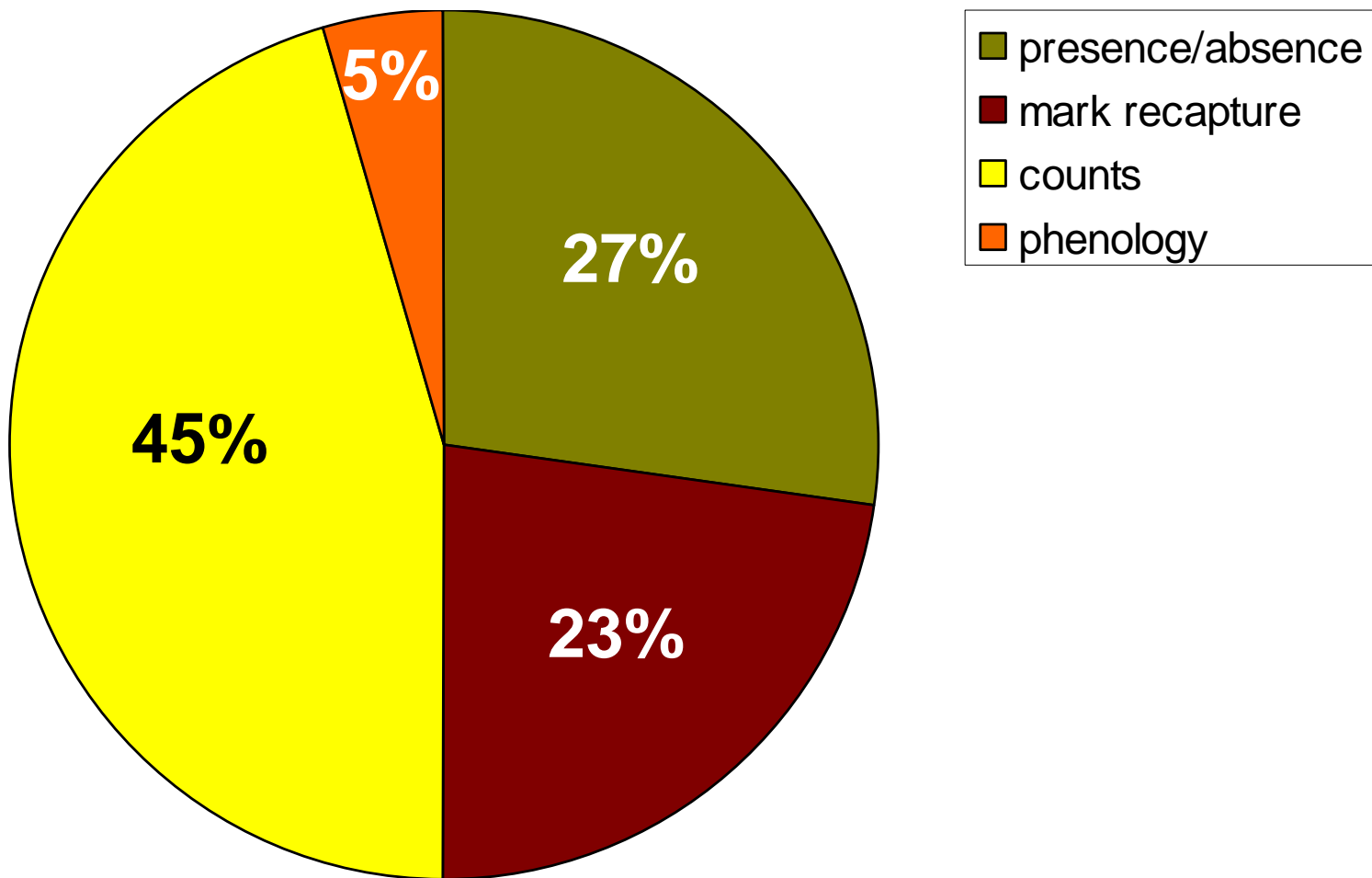
27% of these representative schemes **monitor all sites** where the species occur

43% account for detection probability



# Monitoring Herpetofauna

- Field data





## *Important criteria when designing a monitoring scheme*

### **Ability to statistically detect temporal/spatial trends**

- number of sites monitored
- number of years of monitoring
- among-year frequency of monitoring

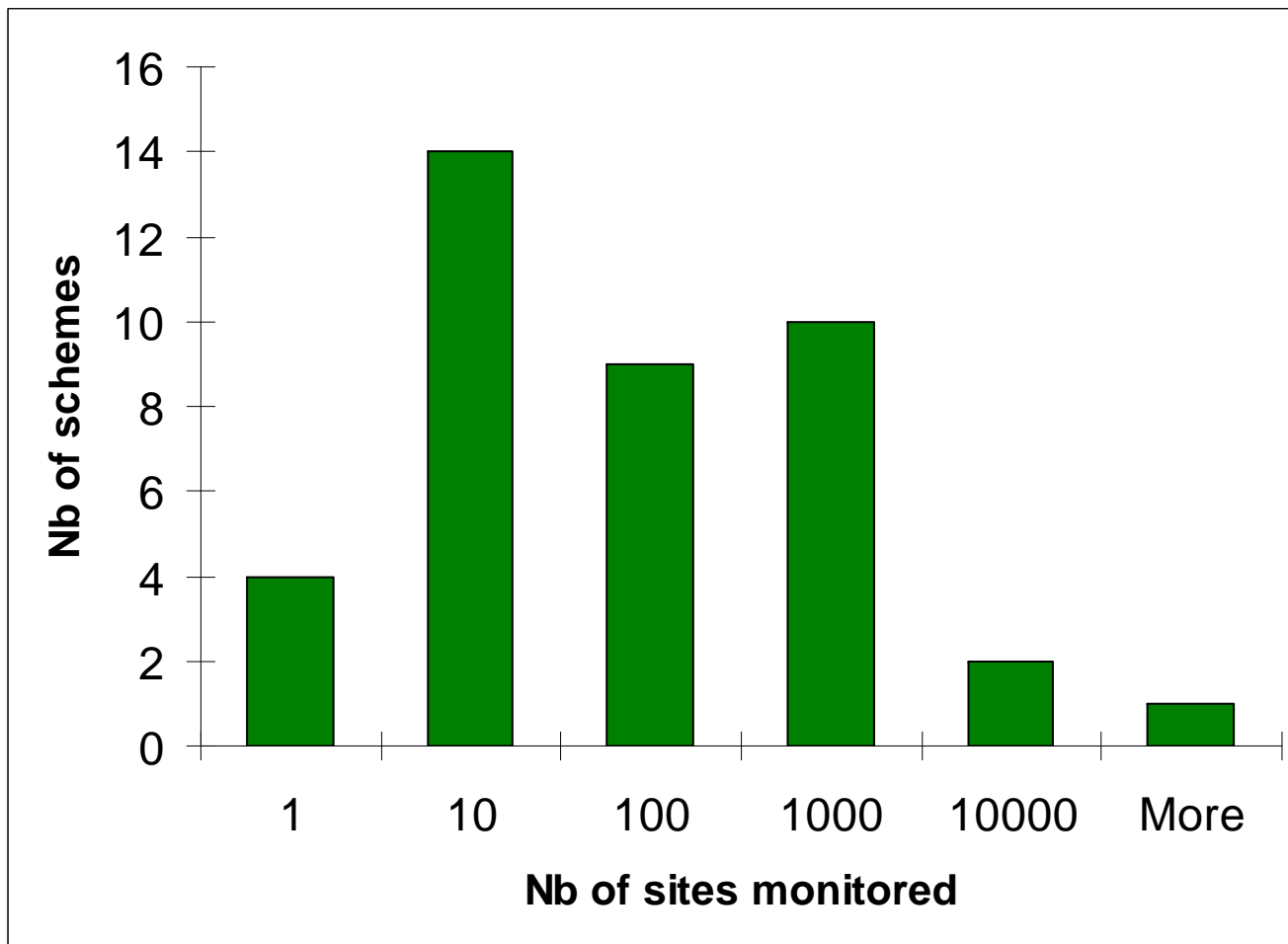
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# Monitoring Herpetofauna

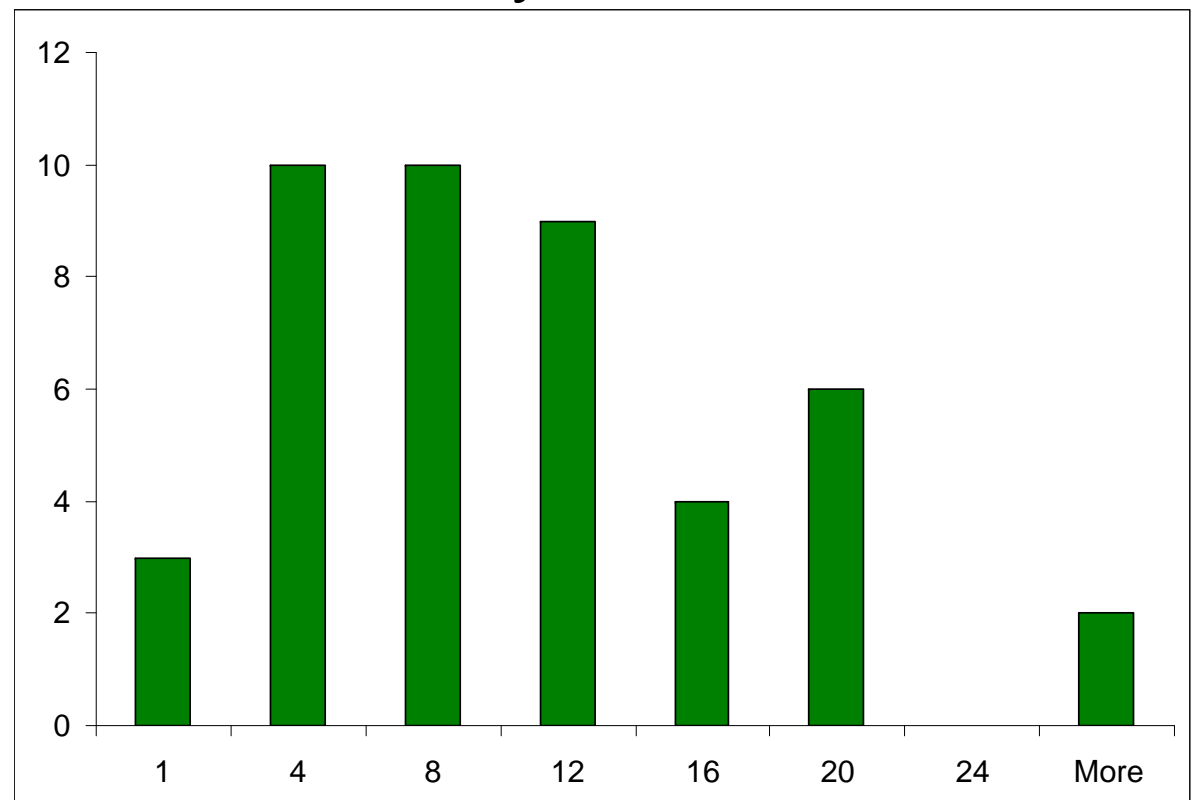
- Nb of sites visited





# Monitoring Herpetofauna

- Number of years monitored



June 1994: member states transpose the Habitats Directive into national legislation (article 23).

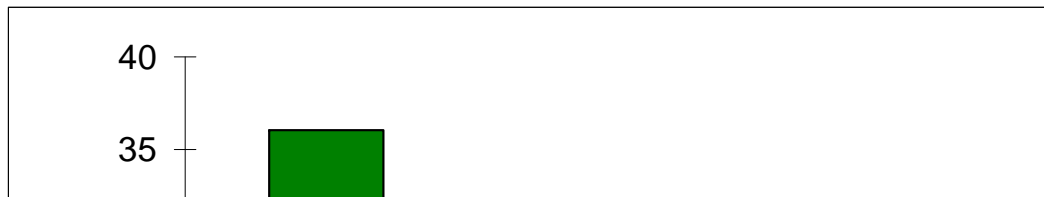
1995-1998: The Commission evaluates the national lists and selects Sites of Community Importance.

	2003	1999	1995	1991	1987	1983
2007	2006	2002	1998	1994	1990	1986

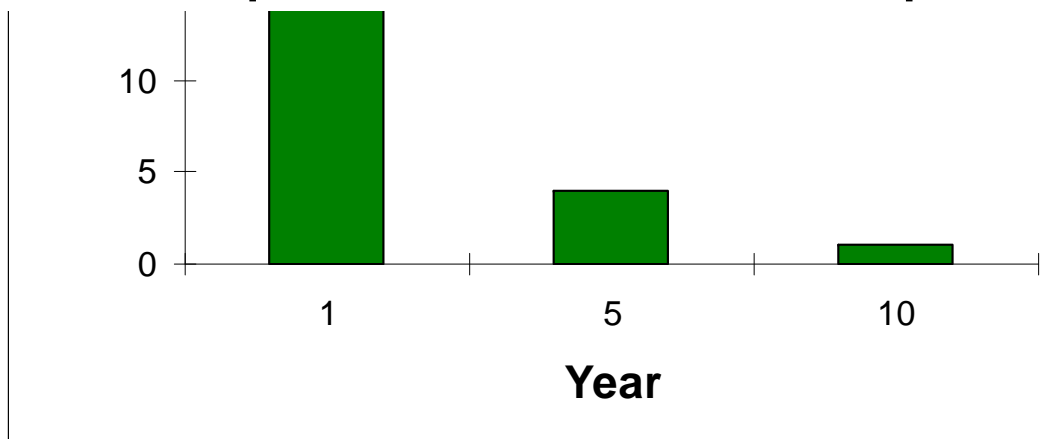


# Monitoring Herpetofauna

- Between year frequency



**87%** of schemes **monitor each year**, whereas for long-lived species, **a lower year-frequency could be considered** without lowering much statistical power to detect temporal trends

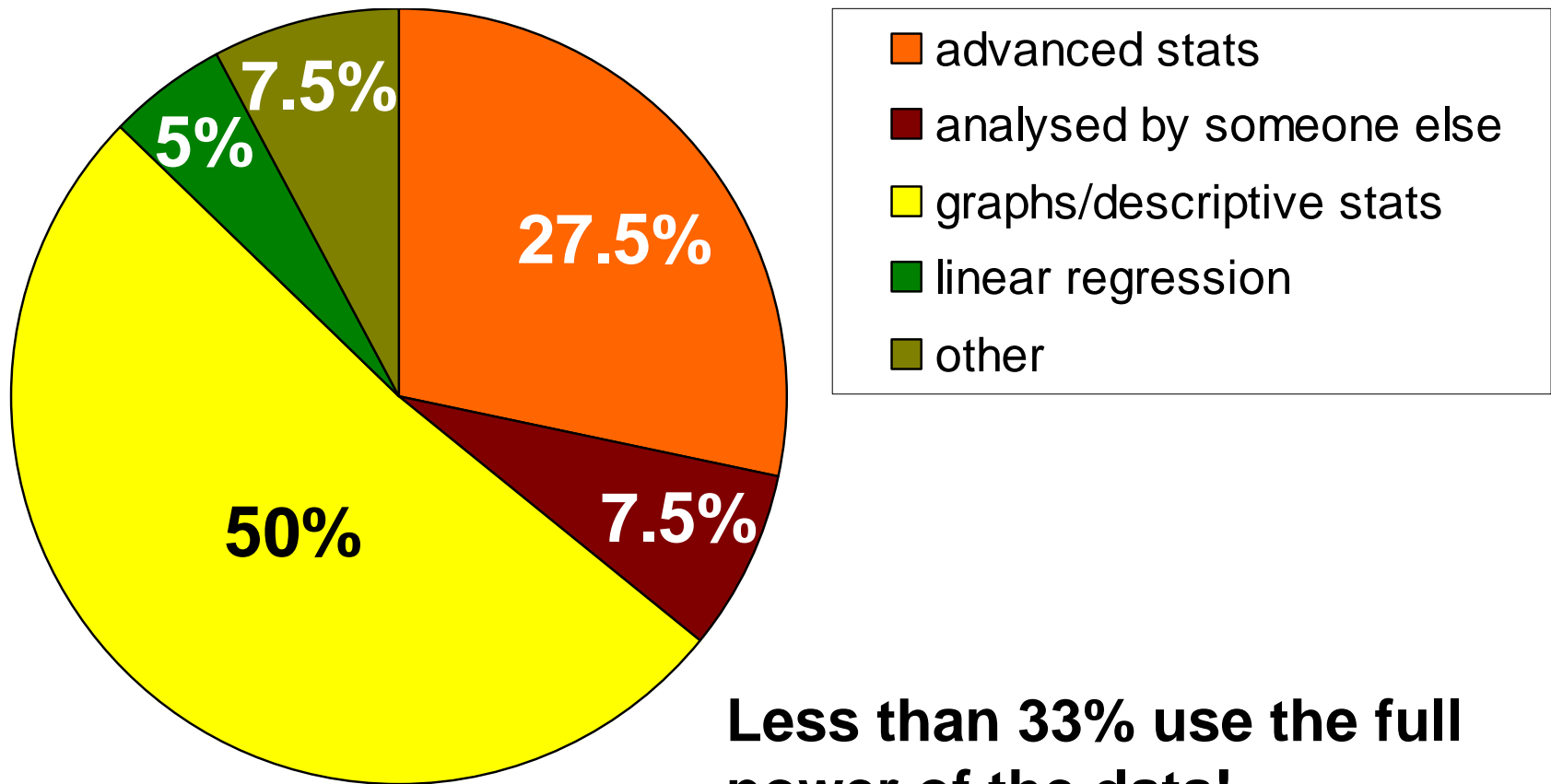






# Monitoring Herpetofauna

- Data analysis

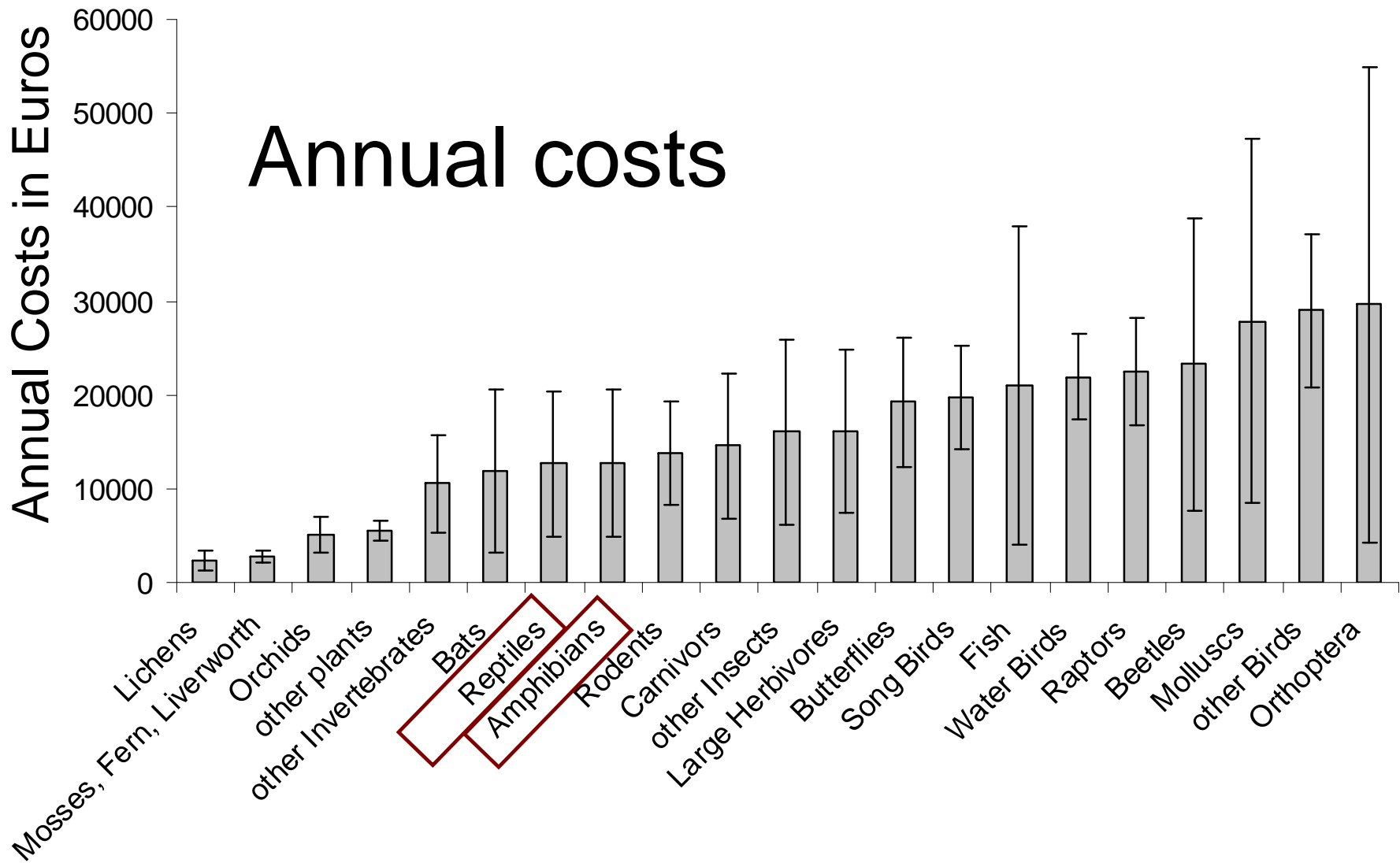


**Less than 33% use the full power of the data!**



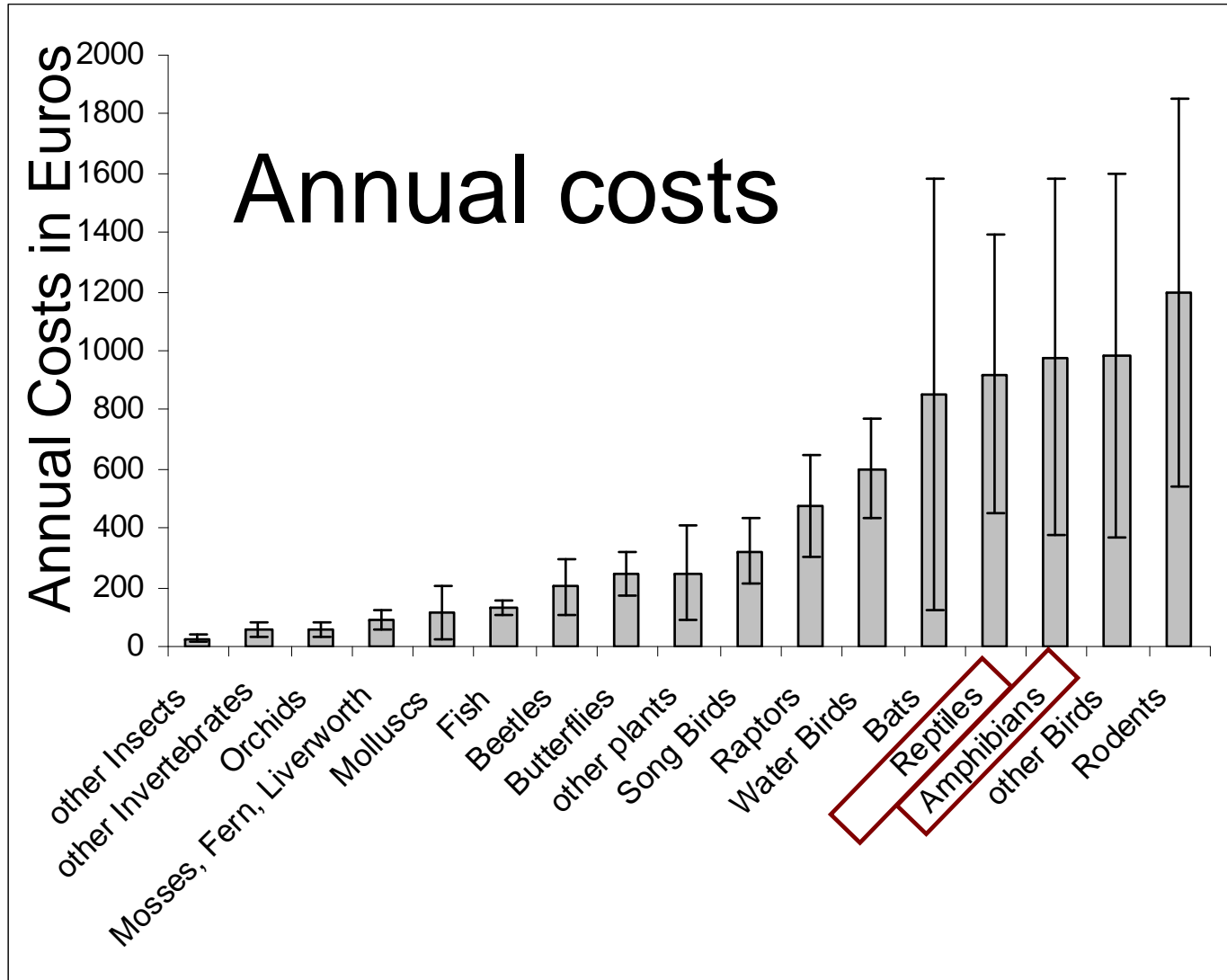
# Total costs per species group

## Annual costs



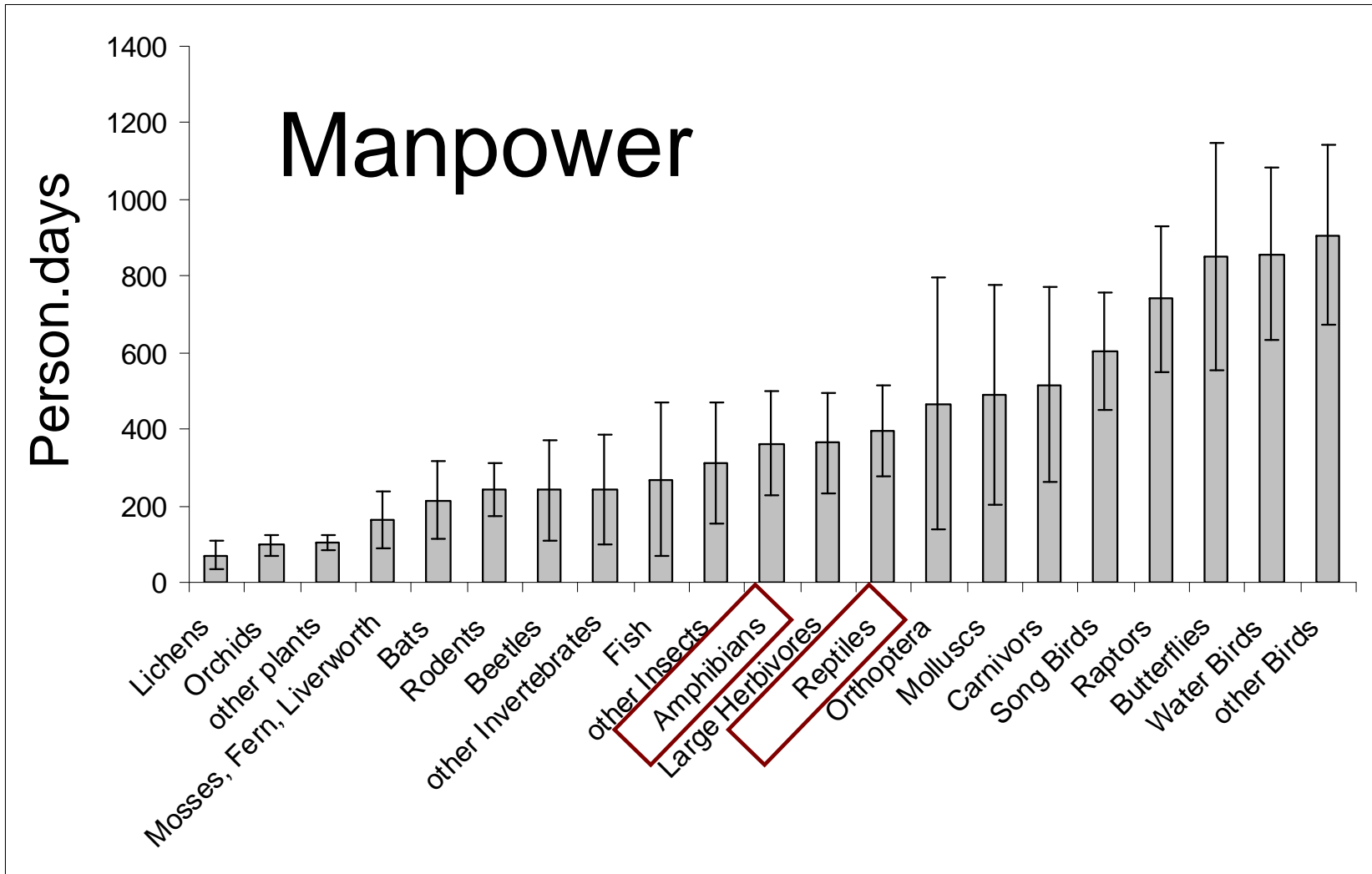


# Annual costs per species monitored



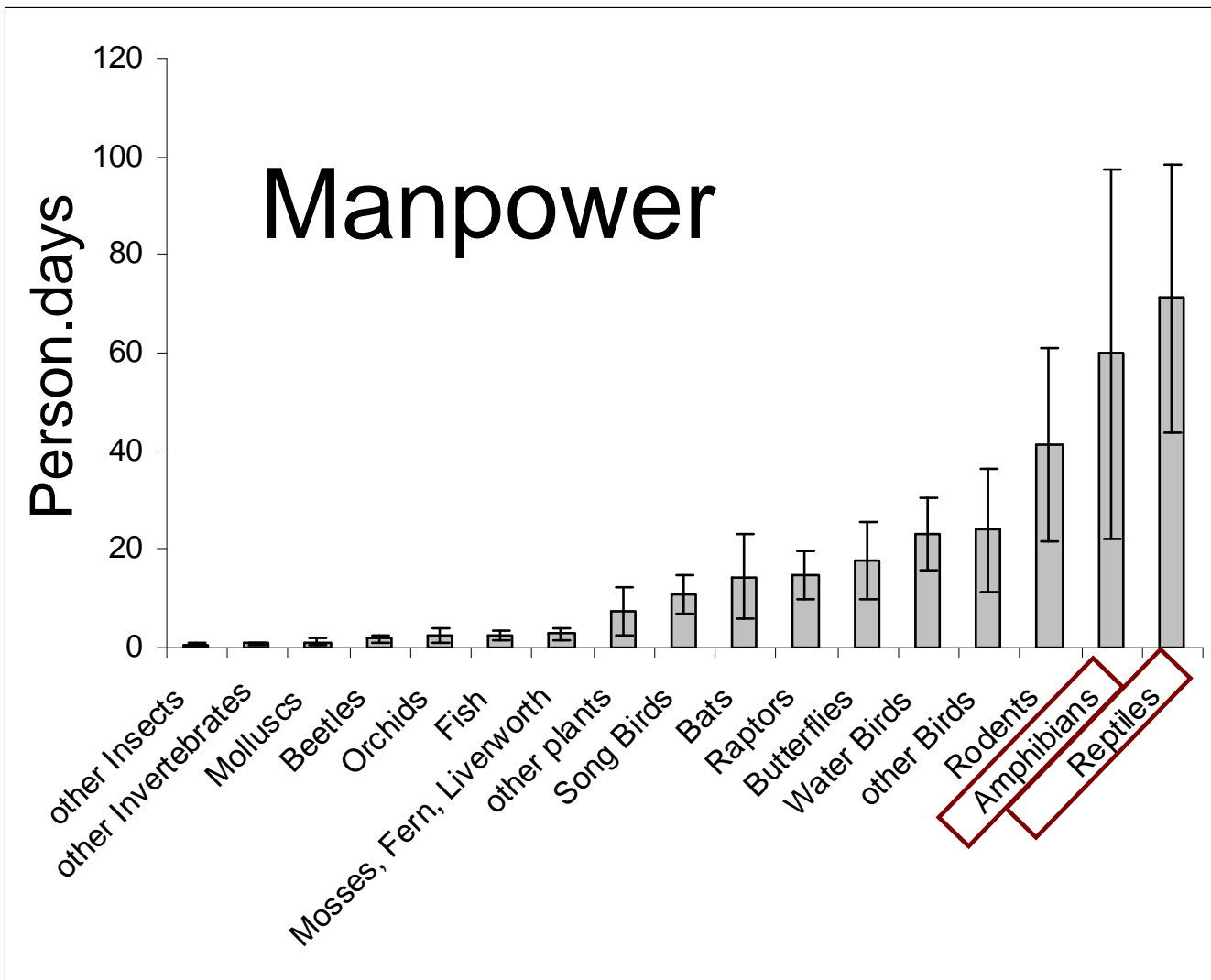


# Manpower per species group





# Manpower per species monitored





# Monitoring Herpetofauna

- Sampling effort

Parameter	Reptiles	Amphibiens	Both
Visits	6.6	20.9	2.3
Costs per species	4014.00 €	3009.50 €	120.40 €

Reptiles x both:

Visits;  $Z_{16,9} = 2.22, p = 0.026$

Costs;  $Z_{13,3} = 2.48, p = 0.013$

Amphibiens x both:

Visits;  $Z_{19,9} = 2.43, p = 0.016$

Costs;  $Z_{10,3} = 1.86, p = 0.063$

Mann-Whitney U-Test

Corrected for small sample size

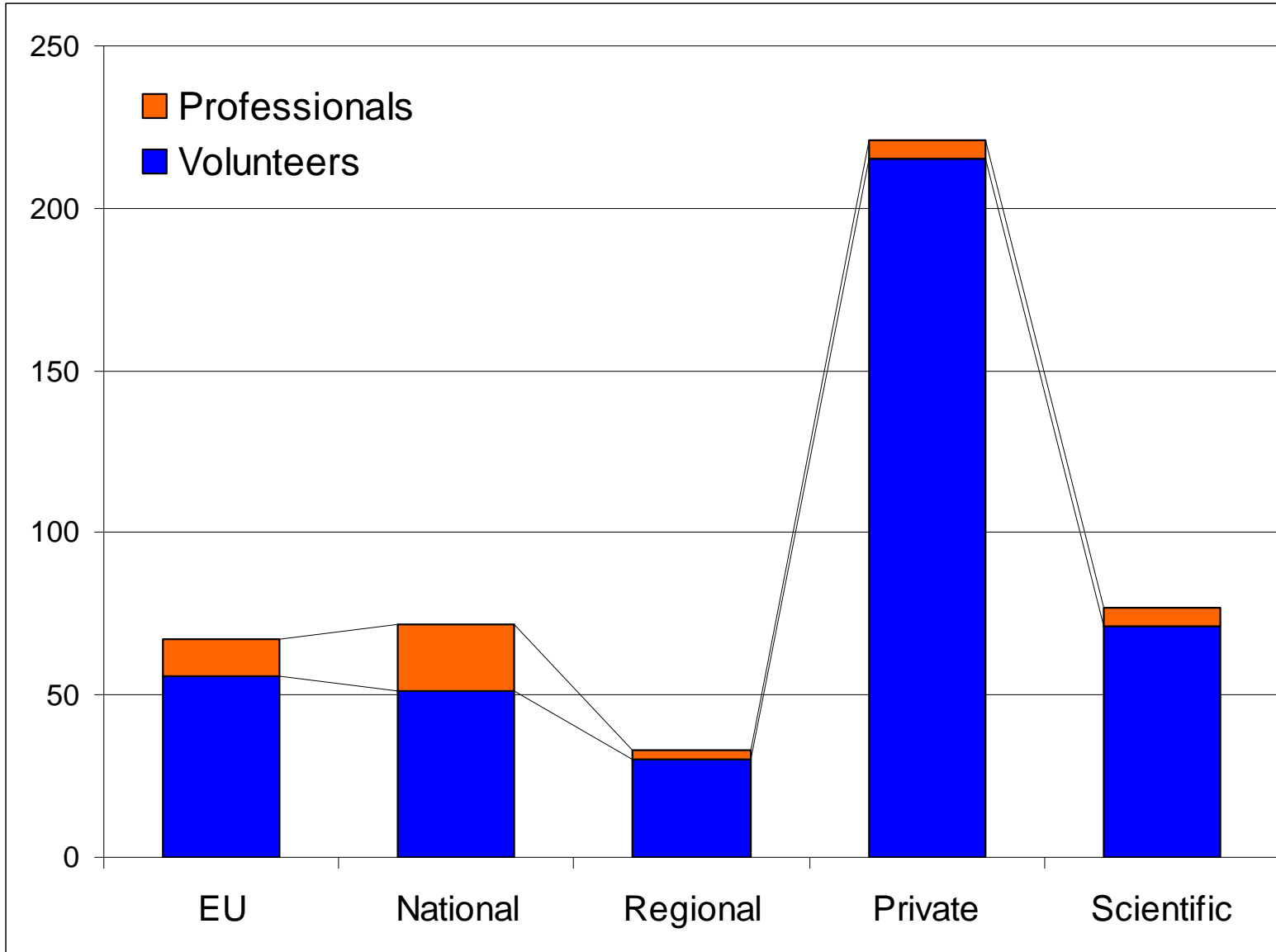


# Monitoring Herpetofauna

- The biggest scheme
- Brussels Avifaune and Herpetofauna Monitoring
  - Coordinator: Anne Weiserbs  
Brussels Institut for Management of the Environment
  - Funded by the region
  - scientific interest
  - Uses advanced statistics, exhaustive sampling at 100 sites and involves 21 volunteers and 1 professional for monitoring 34 species
- **Database search:**  
<http://eumon.ckff.si/monitoring/search.php>



# Volunteer involvement







# Volunteer involvement

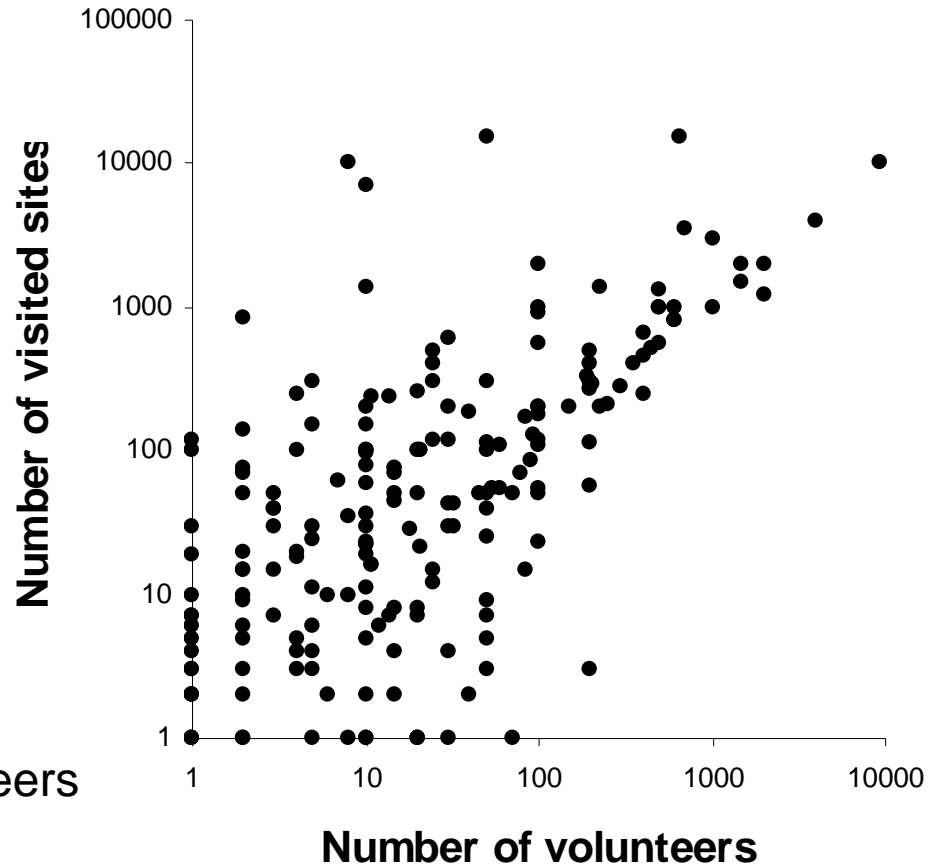
**Volunteer involvement benefits monitoring programs in several ways, e.g.:**

- **increases transfer of monitoring outputs to society** (cf. participative science or citizen science)
- **increases cost-effectiveness** of scheme



# Monitoring Herpetofauna

- Sampling effort and Volunteers
  - Number of sites x Volunteers ( $R_{39} = 0.80, p < 0.001$ )



Number of species x Volunteers  
( $R_{39} = 0.28, p = 0.079$ )



# Volunteer involvement

## EuMon's product:

guidelines for **promoting volunteer involvement** in monitoring activities are found at

[http://eumon.ckff.si/d4\\_short.doc](http://eumon.ckff.si/d4_short.doc)



# Combining data

- Combining data from different schemes improves
  1. Representativity
  2. Precision
  3. Robustnessof conclusions derived from monitoring data on biodiversity changes
- **D16: Framework for integration of different species monitoring schemes**



# Combining data



## Combining schemes with similar characteristics

- Advantages:
  - increase geographical coverage per taxonomic group.
    - If geographical scales differ among schemes to be integrated, then one may use **post-stratification** with **weights** in statistical analysis to compensate for these differences;
  - increased precision of estimates of states and trends, e.g. by increasing sample size (cf. number of sites);
  - increased representativity of results



# Combining data

## Combine schemes with different characteristics

- Advantages:
  - increase biological coverage;
  - increase geographical coverage;
  - increase temporal coverage;
  - increase coherence of monitoring activities with EU Directives
    - by identifying which schemes need to be combined so that ‘state and trends of species and their habitats’ are monitored for all species listed in the Directives in all countries.



# Methods to combine data

- **Raw data combination**
  - recommended when data were collected with similar field methods and correspond to the same data type
  - For combining estimates, **geometrical mean**, and **meta-analysis** methods are recommended.

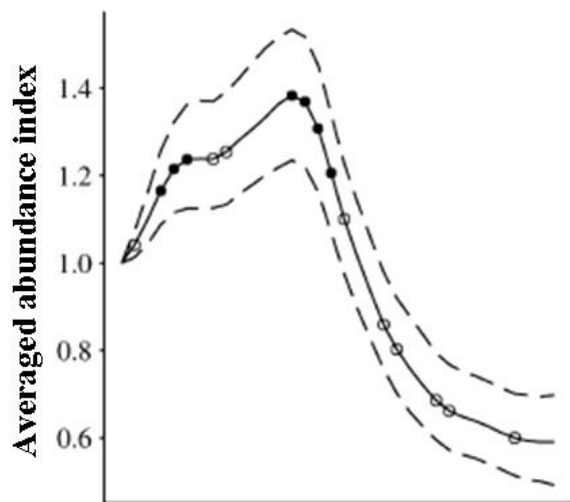


# Methods to combine data

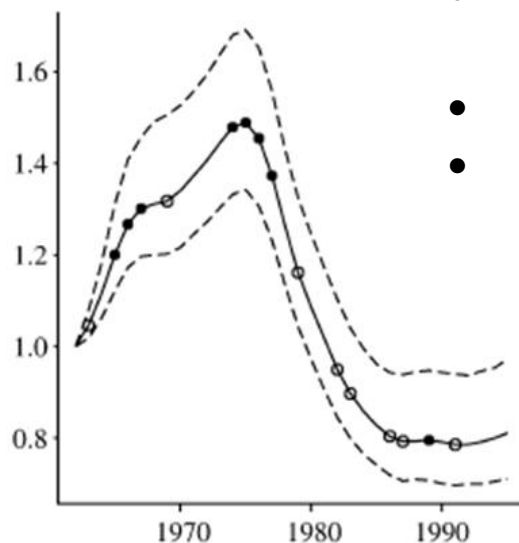
In all cases,

- **Weights**

- to account for differences in sampling design and sampling effort



Geometrical Mean



Arithmetic Mean

- Increases in the averaged abundance index are weaker,
- decreases are stronger,
- estimates are more precise

- Abundance indices for 12 farmland bird species in the UK

- (data from the Christmas Bird Count; figures from Buckland *et al.* 2005).





# Methods to combine data

- **Complementarity**
  - Combining estimates from
    - count survey and
    - capture-mark-recapture survey
    - **allows linking population trends to demographic processes.**



# Methods to combine data

## For those who can't wait

- D18: Compilation and illustration of recommended methods for analysis of combined data from different monitoring schemes



# Products

- **For those who can wait:**
  - a comprehensive framework for integration will be developed and made available (2008) on an **internet portal to promote integration of monitoring** efforts across schemes, species, and countries
- **Contact: Erik Framstad,**  
**[Erik.Framstad@nina.no](mailto:Erik.Framstad@nina.no)**



# Products



- **Internet portal**
  - Statistical analysis of monitoring data
  - Data combination
  - Volunteer involvement
  - General guideline to design a monitoring schemes, considering various parameters



# Conclusion

**Coordinating monitoring efforts and data across Europe should increase relevance and potential implications of monitoring outputs**

**Lets discuss this later**



# **Thanks to all the contributors to the EuMon Database**

**– the past, the present, and the  
future ones**

**Give it all for an efficient  
biodiversity monitoring**



**Contact EuMon**

**project Coordination**

**eumon@ufz.de**

**Web page :**

**<http://eumon.ckff.si>**