European Raptor Biomonitoring Facility

Naturalis Biodiversity Center

A REVIEW OF RAPTOR COLLECTIONS IN EUROPE

WG3 STSM

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Mission aim, dates, participants

Aim

•To carry out a review of raptor collections in Europe with a focus on recent, frozen raptor carcasses and tissue samples

Principle objectives

- To assess how many carcasses arrive annually, how many are stored, of which species
- To assess extent to which collections store frozen tissues from these carcasses
- To assess extent of digitization of these collections
- To assess constraints on processing/storage of raptor specimens
- To assess collections' engagement in raptor research, ecotoxicology

Dates of Mission: 03/10/2019 – 26/10/2018

Mission Holder: Gloria Ramello, Museo Civico di Storia Naturale, Carmagnola, Italy

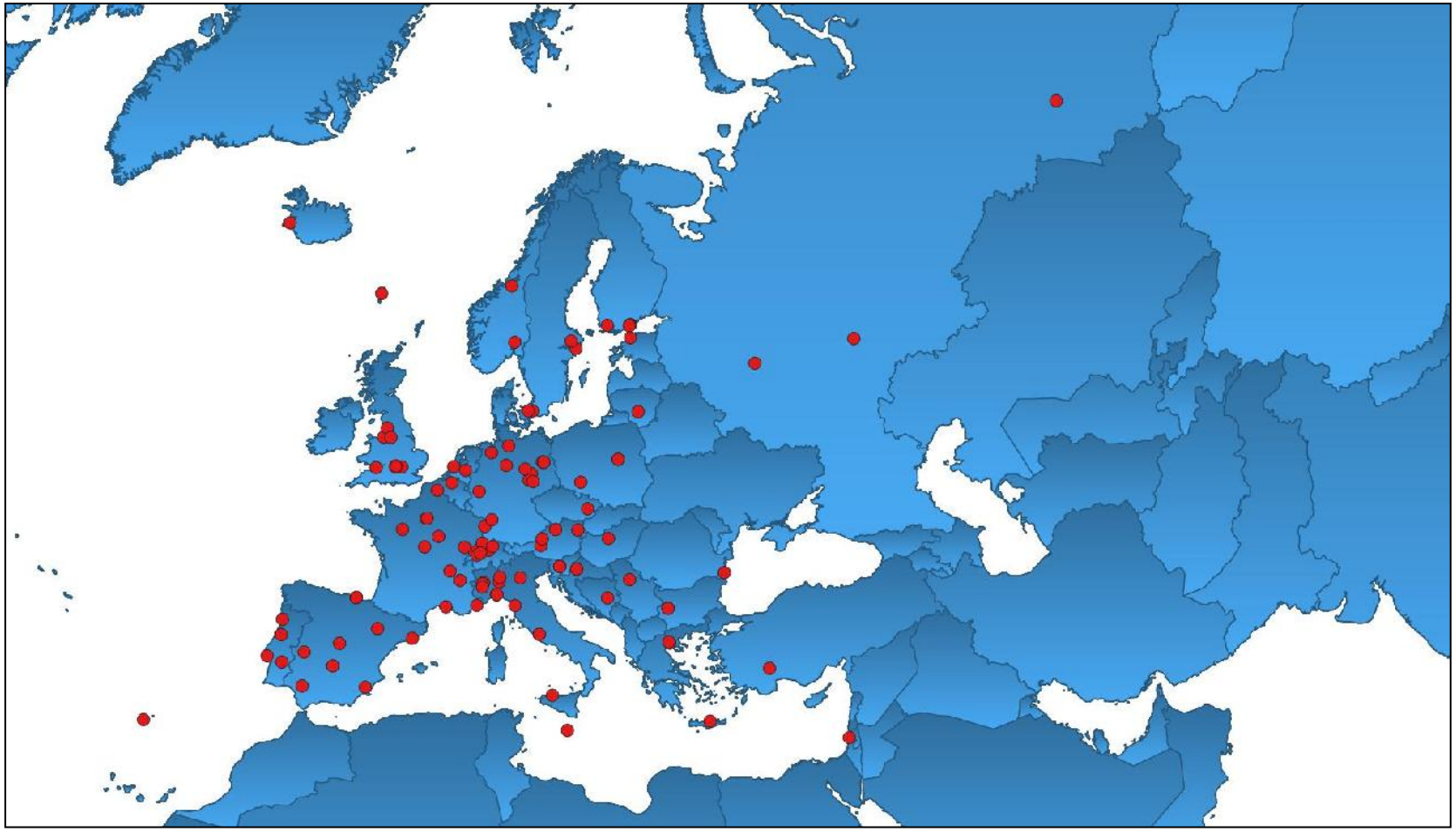
Mission Hosts: Paola Movalli & René Dekker, Naturalis Biodiversity Center, The Netherlands

Method

1. Gather contacts for relevant natural science collections around Europe
    - Natural history museums (NHMs)
    - Environmental specimen banks (ESBs)
    - Other research collections (ORCs)
2. Develop and format a *Google Forms* online questionnaire
3. Prepare launch including cover email, supporting letter
4. Launch questionnaire (email to 178 collections in 38 countries)
5. Track, encourage and collate responses
6. Analyse response data

Responses

116 responses (65%) – 74 NHMs, 7 ESBs, 35 ORCs from 30 countries



% of collections receiving raptor specimens

- 75% of all collections (87, n=116) receive fresh raptor specimens
  - NHMs (n=74) – 66 receive fresh raptor specimens (89%)
  - ESBs (n=7) – 2 receive fresh raptor specimens (29%)
  - ORCs (n=35) – 19 receive fresh raptor specimens (54%)
- Specimens include:
  - victims of collision (vehicle, window, windmill, power line, etc.)
  - birds found shot or poisoned
  - ill or injured birds that have died at recovery centres.
- Specimens are brought in by both professionals and non-professionals

Number of raptor specimens arriving annually

Number of carcasses	NMHs (n=74)		ESBs (n=7)		ORCs (n=35)	
	no.	%	no.	%	no.	%
0	6	8.1	0	0	11	31.4
1-9	25	33.8	0	0	4	11.4
10-99	26	35.1	0	0	9	25.7
100-249	4	5.4	0	0	3	8.6
250-499	2	2.7	1	14.3	2	5.7
500-999	0	0	0	0	0	0
1000+	1	1.4	0	0	0	0
not known	10	13.5	0	0	6	17.1
est. total carcasses	**3990+**		**255**		**1780+**	
	6025+					

Number of carcasses retained in freezers

Number of carcasses	NMHs (n=74)		ESBs (n=7)		ORCs (n=35)	
	no.	%	no.	%	no.	%
0	13	17.6	6	0	22	62.9
1 - 9	9	12.2	0	0	4	11.4
10 -99	30	40.5	0	0	3	8.6
100 - 249	5	6.8	0	0	2	5.7
250 - 499	2	2.7	1	14.3	1	2.9
500 - 999	2	2.7	0	0	0	0
1000+	1	1.4	0	0	1	2.9
not known	12	16.2	0	0	1	2.9
Total carcasses (est.)	**5800+**		**300**		**1900+**	
	8000+					

Species most commonly stored in freezers

- NHMs (n=35) provided detail of specimens by species
- 49 species stored
- Most frequently stored (each >100 specimens)
    - Eurasian sparrowhawk *Accipiter nisus*
    - Eurasian kestrel *Falco tinnunculus*
    - Eurasian buzzard *Buteo buteo*
    - tawny owl *Strix aluco*
    - long-eared owl *Asio otus*
    - Ural owl *Strix uralensis*
    - barn owl *Tito alba*
    - eagle owl *Bubo bubo*

Other key findings

- Most collections store fresh tissues deriving from raptor carcasses
  - ORCs and ESBs mostly store tissues frozen, while NHMs more frequently store in ethanol (less suitable for contaminant analyses)
- Storage protocols are more frequently used in ESBs and ORCs than in NHMs
- Many raptor specimens arriving at collections are destroyed and not stored
- Constraints to storage:
  - Freezer capacity – a constraint for c. ½ of NHMs and ORCs
  - Processing effort - a constraint for c. ⅓ of NHMs and ORCs

Digitization of collections

- NHMs (n=74)
  - 14 (19%) digitized, online
  - 16 (22%) digitized, not online
  - 32 (43%) digitization in progress
  - 12 (16%) not begun to digitize
- ORCs (n=23)
  - 1 (4%) digitized, not online
  - 4 (18%) digitization in progress
  - 18 (78%) not yet begun
- ESBs (n=2)
  - 1 digitized, available online, 1 digitized, not online

Raptor research in collections

NHMs (n=74)

- **20 (27%) involved in research on raptors**
- 48 (65%) not actively involved

ORCs (n=31)

- **26 (84%) involved in research on raptors**
- 4 (13%) not actively involved

ESBs (n=4)

- **1 (25%) involved in research on raptors**
- 2 (50%) not actively involved

Ecotoxicology publications are much less frequent for NHMs than for ORCs and ESBs

Conclusions

1. Collections in Europe receive thousands of raptor carcasses per annum
2. NHMs are the key recipients of raptor carcasses for most countries
3. NHMs and other collections offer a substantial resource of frozen raptor carcasses and tissues from recent years
4. Collections have good specimen numbers for species that have been prioritised for pan-European contaminant monitoring
5. Freezer capacity is a key constraint to retention of carcasses
6. Collections are becoming digitized and thus more accessible
7. Contaminant biomonitoring is novel for most NHMs

Thank you!