CONTEXT

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Knowledge flow on impacts of Transmission Power Lines (TPL; 150-400 kV) on Birds

EIA Process

Environmental & Nature Conservation Authorities

Monitoring Programmes (post-evaluation)

Consultancy companies

REN

Technical Reports & Data

Specific Protocols

NGO's / ICNF

CIBIO
Research Center in Biodiversity and Genetic Resources

New data

Scientific literature

Type of information:
- Mortality rates (collis.)
- Trials to correct scavenger and detection bias
- Flight rates (through PL)
- General Bird Abundance
- Specific surveys for sensitive species (displacement)
- 1 National bird mortality assessment
- 2 Studies designed to test Wire-marking effectiveness

Last ~15 years:
- Large amount of data
- High research potential
- Unexplored for science

✓ **Gathering data on Bird–PL interactions from REN studies (Task 1.2) aims to improve the scientific knowledge on:**

➡ • Collision patterns and driving factors (e.g. season, habitat, PL-features)

➡ • Susceptibility of different species (to improve predictability of impacts)

➡ • Carcass (un)detectability and removal by scavengers

➡ • Effectiveness of wire-marking devices to reduce bird collision

• Indirect impacts of TPL on sensitive species (e.g. displacement)

➡ • Review the current practices on monitoring, mitigation and compensation of TPL impacts on birds, as well as on the evaluation of their effectiveness

✓ **Main application for REN (& other stakeholders)**:

➡ • Update the Best Practice Guidelines

Compilation of bird mortality data from REN studies

- General Patterns of Collision with TPL

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General Patterns of Bird Collision with TPL Methods

Data compilation on bird collision
- REN Digital Archive;
- 34 studies (31 Monit Prog EIA process + 3 from protocols)
  - Duration: 1 - 5 years; Period: 2003-2015
  - >60 TPL

From final reports, extracted:
- Nr Carcasses found / species
- Extention of sampled PL sections
- Nr surveys (repetitions year-round)
- Calculated the accumulated effort

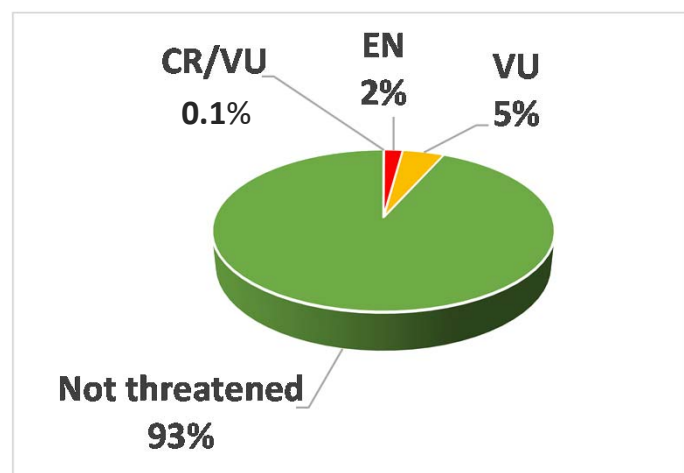- 700 km of PL sections
- 13400 km of total effort
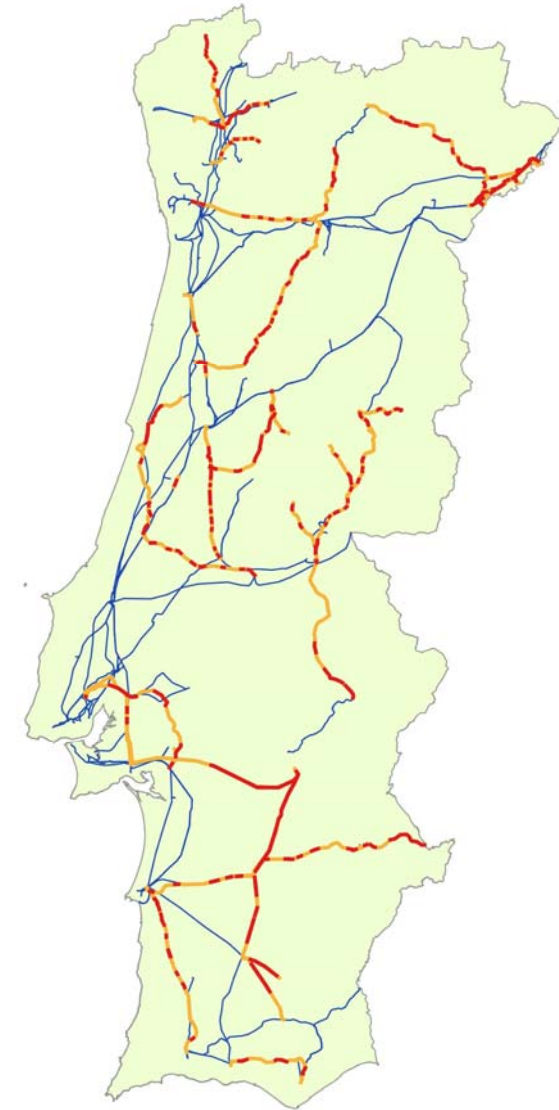
GENERAL PATTERNS OF BIRD COLLISION WITH TPL RESULTS (PRELIMINARY)

	Nr Carc	Effort (km)	Indic OMR
Total (n=34 stud)	3410	13400	0.25 carc/km
Range	0-1108	4.6-2112	0 – 0.58 carc/km

Conservations Status (n=2957 identified carcass)

| Rk	Species (Eng names)	Species (Pt names)	Nr carc	Cons Stat
1	Corn bunting	Trigueirão	300	LC
2	Spotless starling	Estorninho-preto	274	LC
3	Blackcap	Toutinegra-barrete	268	LC
4	Song thrush	Tordo-pinto	160	NT/LC
5	White stork	Cegonha-branca	153	LC
6	Rock pigeon	Pombo-das-rochas	150	DD
7	Wood pigeon	Pombo-torcaz	140	LC
8	Lapwing	Abibe	130	LC
9	Cattle egret	Carraceiro	117	LC
10	Quail	Codorniz	96	LC
11	Little bustard	Sisão	88	VU
12	Collared dove	Rola-turca	77	LC
13	Red legged partridge	Perdiz	65	LC
14	Mallard	Pato-real	58	LC
15	Golden plover	Tarambola-dourada	57	LC
16	Great bustard	Abetarda	54	EN
17	Turtle dove	Rola-brava	41	LC
18	Azure winged magpie	Charneco	40	LC
19	Blackbird	Melro	37	LC
20	Carrion crow	Gralha-preta	32	LC

GENERAL PATTERNS OF BIRD COLLISION WITH TPL
RESULTS (PRELIMINARY)

Mortality rates (iOMR) by season
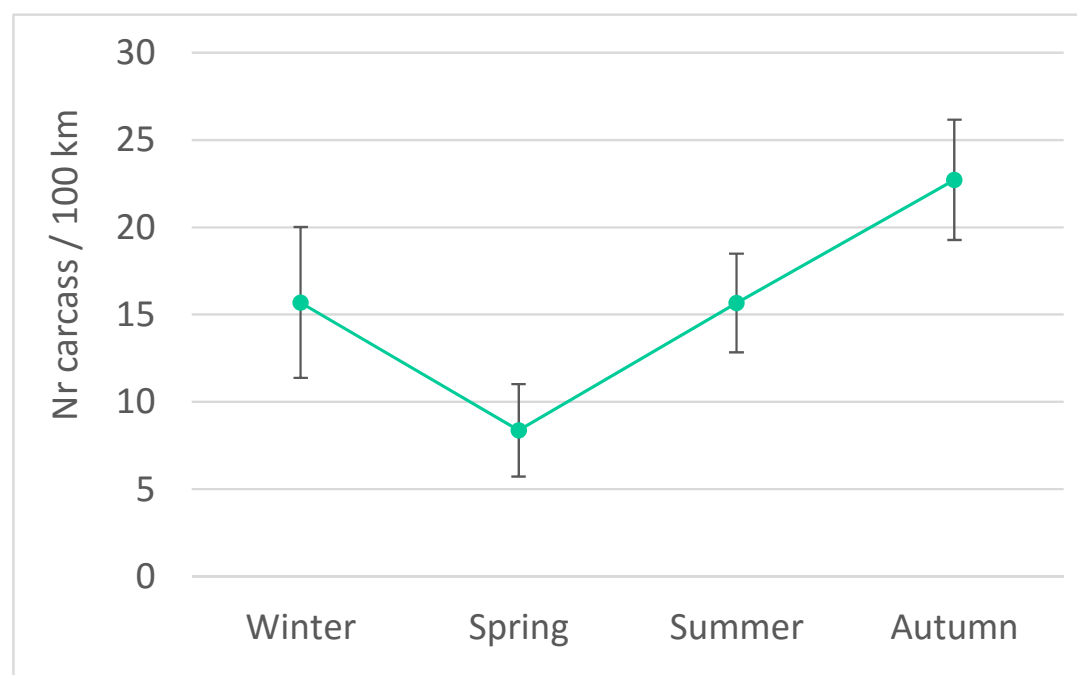
Nr of studies	27	30	27	28
(accum.) Effort (km)	2306	2485	1915	1981

General Patterns of Bird Collision with TPL
Results (preliminary)

Mortality rates (iOMR) by Nr of collision plans

4 plans
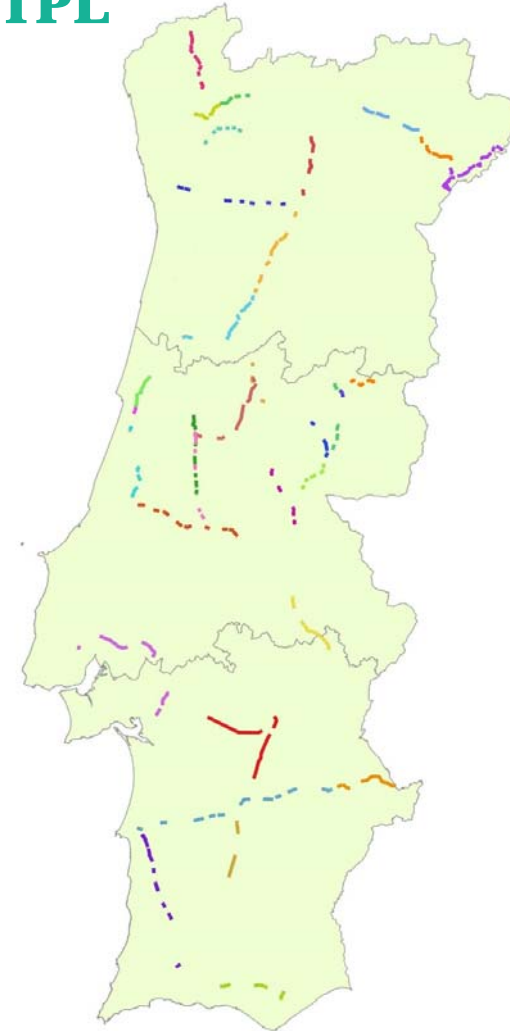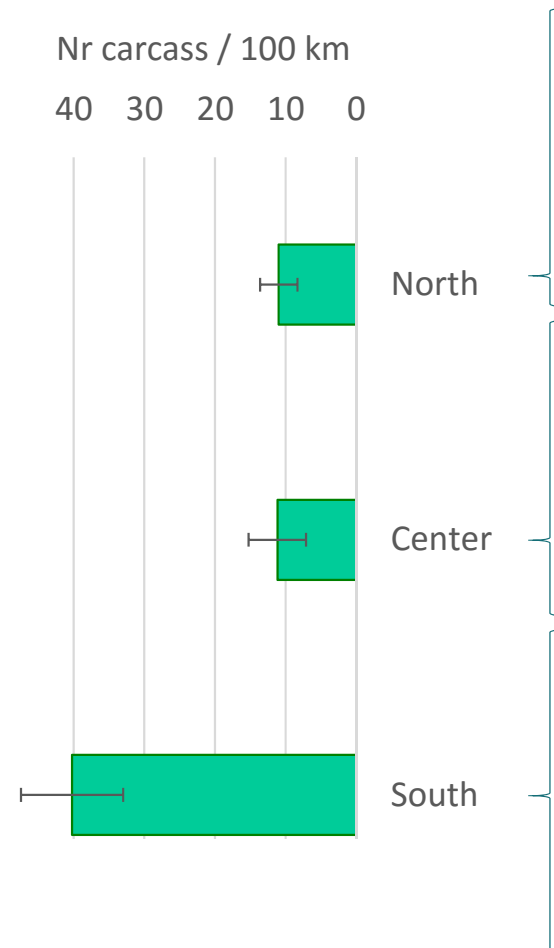
2 plans
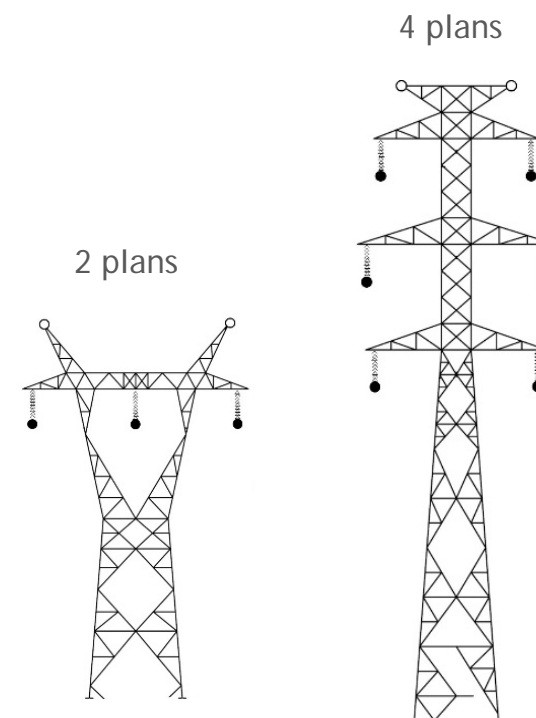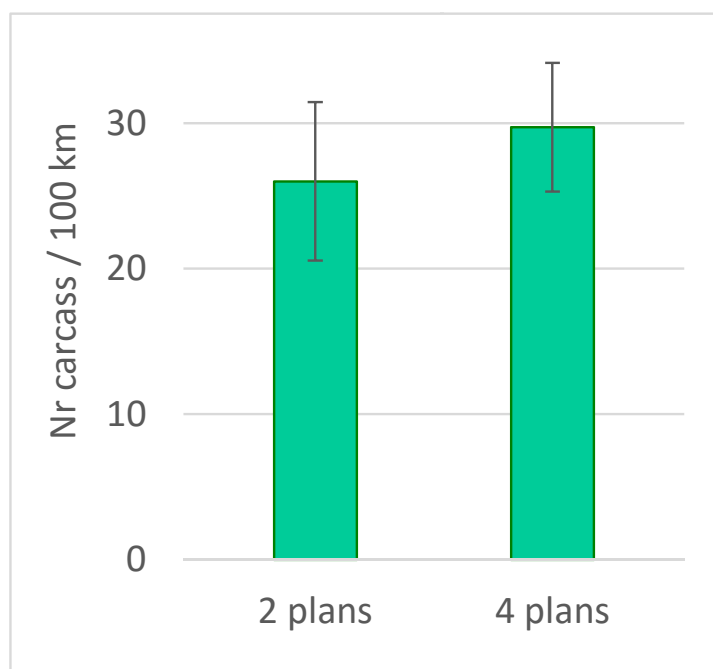
Nr of studies	7	16
(accum.) Effort (km)	3870	4598

GENERAL PATTERNS OF BIRD COLLISION WITH TPL
RESULTS (PRELIMINARY)

Mortality rates (iOMR) by region of Portugal

Nr carcass / 100 km

	Nr of studies	Effort (km)
North	11	3530
Center	16	3652
South	6	5236

General Patterns of Bird Collision with TPL Results (preliminary)

Spatial exploration of data (examples)
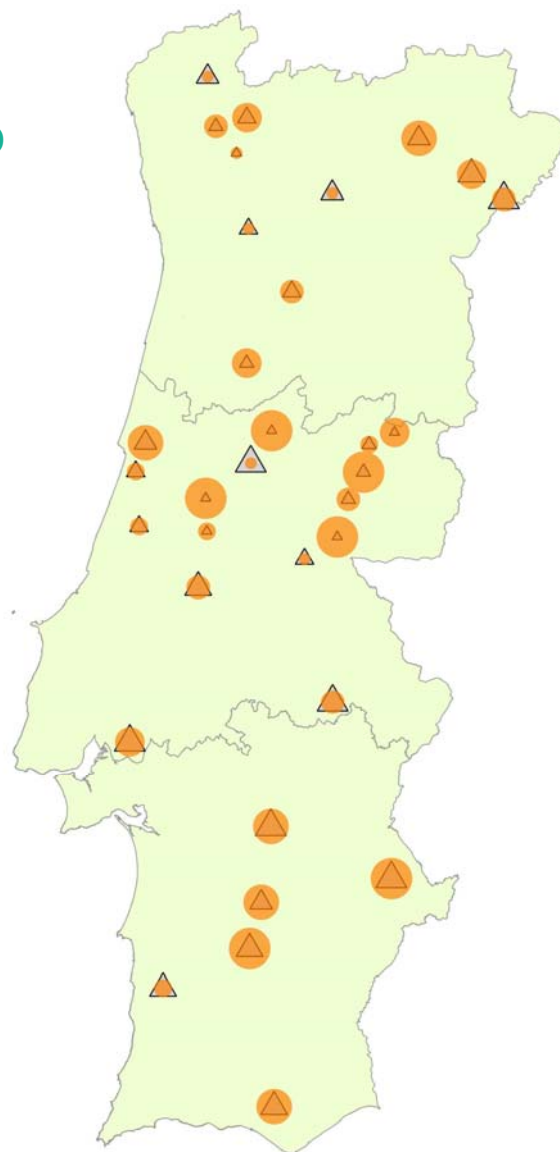
(ac.) Effort (km)

△	4.6 - 42.1
△	42.1 - 62.7
△	62.7 - 126.4
△	126.4 - 338.6
△	338.6 - 714.4
△	714.4 - 2112.0

iOMR (Nr Carcass/100km)

•	0.0 - 5.1
●	5.1 - 8.3
●	8.3 - 11.7
●	11.7 - 25.8
●	25.8 - 37.7
●	37.7 - 58.1

GENERAL PATTERNS OF BIRD COLLISION WITH TPL RESULTS (PRELIMINARY)

Spatial exploration of data (examples)

Nr of species
(Atlas Breeding Birds)

- 1.0 - 58.0
- 58.0 - 66.0
- 66.0 - 73.0
- 73.0 - 80.0
- 80.0 - 86.0
- 86.0 - 113.0
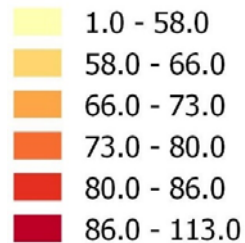
(Source: *Equipa Atlas, 2008*)

(ac.) Effort (km)

- 4.6 - 42.1
- 42.1 - 62.7
- 62.7 - 126.4
- 126.4 - 338.6
- 338.6 - 714.4
- 714.4 - 2112.0

Nr of species (collided)

- 0.0 - 3.0
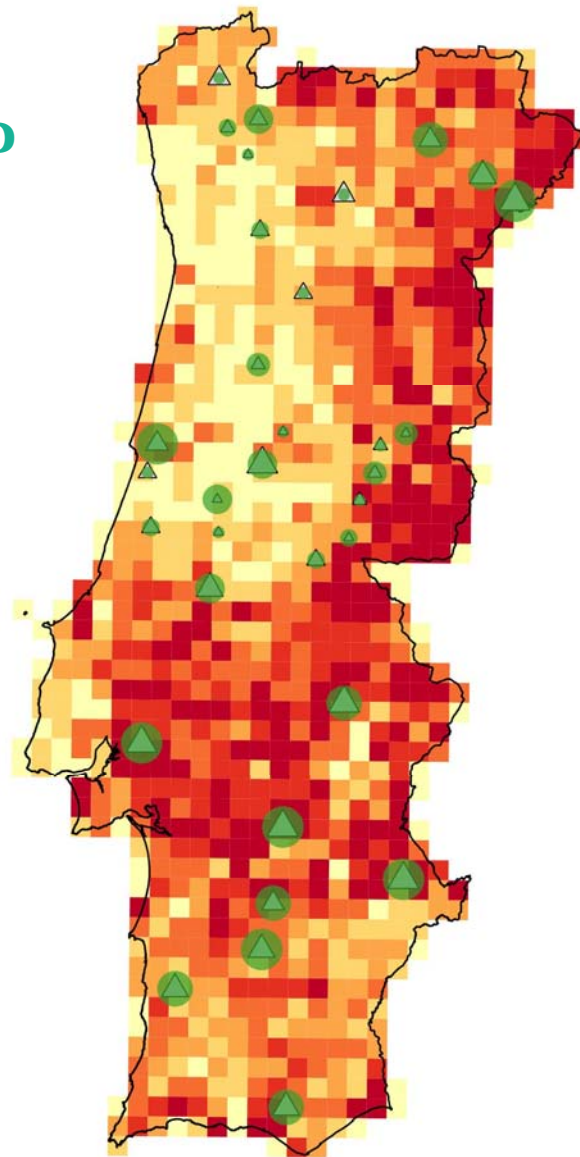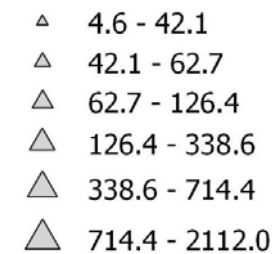- 3.0 - 4.0
- 4.0 - 8.0
- 8.0 - 18.3
- 18.3 - 27.7
- 27.7 - 75.0
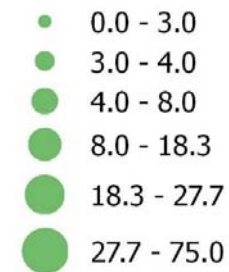
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Compilation of bird mortality data from REN studies

- Species' susceptibility to Collision

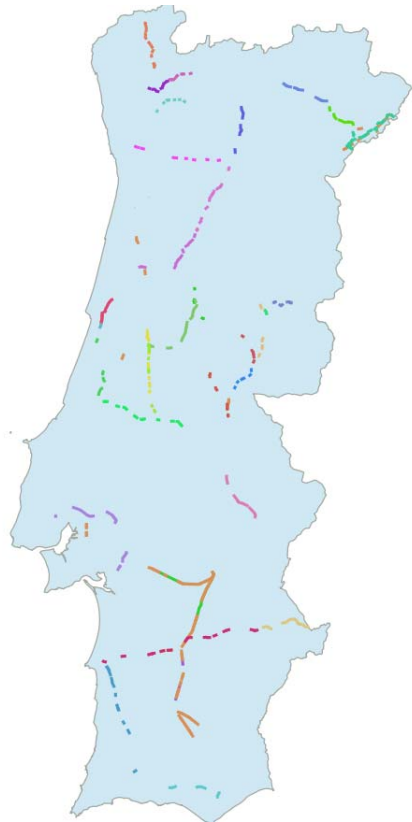# SPECIES' SUSCEPTIBILITY TO COLLISION - METHODS

X

=

For each of 214 species (from Atlas):

- % of occurrence (collided)

- Average Nr carcass found/km (iOMR)

Whenever available

Drawbacks of the (preliminary) approach:

- Not corrected for species' size (carcass removal and detection effects)

- Not adequate for species with large seasonal variations in abundance

- Not weighted by abundance /flight intensity

Bird collision by species (REN studies)
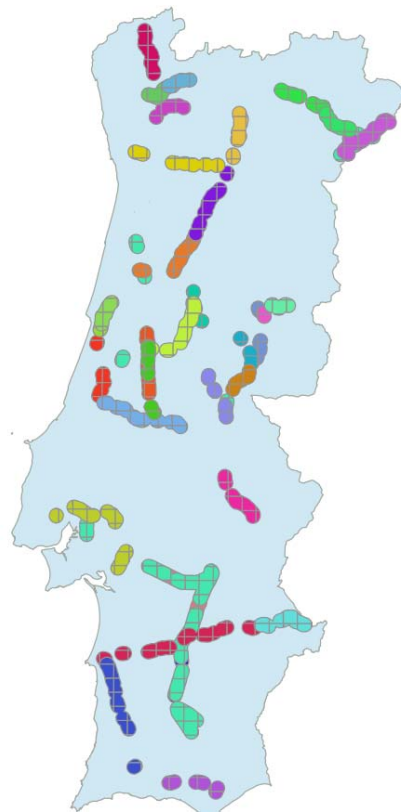
Pres/abs of species (Atlas of breeding birds)

SPECIES' SUSCEPTIBILITY TO COLLISION – (PRELIMINARY) RESULTS

Rk	Species (Eng names)	Species (Pt names)	Cons Stat	% Ocorr collision
1	Cattle egret	Carraceiro	LC	58%
2	Rock pigeon	Pombo-das-rochas	DD	56%
3	Song thrush	Tordo-pinto	NT	56%
4	Lapwing	Abibe	DD	50%
5	Little bustard	Sisão	VU	50%
6	Blackcap	Toutinegra--barrete	LC	47%
7	Spotless starling	Estorninho-preto	LC	44%
8	Blackbird	Melro	LC	41%
9	Chafinch	Tentilhão	LC	41%
10	Collared dove	Rola-turca	LC	41%
11	Corn bunting	Trigueirão	LC	39%
12	White stork	Cegonha-branca	LC	39%
13	Wood pigeon	Pombo-torcaz	LC	38%
14	Great bustard	Abetarda	EN	33%
15	Red-legged partridge	Perdiz	LC	33%
16	Black-bellied sandgrouse	Cortiçol-barr.-preta	EN	33%
17	Quail	Codorniz	LC	32%
18	Carrion crow	Gralha-preta	LC	30%
19	Turtle dove	Rola-brava	LC	29%
20	House sparrow	Pardal	LC	29%

Rk	Species (Eng names)	Species (Pt names)	Cons Stat	iOMR (carc /100 km)
1	Song thrush	Tordo-pinto	NT	1.737
2	Blackcap	Toutinegra-barrete	LC	1.472
3	Spotless starling	Estorninho-preto	LC	1.147
4	Rock pigeon	Pombo-das-rochas	DD	1.111
5	Lapwing	Abibe	DD	1.074
6	Blackbird	Melro	LC	1.064
7	Little bustard	Sisão	VU	1.039
8	White stork	Cegonha-branca	LC	0.983
9	Cattle egret	Carraceiro	LC	0.866
10	Corn bunting	Trigueirão	LC	0.790
11	Great bustard	Abetarda	EN	0.776
12	Wood pigeon	Pombo-torcaz	LC	0.603
13	Chafinch	Tentilhão	LC	0.431
14	Turtle dove	Rola-brava	LC	0.414
15	Quail	Codorniz	LC	0.397
16	House sparrow	Pardal	LC	0.328
17	Collared dove	Rola-turca	LC	0.254
18	Carrion crow	Gralha-preta	LC	0.244
19	Mallard	Pato-real	LC	0.240
20	Red-legged partridge	Perdiz	LC	0.221

SPECIES' SUSCEPTIBILITY TO COLLISION – (PRELIMINARY) RESULTS
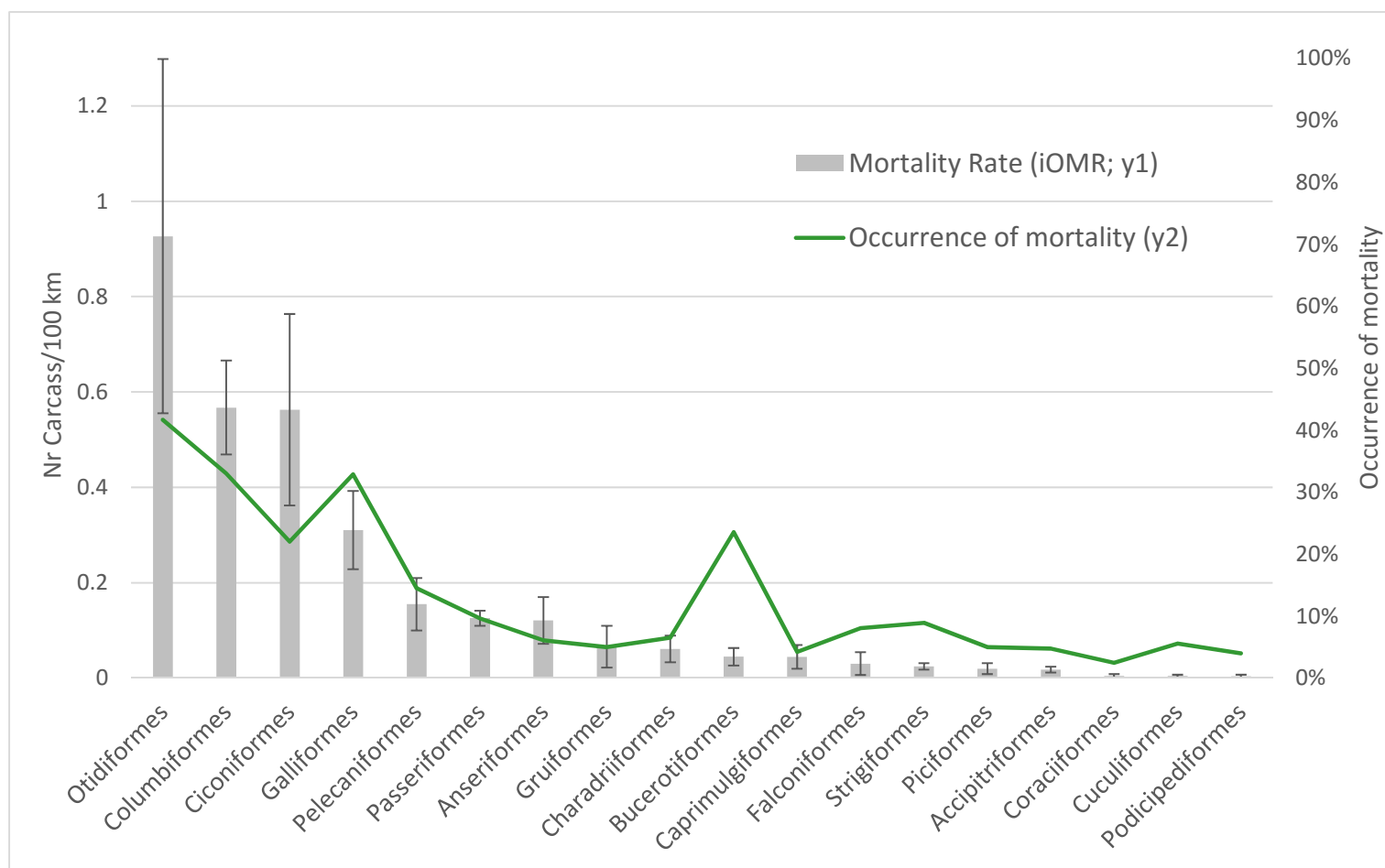
CONCLUDING REMARKS

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✓ **REN studies (Monitoring Programmes + Protocols)**

- Large data set on bird collision with TPL
- Good potential to improve the scientific knowledge on this type of interactions
- High relevance for REN and other stakeholders in the EIA process (e.g. better prediction of impacts; improve prioritization of species and areas to implement mitigation)

✓ **Next steps to improve this research potential**

- Refining data resolution (temporal, spatial scale) from already available data formats
- Collaboration with REN consultants (&NGO's) to facilitate data base "reconstruction"
- Adequate data modelling to account for the effects of several variables on bird collision
- Propose model data bases to enable centralization (by REN) of raw data from monitoring programmes of new TPL
  - Avoid data loss
  - Facilitate future reanalyses

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