

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

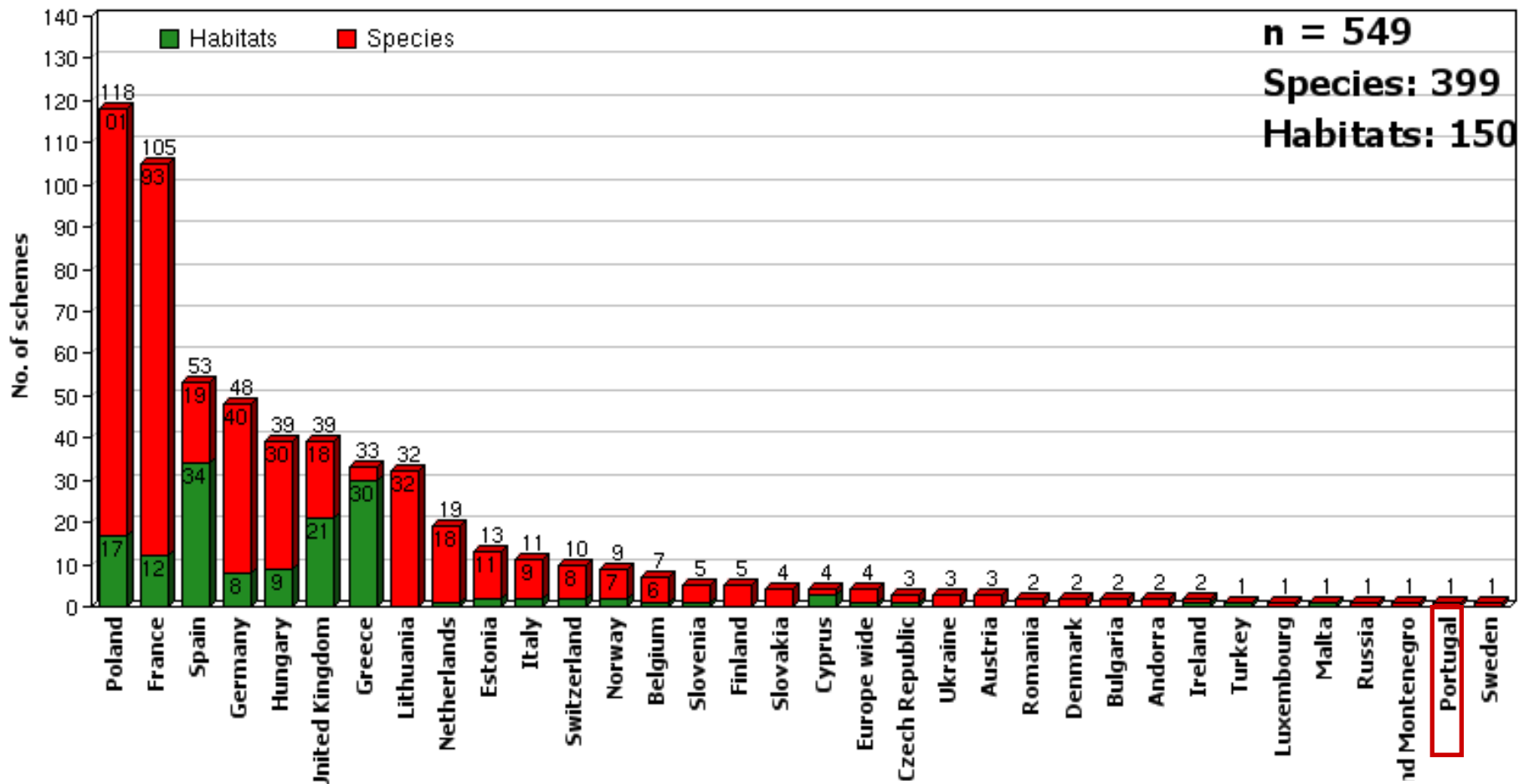
Providing tools to assess the status of and trends in Biodiversity

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)

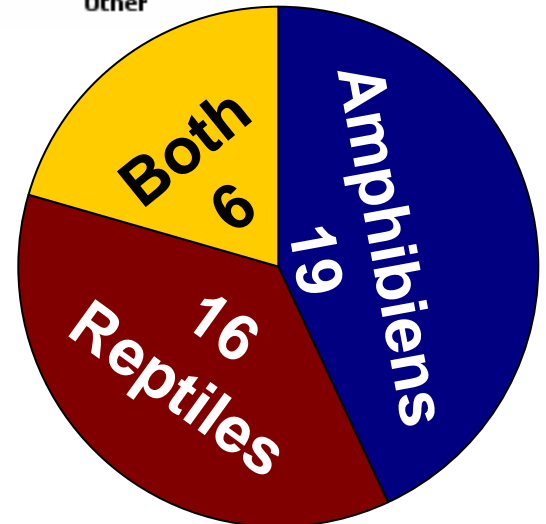
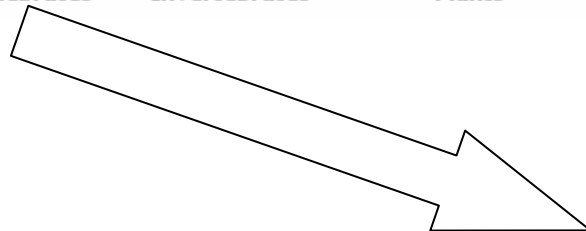
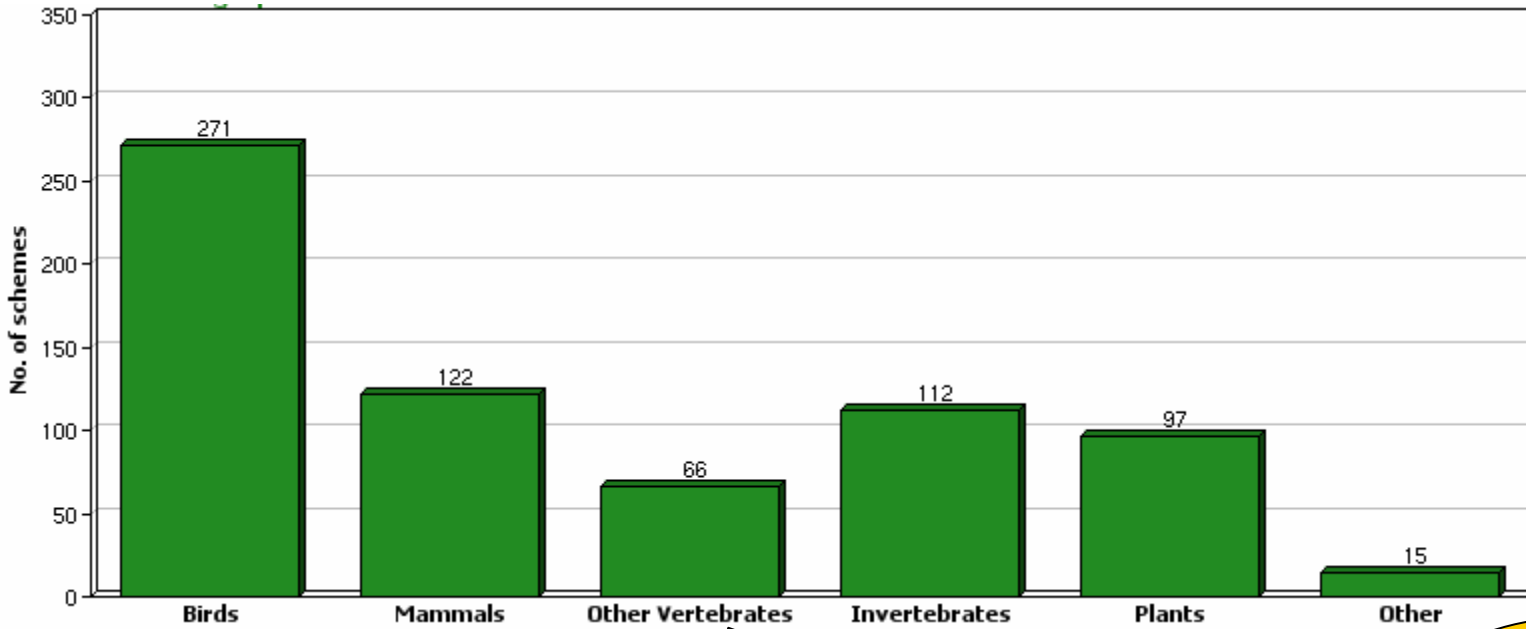
- Search Interface is available to identify schemes monitoring specific taxa (explicit entry)
- database as tool for integration of monitoring schemes

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

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



Biodiversity Monitoring





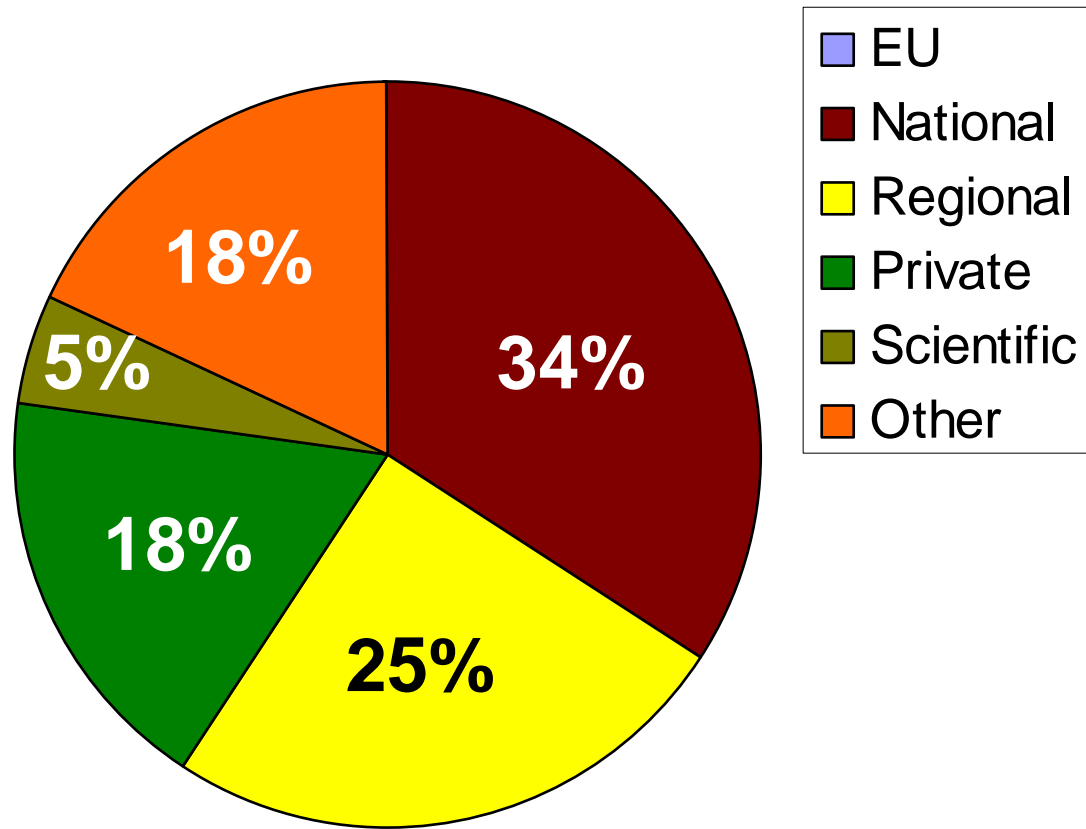
Monitoring Herpetofauna

- 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

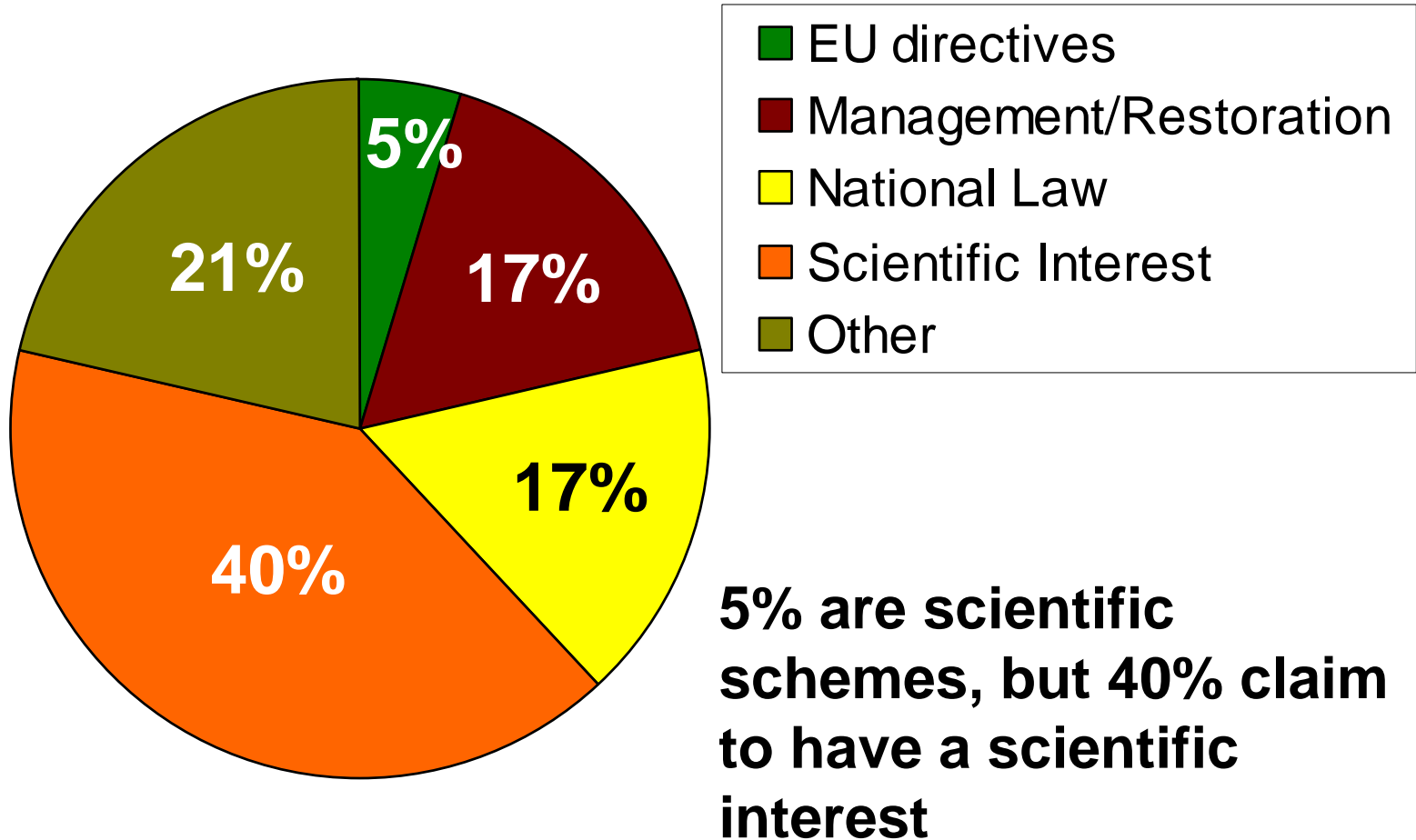


NO EU-Funding!



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)

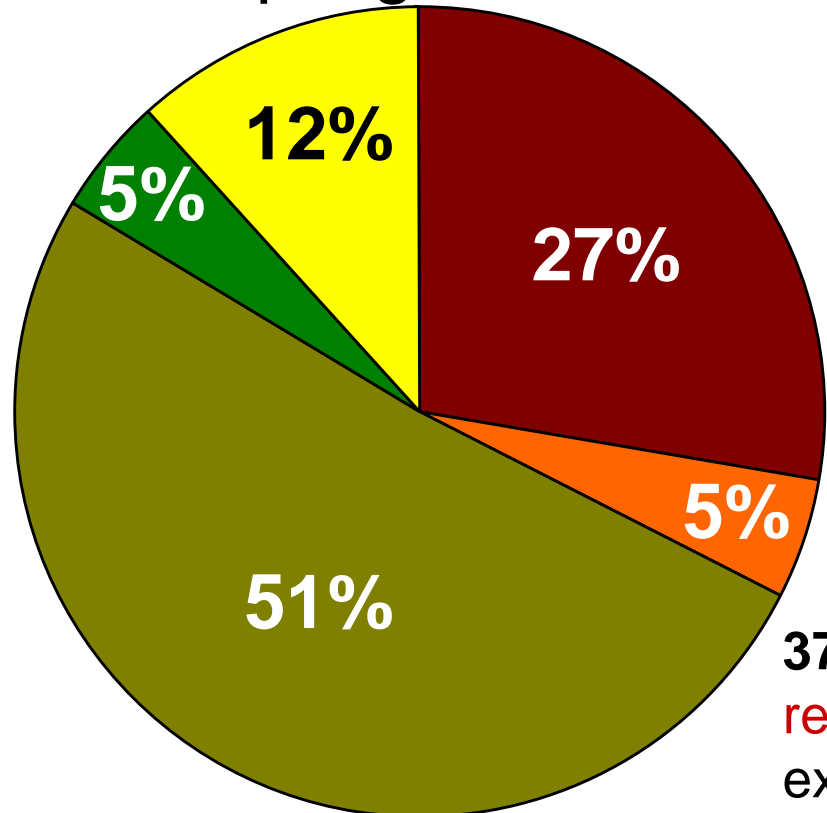
„Report on basic principles for biodiversity monitoring“ *available at*

http://eumon.ckff.si/d2_fin.pdf



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)

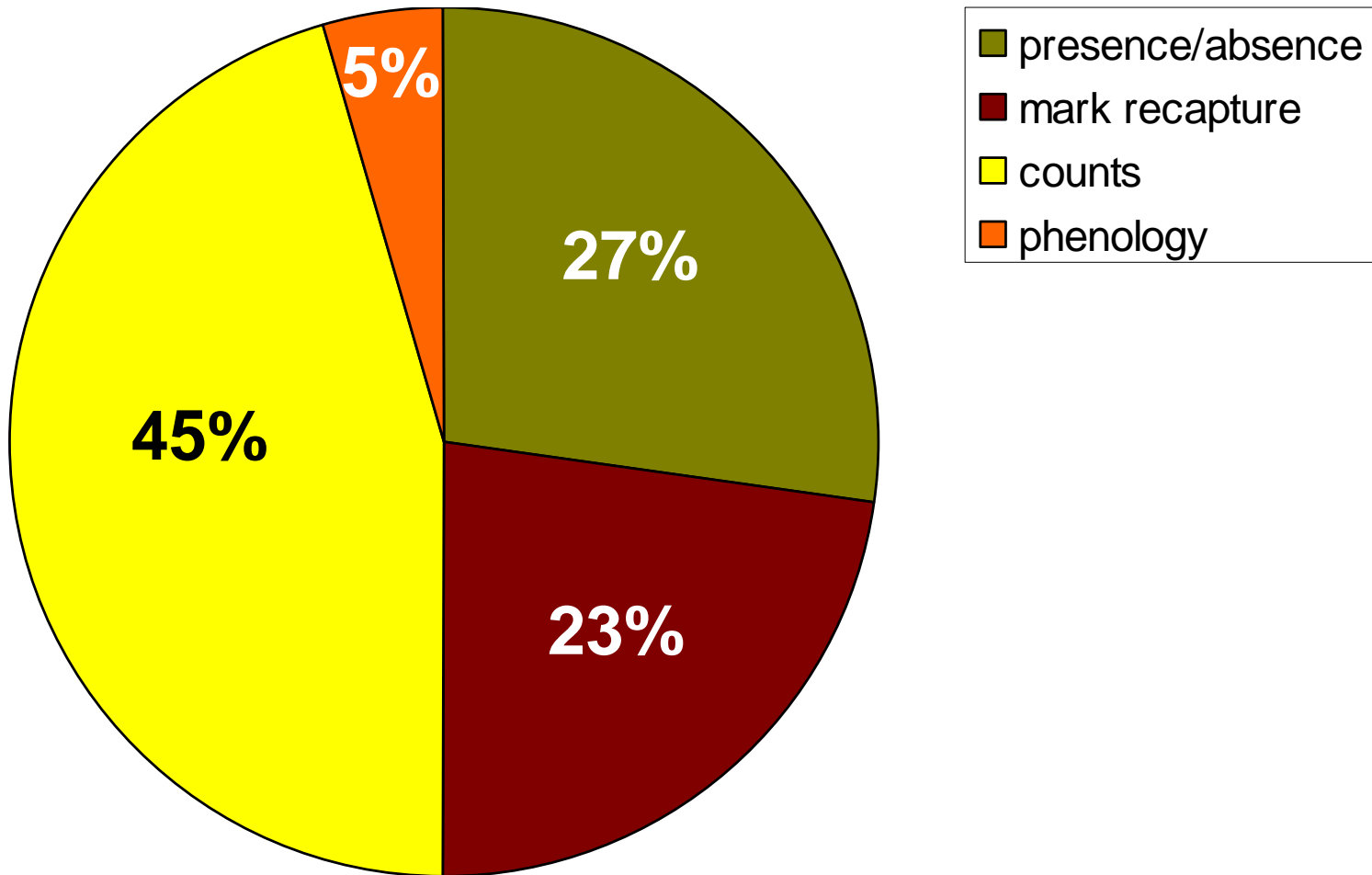
27% of these representative schemes **monitor all sites** where the species occur

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

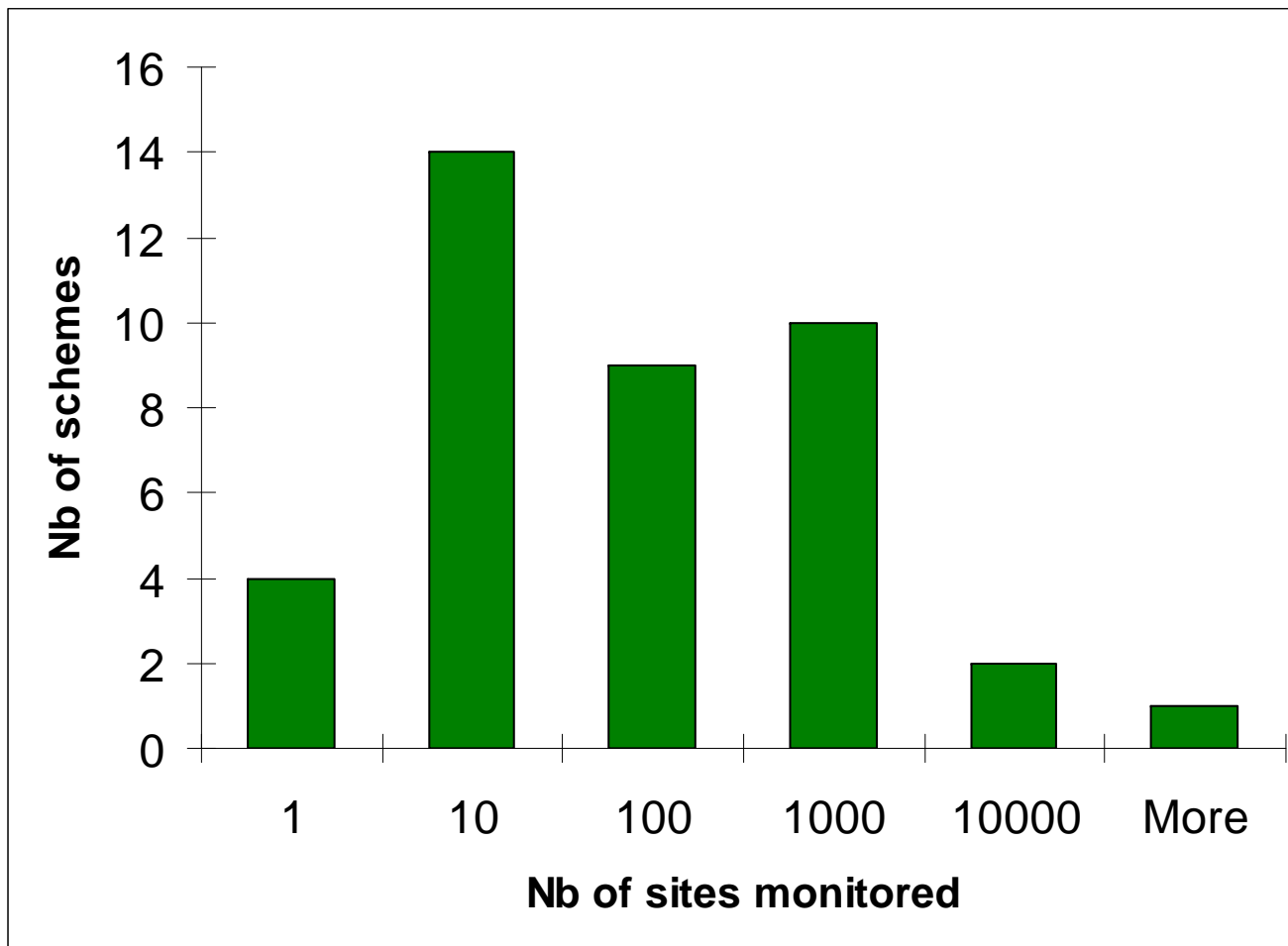
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Monitoring Herpetofauna

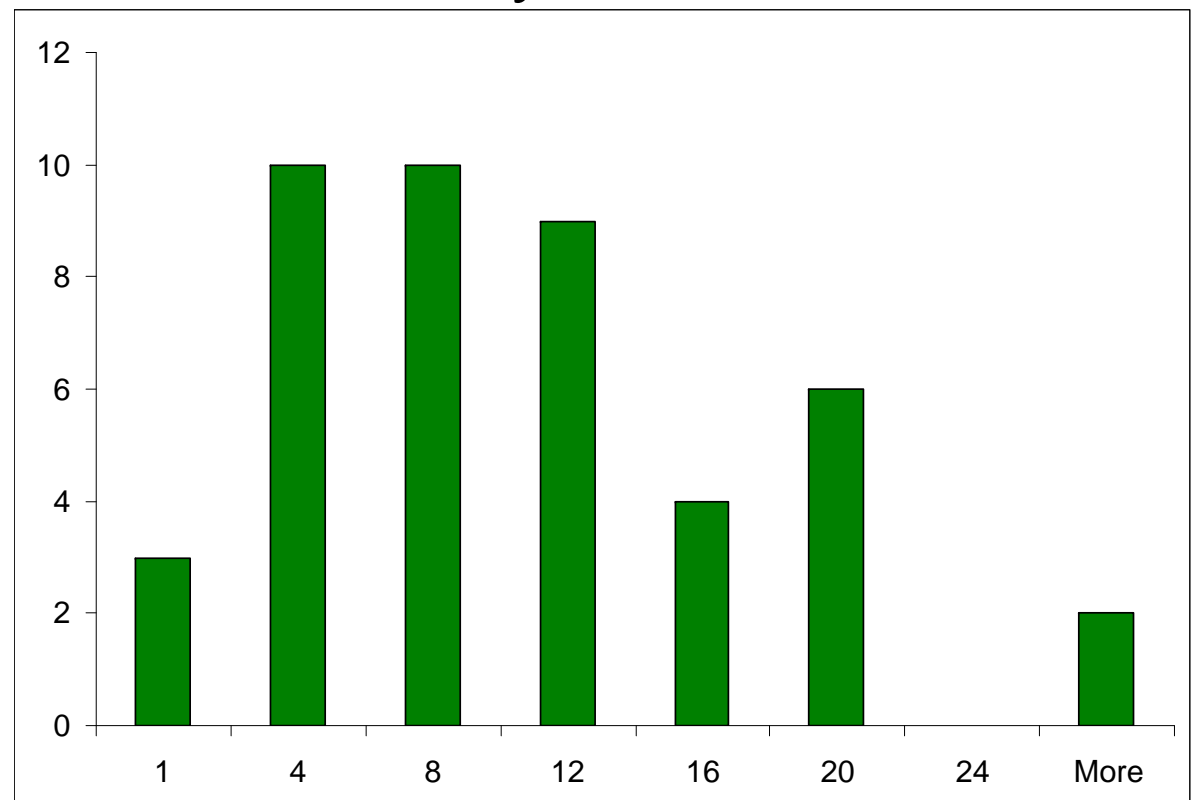
- Nb of sites visited





Monitoring Herpetofauna

- Number of years monitored



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

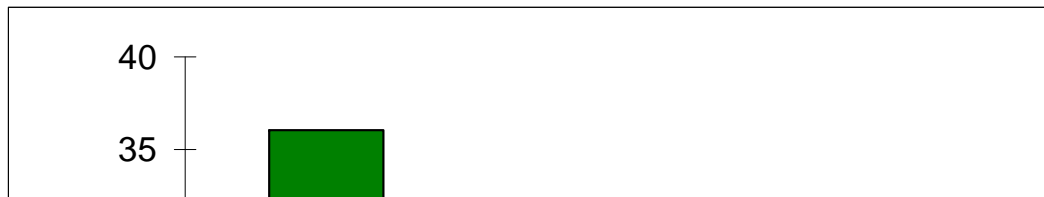
1995-1998: The Commission evaluates the national lists and selects Sites of Community Importance.

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

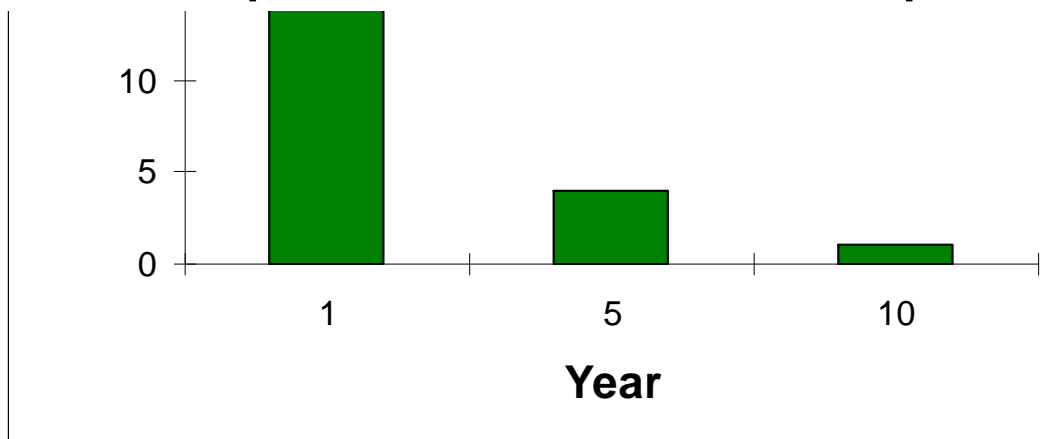


Monitoring Herpetofauna

- Between year frequency



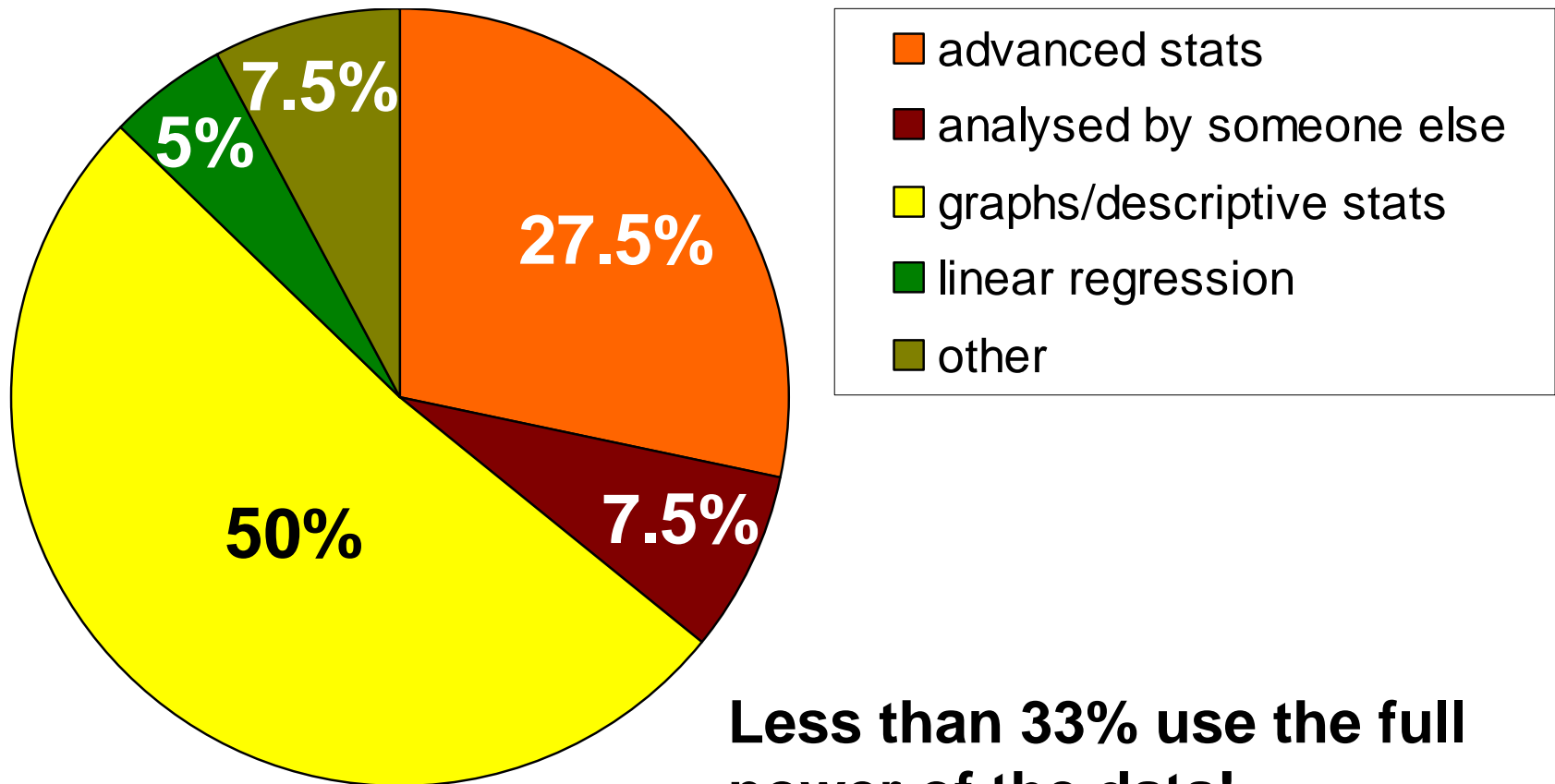
87% of schemes **monitor each year**, whereas for long-lived species, **a lower year-frequency could be considered** without lowering much statistical power to detect temporal trends





Monitoring Herpetofauna

- Data analysis

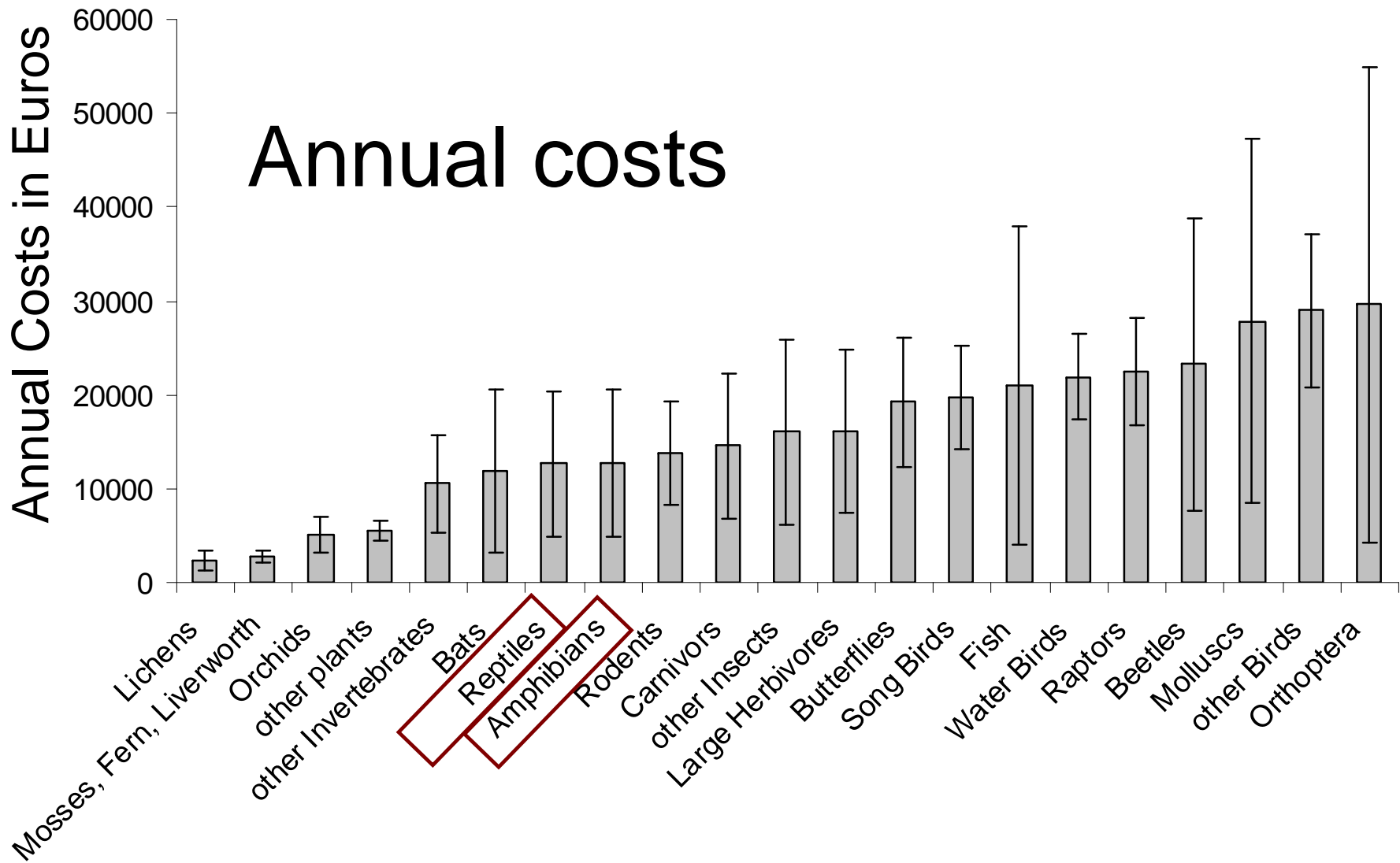


Less than 33% use the full power of the data!



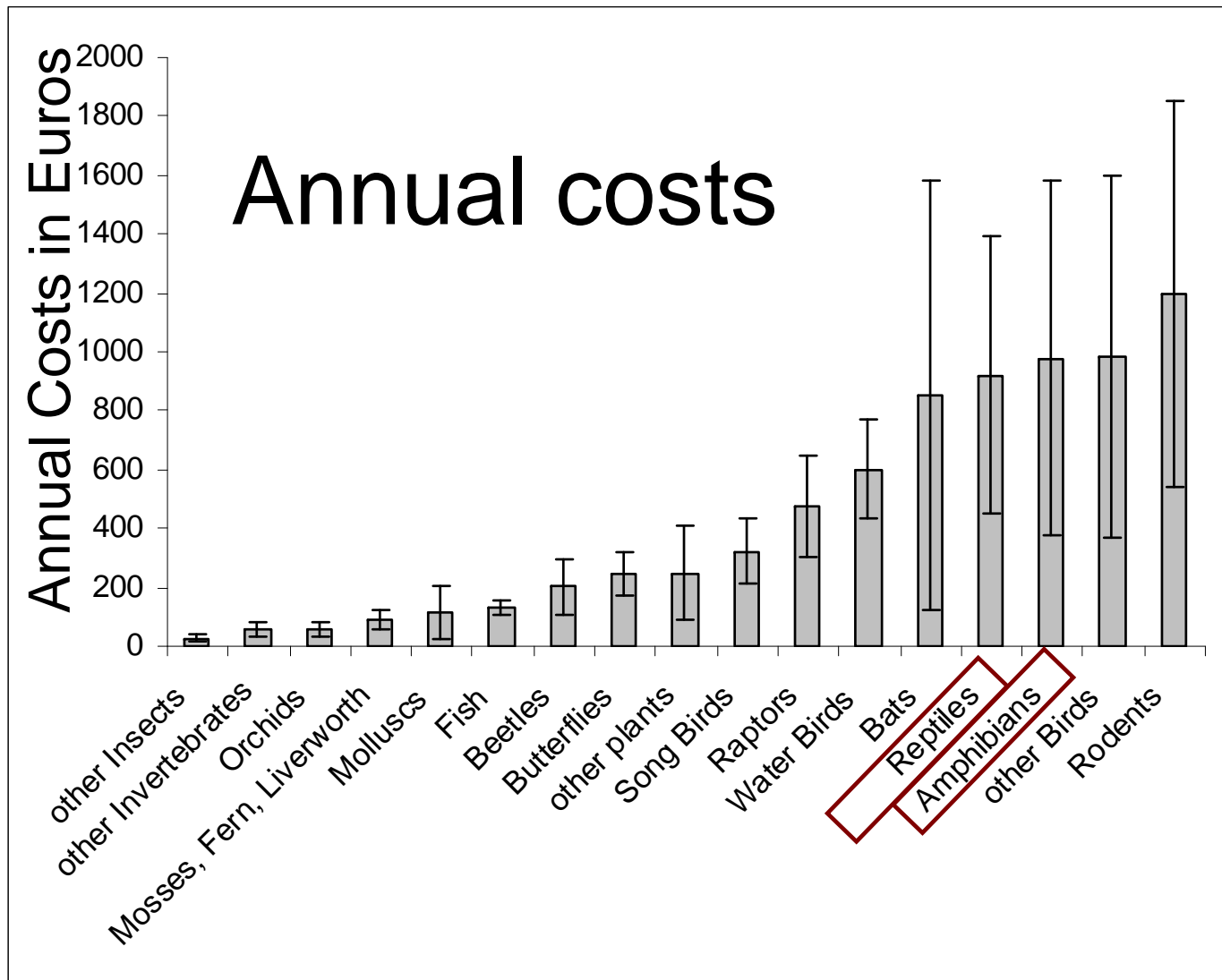
Total costs per species group

Annual costs



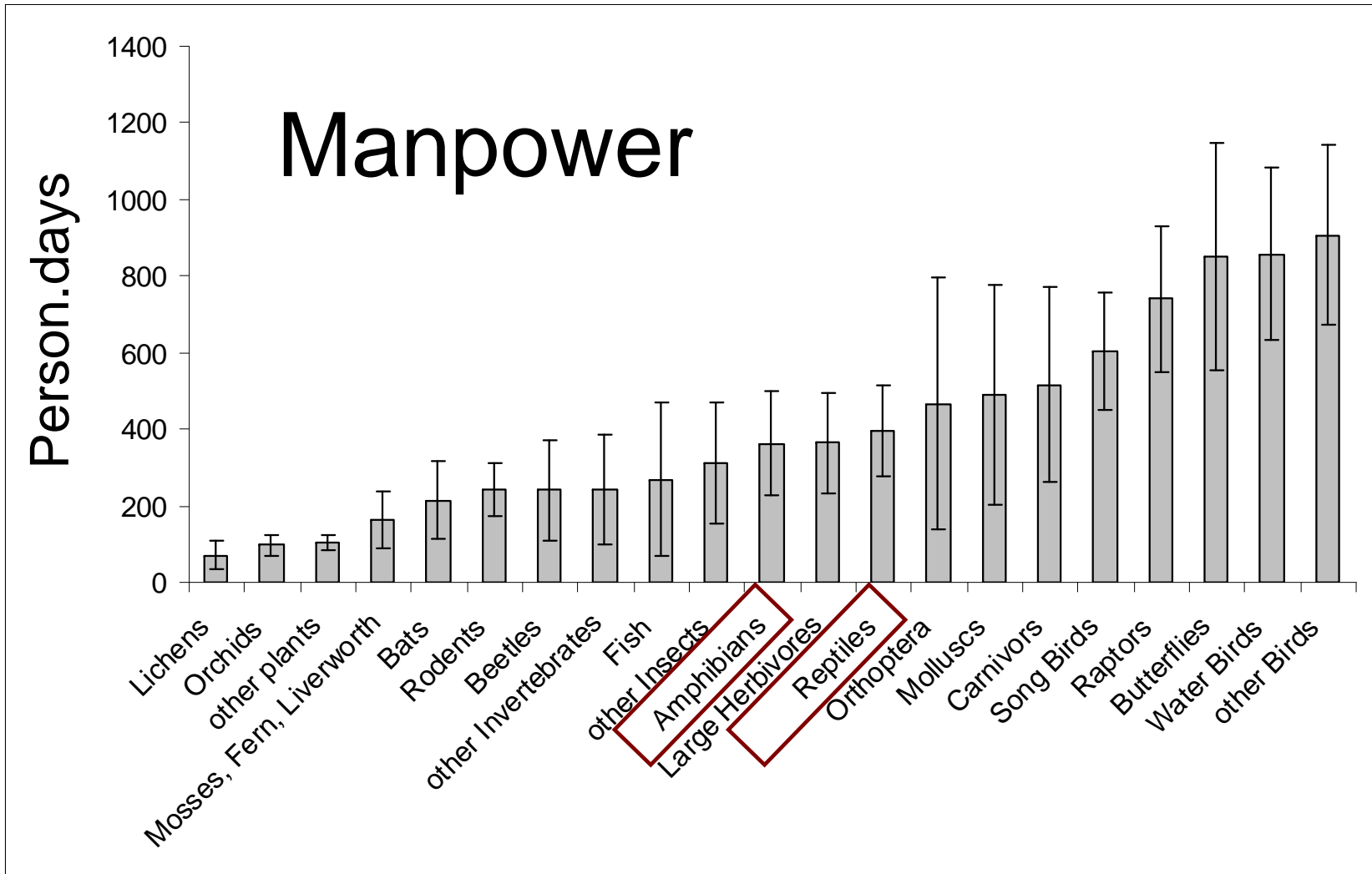


Annual costs per species monitored



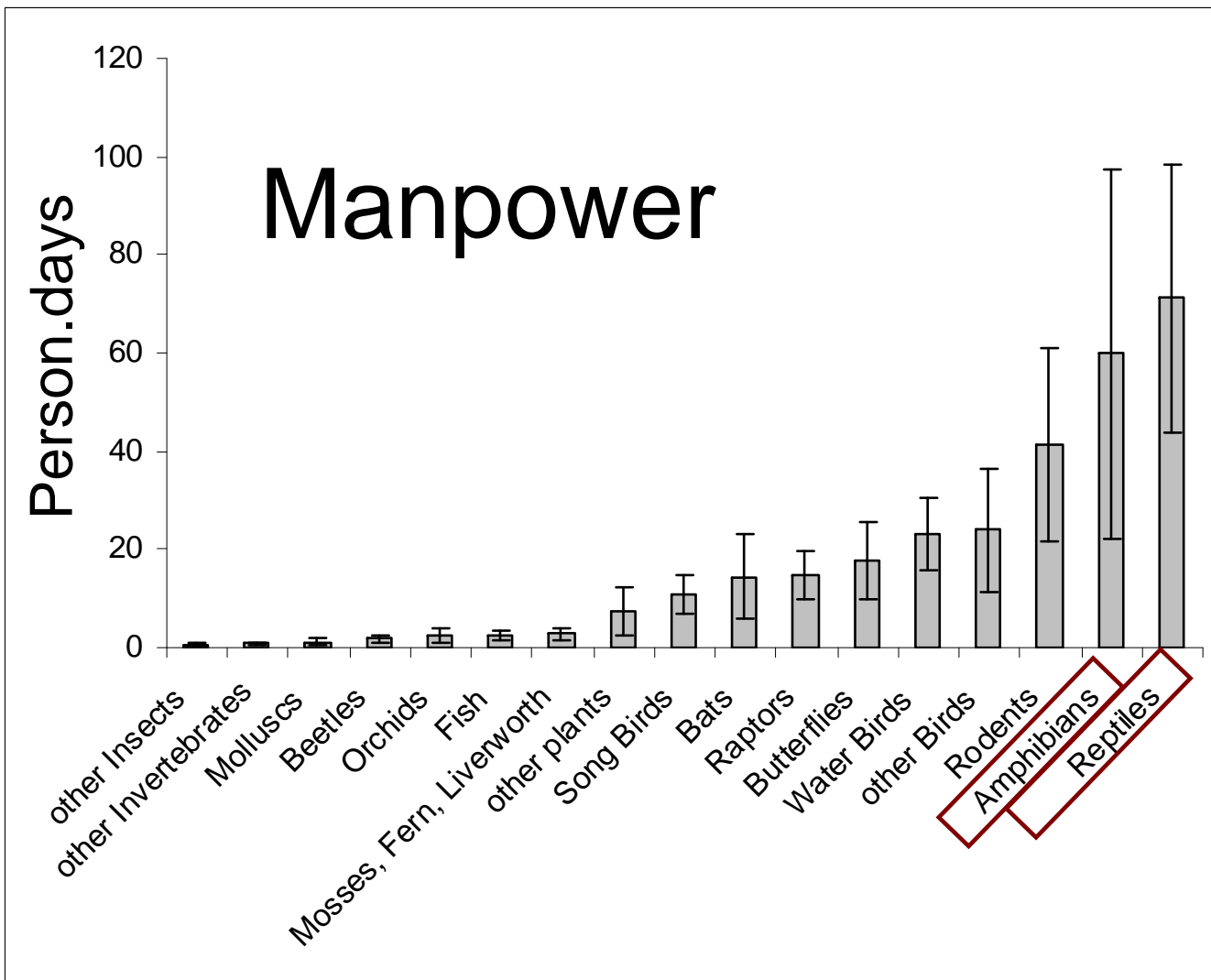


Manpower per species group





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

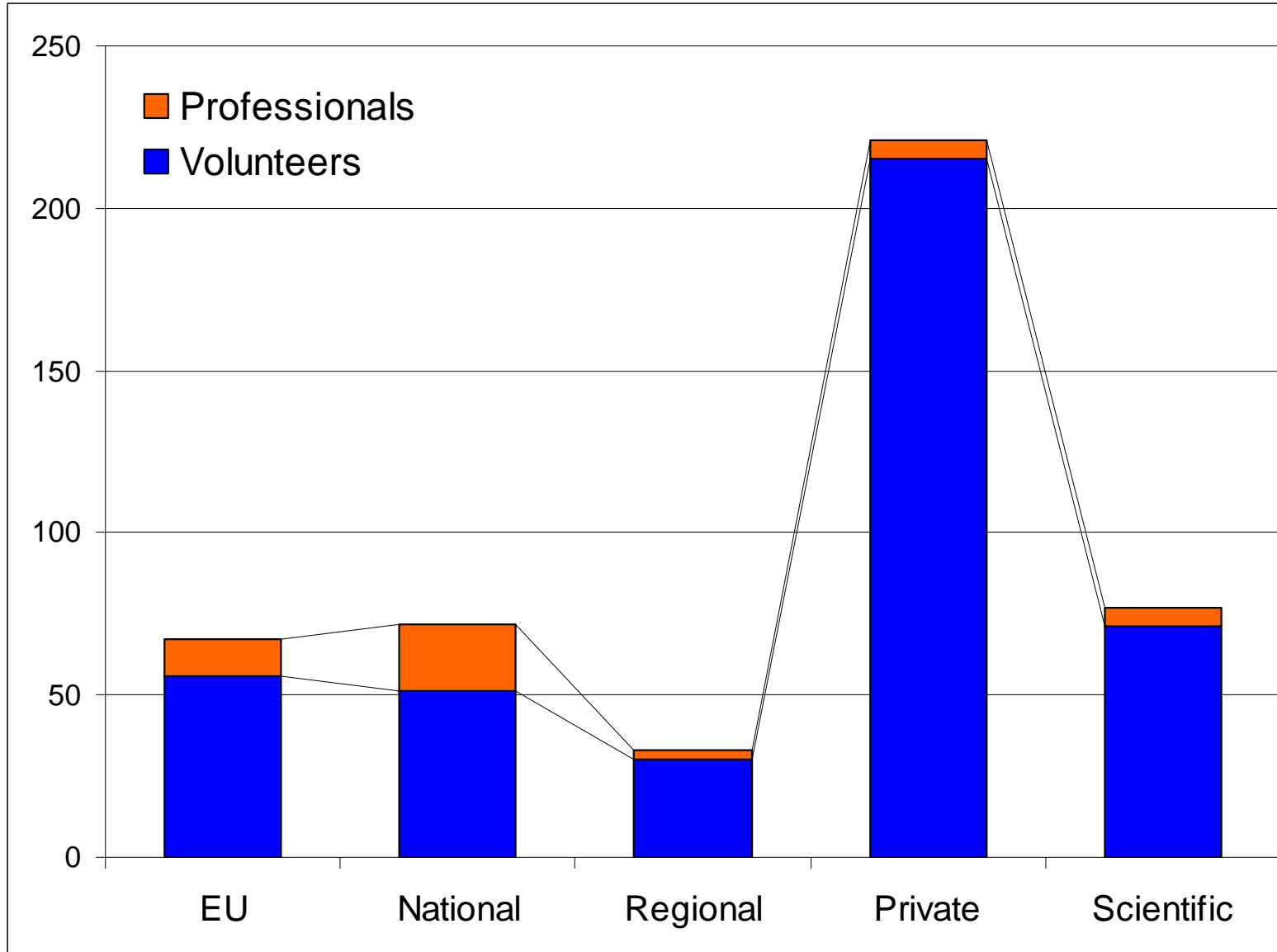


Monitoring Herpetofauna

- 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

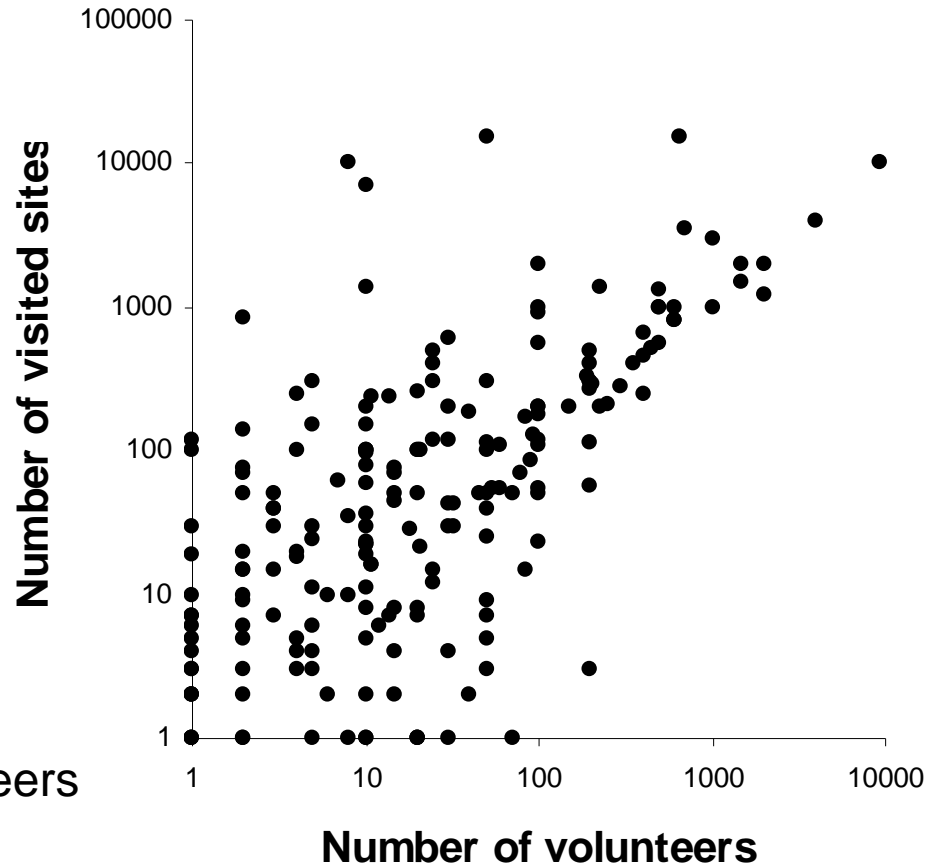
Volunteer involvement benefits monitoring programs in several ways, e.g.:

- **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



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.

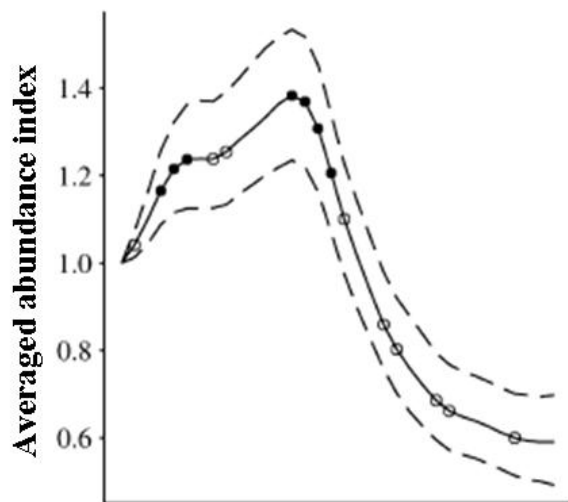


Methods to combine data

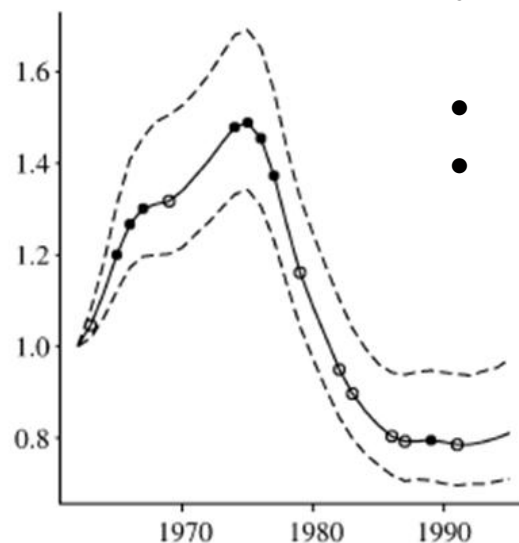
In all cases,

▪ 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



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

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Web page :

<http://eumon.ckff.si>