Identification of black spot for bird mortality on high-voltage powerlines in Belgium by combining sensitivity mapping, citizen sciences and field expertise

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1000's ornithologists in the field
Long-term biodiversity monitoring schemes
Monitoring of specific area (e.g. nature reserve…)
1-3 millions of roving records every year

Elia, Belgium's electricity transmission system operator

high-voltage (30 kV to 380 kV) electricity transmission system

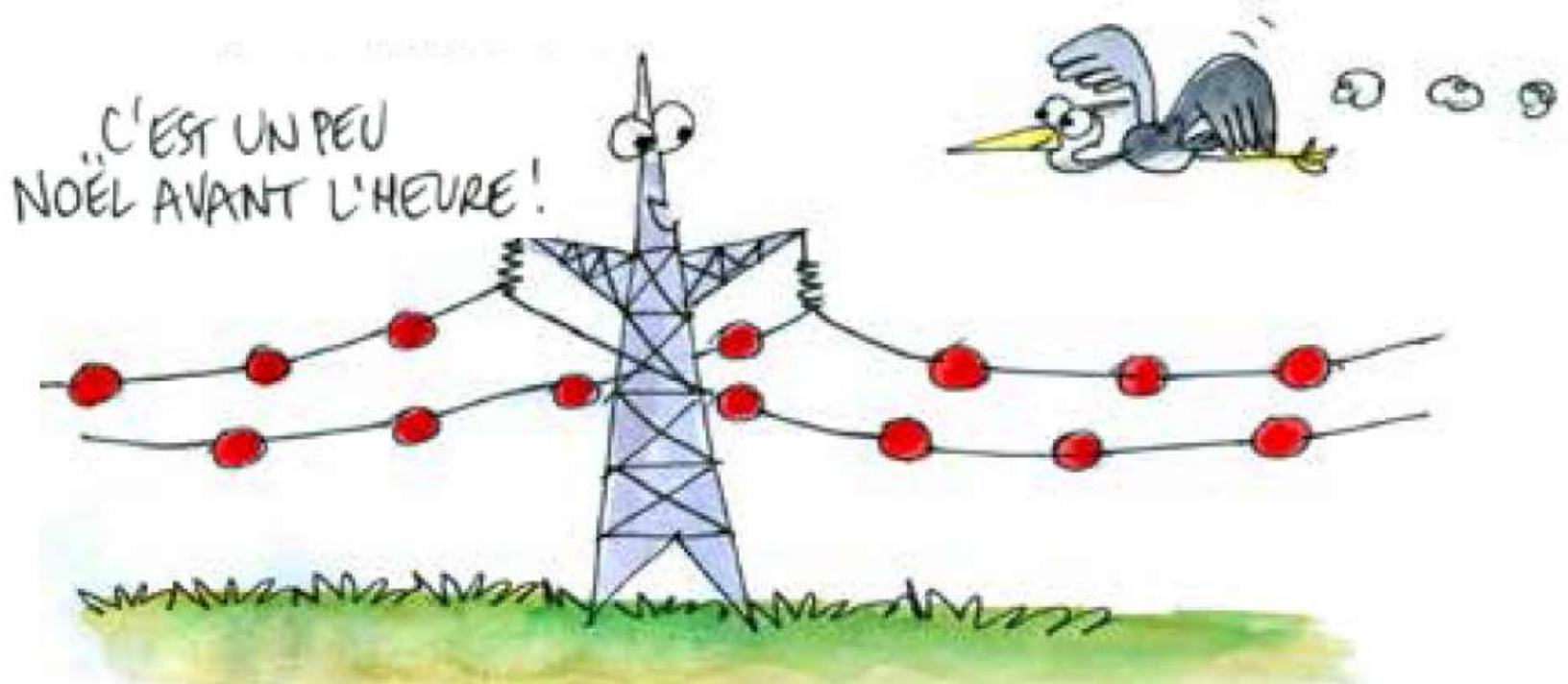5,000 km of high voltage overhead lines in Belgium

Powering a world in progress

A common question: how to decrease bird collision risks ?

Estimation of 100 to 500,000 casualities / year in Belgium only (based on litterature survey)

A solution: devices to enhance overhead lines visibility

(It's Christmas time before the time)

But then: where to prioritize diverter placements ?

À Audenarde (Flandre orientale), des riverains d'un dortoir de mouettes rieuses ont pu ramasser, presque chaque matin d'hiver, plusieurs mouettes agonisantes. Ces observations de terrain confirment notre analyse cartographique et ELIA a pu réaliser en mai dernier le placement de balises sur une partie de la ligne incriminée.
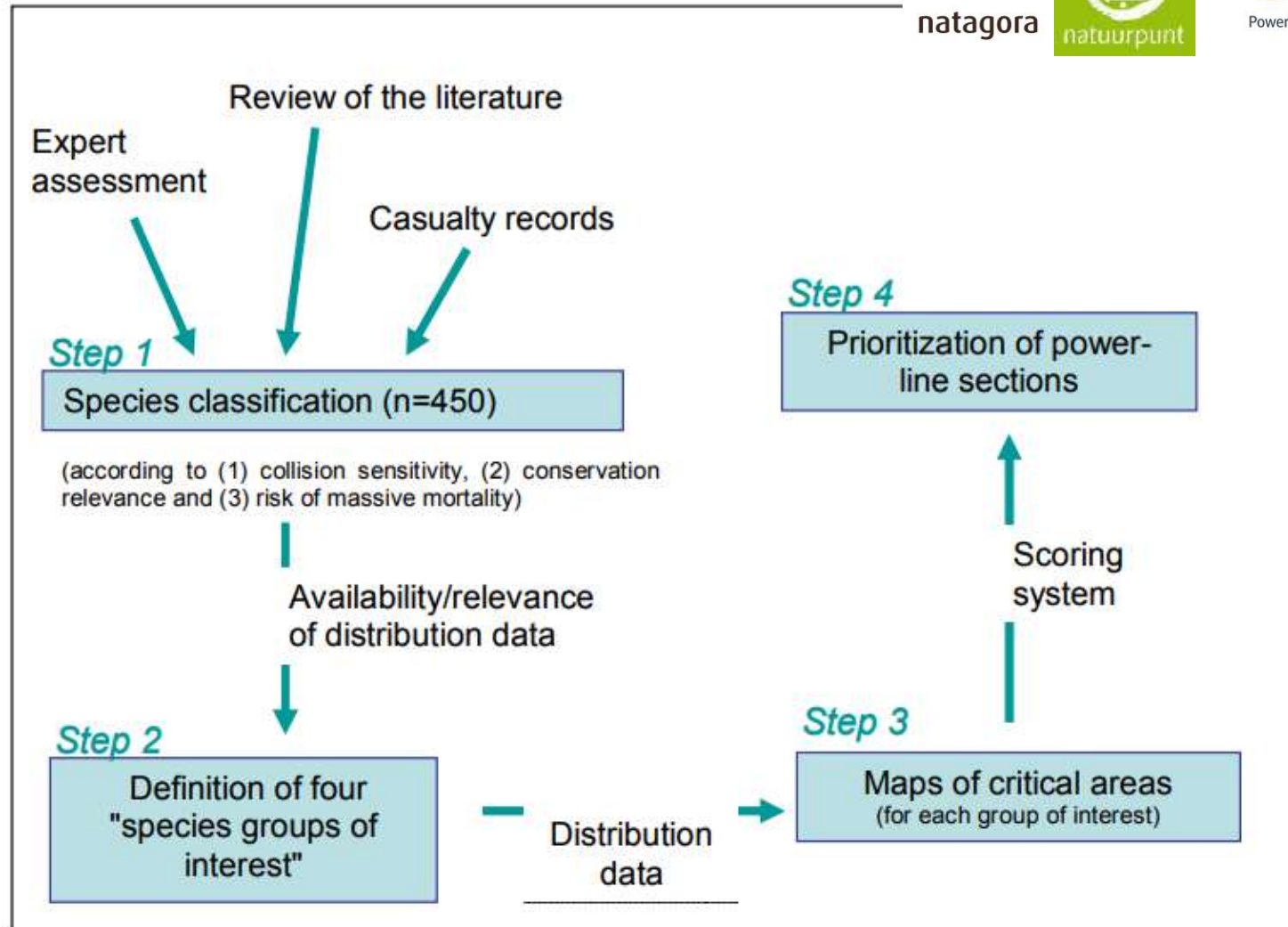
Photos : ELIA

But then: where to prioritize diverter placements ?

Three-ways approach:

1. Sensitivity mapping framework
2. On-site expert assessment
3. Citizen-sciences call for data on collision

1. Sensitivity mapping

See http://www.aves.be/index.php?id=3236

http://www.aves.be/fileadmin/Aves/Colloque50ans/Bird_and_Powerlines_Aves_Final_Report_2012.pdf

1. Sensitivity mapping

Scientific name	Number of power-line victims	Total number of victims	Proportion involving power lines
Cygnus columbianus	1	1	100.0%
Anser albifrons	1	2	50.0%
Aythya ferina	1	2	50.0%
Numenius phaeopus	1	3	33.3%
Botaurus stellaris	2	10	20.0%
Cygnus cygnus	1	8	12.5%
Scolopax rusticola	29	241	12.0%
Anser fabalis	1	9	11.1%
Anser anser	5	46	10.9%
Larus marinus	2	24	8.3%
Accipiter gentilis	2	26	7.7%
Cygnus olor	9	153	5.9%
Cuculus canorus	1	17	5.9%
Accipiter nisus	19	412	4.6%
Branta Leucopsis	1	22	4.5%
Falco tinnunculus	6	140	4.3%
Sitta europaea	1	27	3.7%
Falco peregrinus	1	27	3.7%
Ardea cinerea	14	394	3.6%
Phalacrocorax carbo	3	90	3.3%
Motacilla alba	1	33	3.0%
Alopochen aegyptiaca	1	35	2.9%
Chroicocephalus ridibundus	10	398	2.5%
Podiceps cristatus	1	47	2.1%

1. Sensitivity mapping

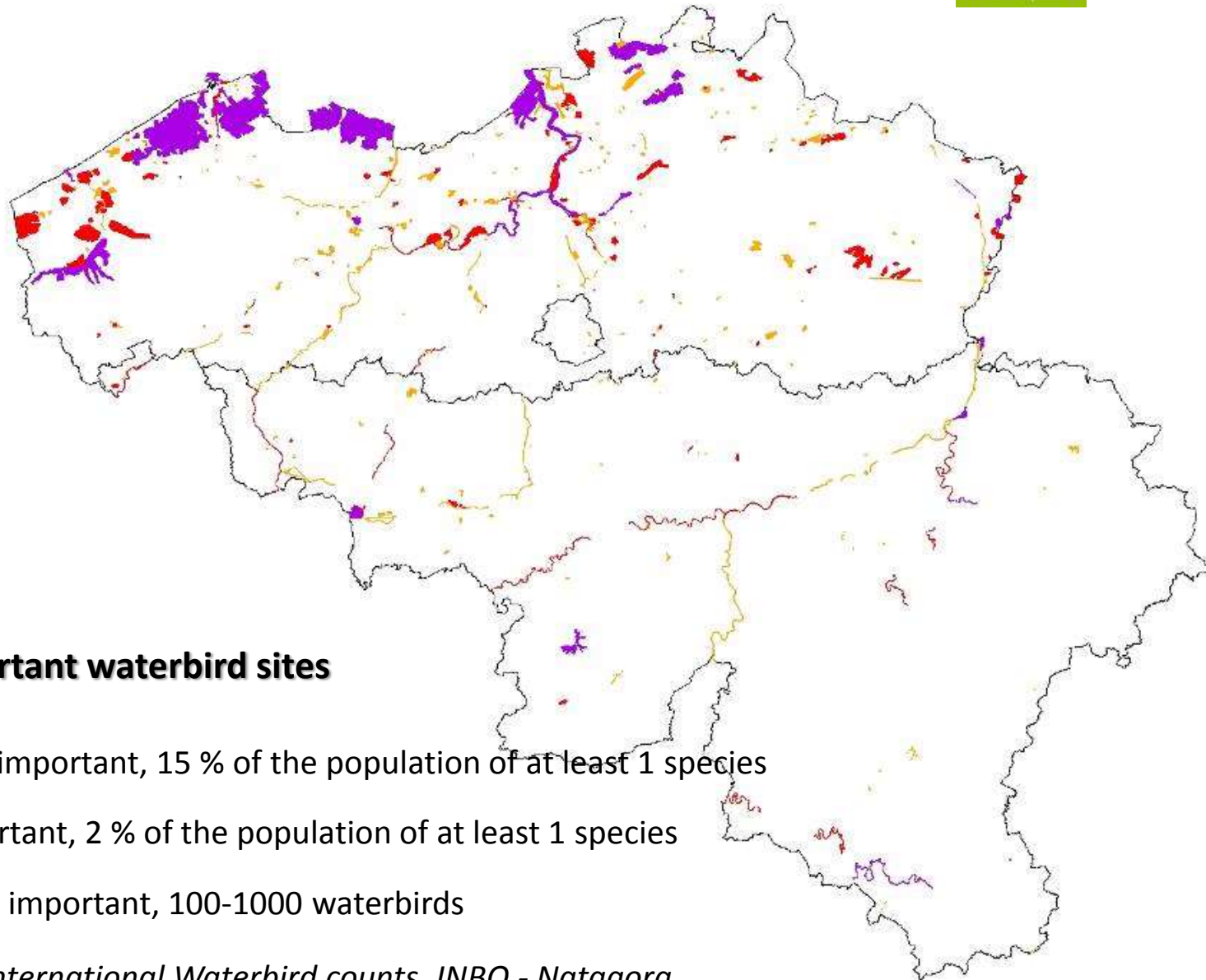## Species selection process: 4 groups of species

Group 1: **Waterbirds** – high numbers – vulnerability when moving at dusk/dawn

Group 2: **Rare breeding birds** – low number – special habitats – additional mortality to be avoided

Group 3: **Migrants** in large numbers

Group 4: **Widespread species**

© A Audevard

1. Sensitivity mapping

Important waterbird sites

Very important, 15 % of the population of at least 1 species

Important, 2 % of the population of at least 1 species

Fairly important, 100-1000 waterbirds

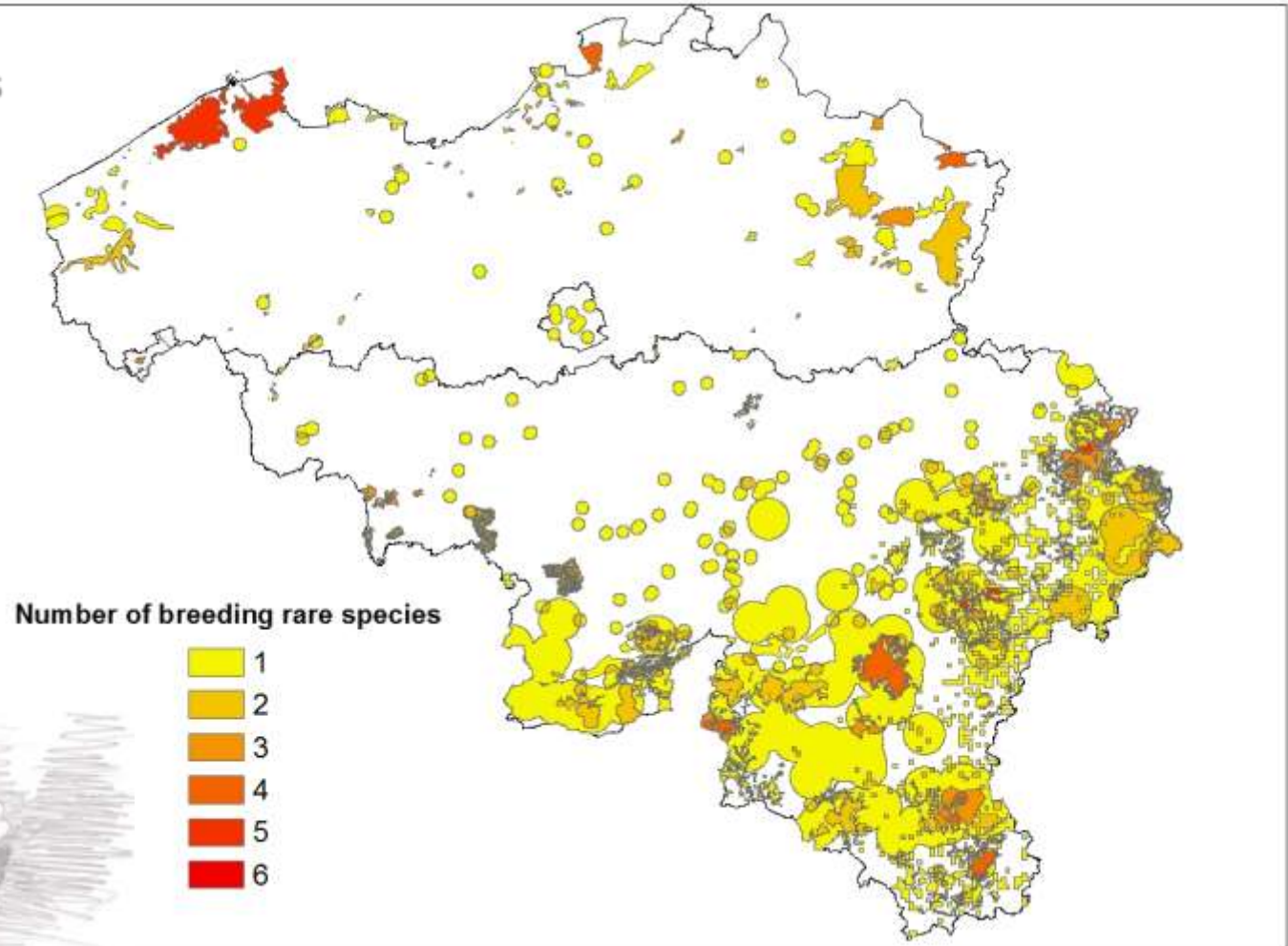*Source: International Waterbird counts, INBO - Natagora*
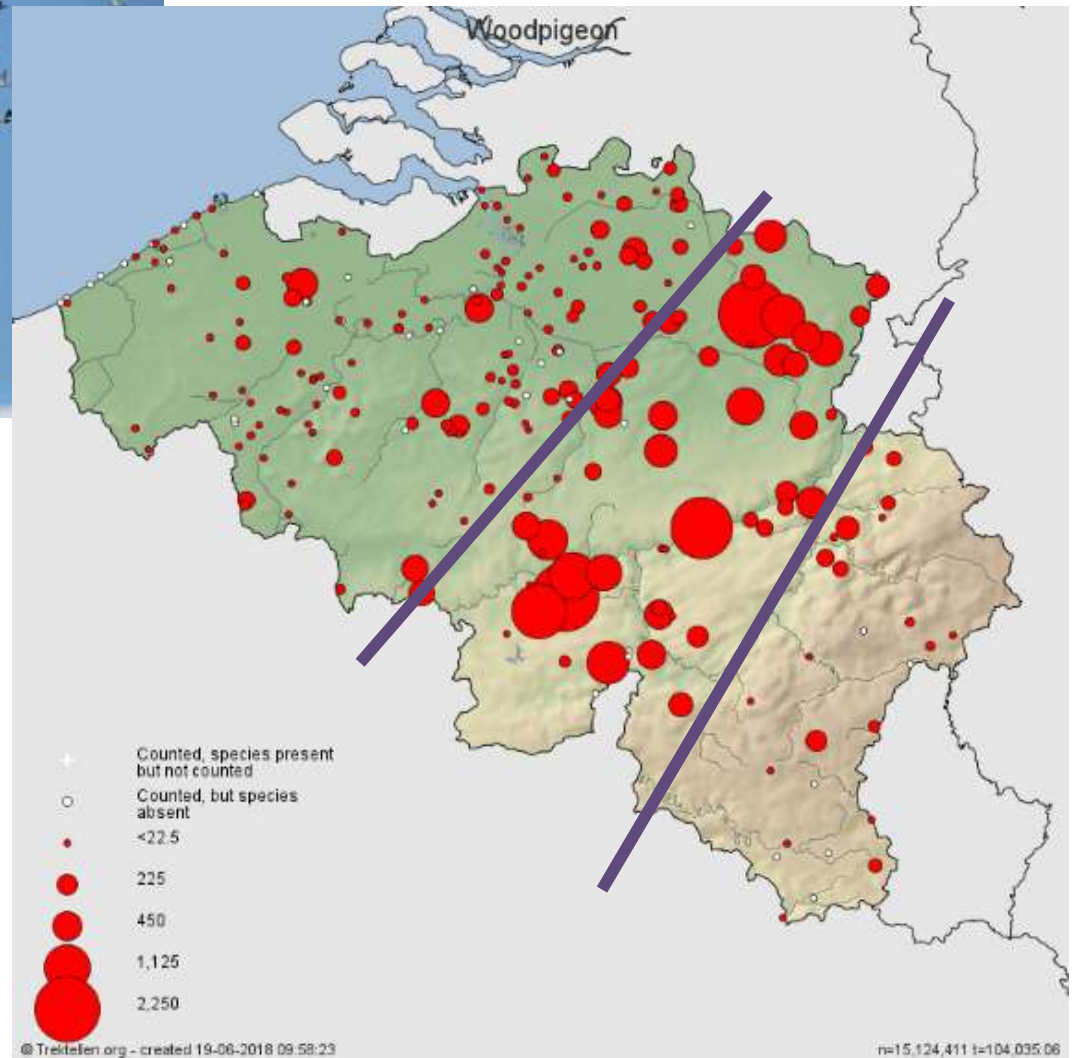
1. Sensitivity mapping

Rare breeding species

Number of breeding rare species
- 1
- 2
- 3
- 4
- 5
- 6

© CH Born

Source: Natuurpunt, INBO, Natagora

1. Sensitivity mapping

Migrants in large number

© G Rasson

www.trektellen.org

Active migration counts
(hourly average)

Woodpigeon

Counted, species present
but not counted

Counted, but species
absent

<22.5

225

450

1,125

2,250

@ Trektellen.org - created 19-06-2018 09:58:23

n=15,124,411 t=104,035.06

1. Sensitivity mapping

Widespread collision-sensitive bird

Modelled relative density of roding woodcock

Relative density
- 0,0005 - 0,1000
- 0,1001 - 0,2000
- 0,2001 - 0,3000
- 0,3001 - 0,4000
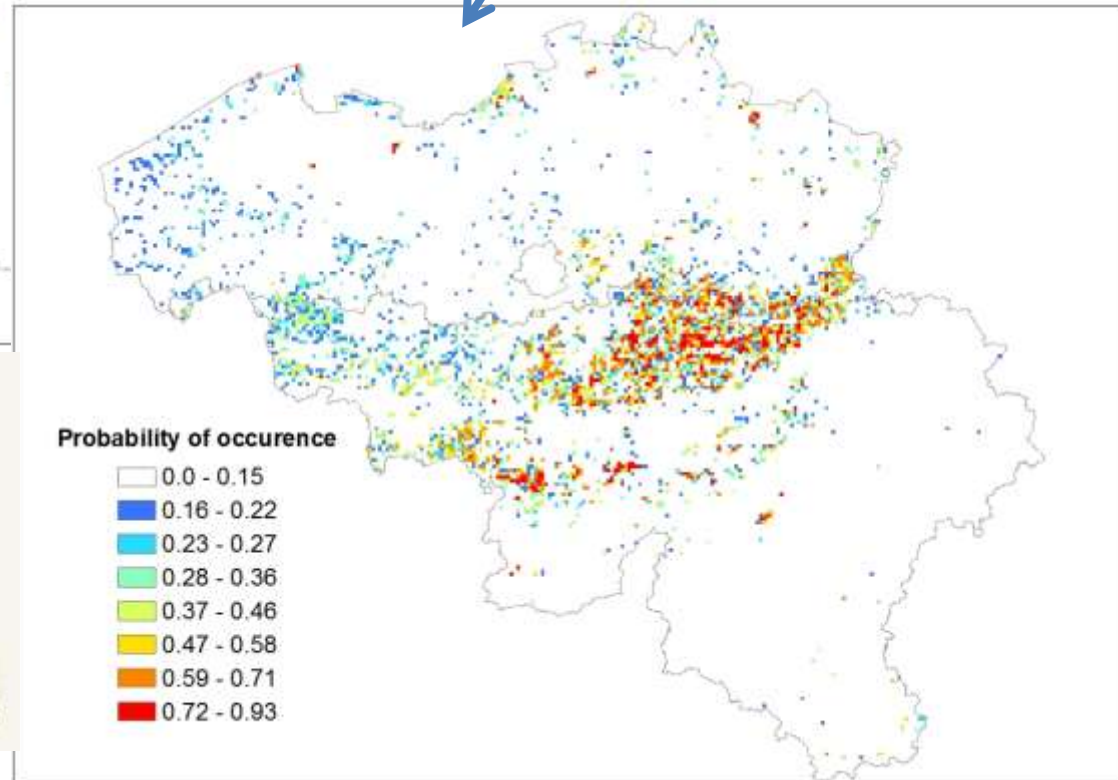- 0,4001 - 0,5000
- 0,5001 - 0,6000
- 0,6001 - 0,7000
- 0,7001 - 0,8000
- 0,8001 - 0,9000
- 0,9001 - 1,0000
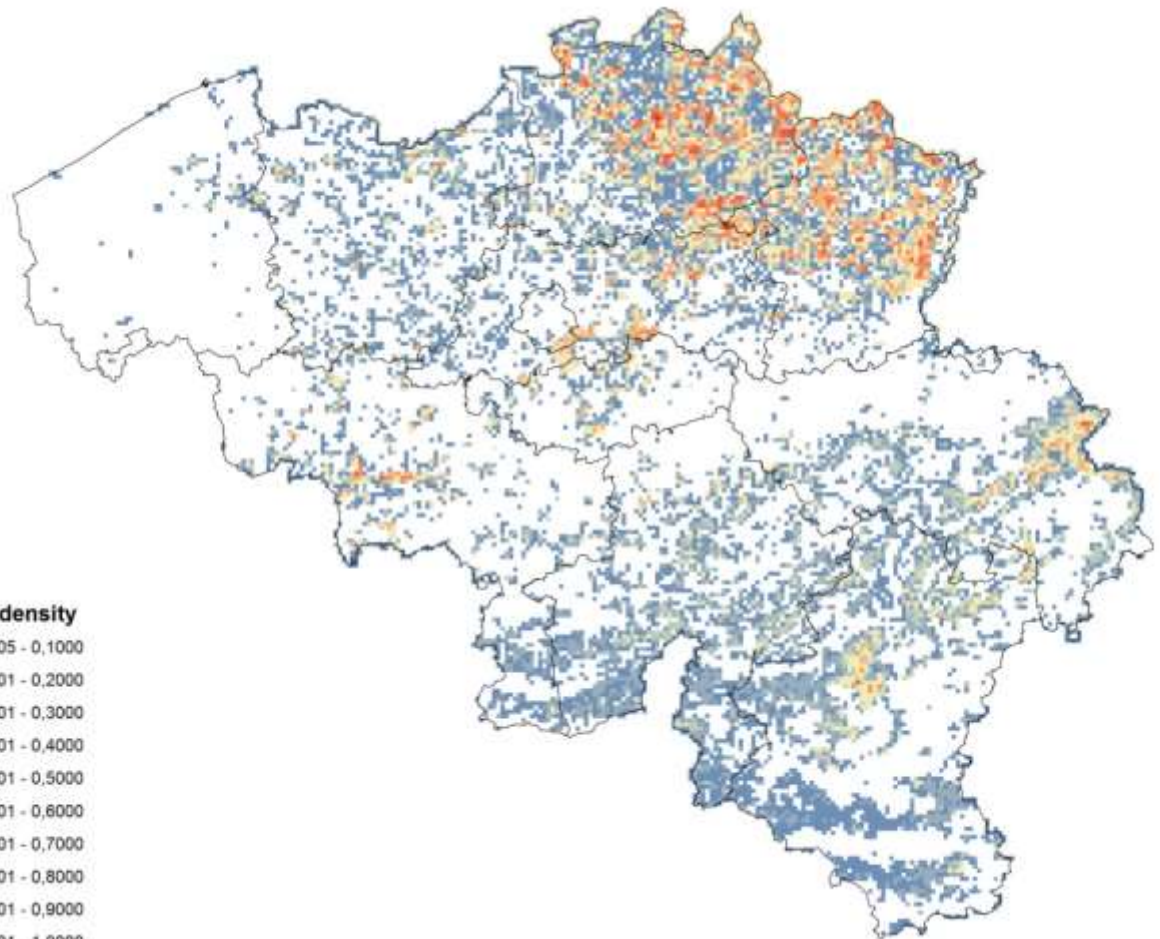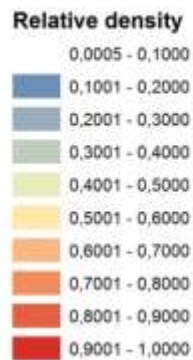
1. Sensitivity mapping

Widespread collision-sensitive bird
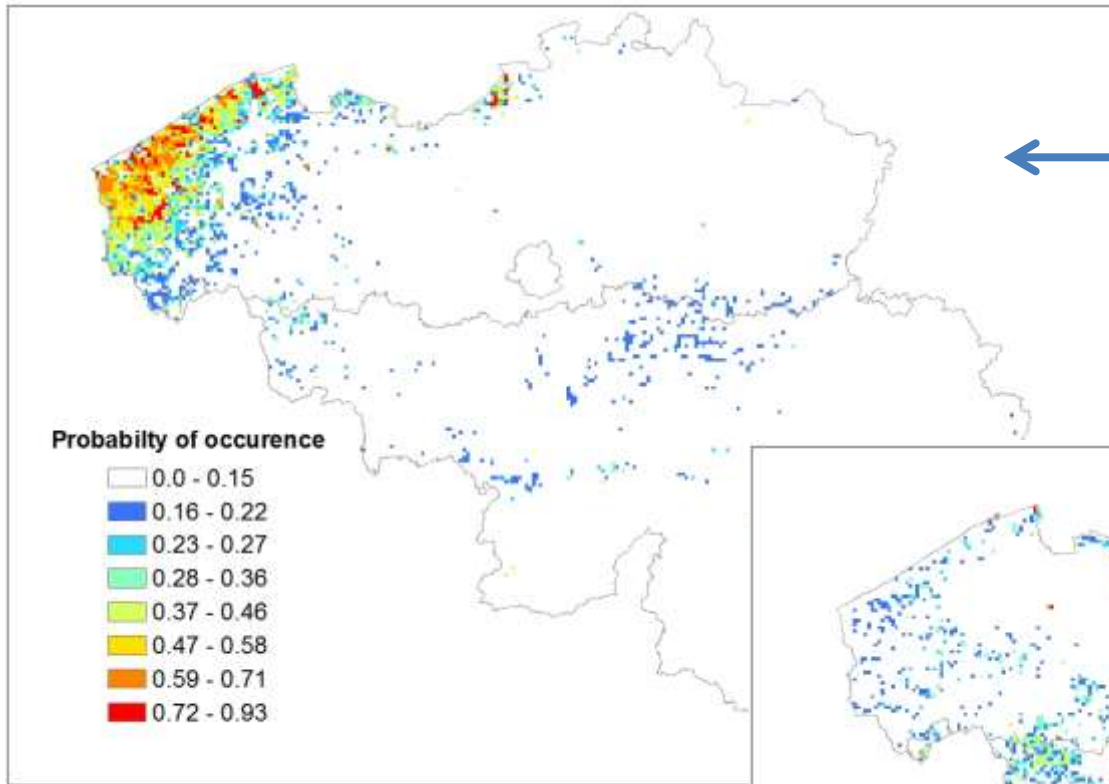
Staging area for:
Golden Plover
Dotterel

Probabilty of occurence
- 0.0 - 0.15
- 0.16 - 0.22
- 0.23 - 0.27
- 0.28 - 0.36
- 0.37 - 0.46
- 0.47 - 0.58
- 0.59 - 0.71
- 0.72 - 0.93

Probability of occurence
- 0.0 - 0.15
- 0.16 - 0.22
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- 0.28 - 0.36
- 0.37 - 0.46
- 0.47 - 0.58
- 0.59 - 0.71
- 0.72 - 0.93

© JS Rousseau-Piot

Expert-based scoring system of the collision risk

Critical area considered	Distance from the critical area				
	Inside	Less than 1 km	Between 1 and 3 km	Between 3 and 5 km	Over 5 km
Waterbird roost	If very important =25; important=20	14	9	4	0
Waterbird colonies	If very important =25; important=20	14	9	4	0
Important waterbird site	If very important =30; important=25; fairly important=20	14	9	4	0
Daily corridor	4 if important, 6 if very important				
Rare-bird Area	10 points for area with 1 rare species, 20 for area with 2-3 rare species, 25 for area with 4-5 rare species and 30 for area with more than 5 species				
Migration corridor	8 points if power line pylon is inside, 12 for the coastal corridor				
Plover staging area	5 points for each of the 2 species, when presence cut-off is reached *				
Widespread breeding bird	4 points by species, when presence cut-off of the species is reached *				

1. Sensitivity mapping
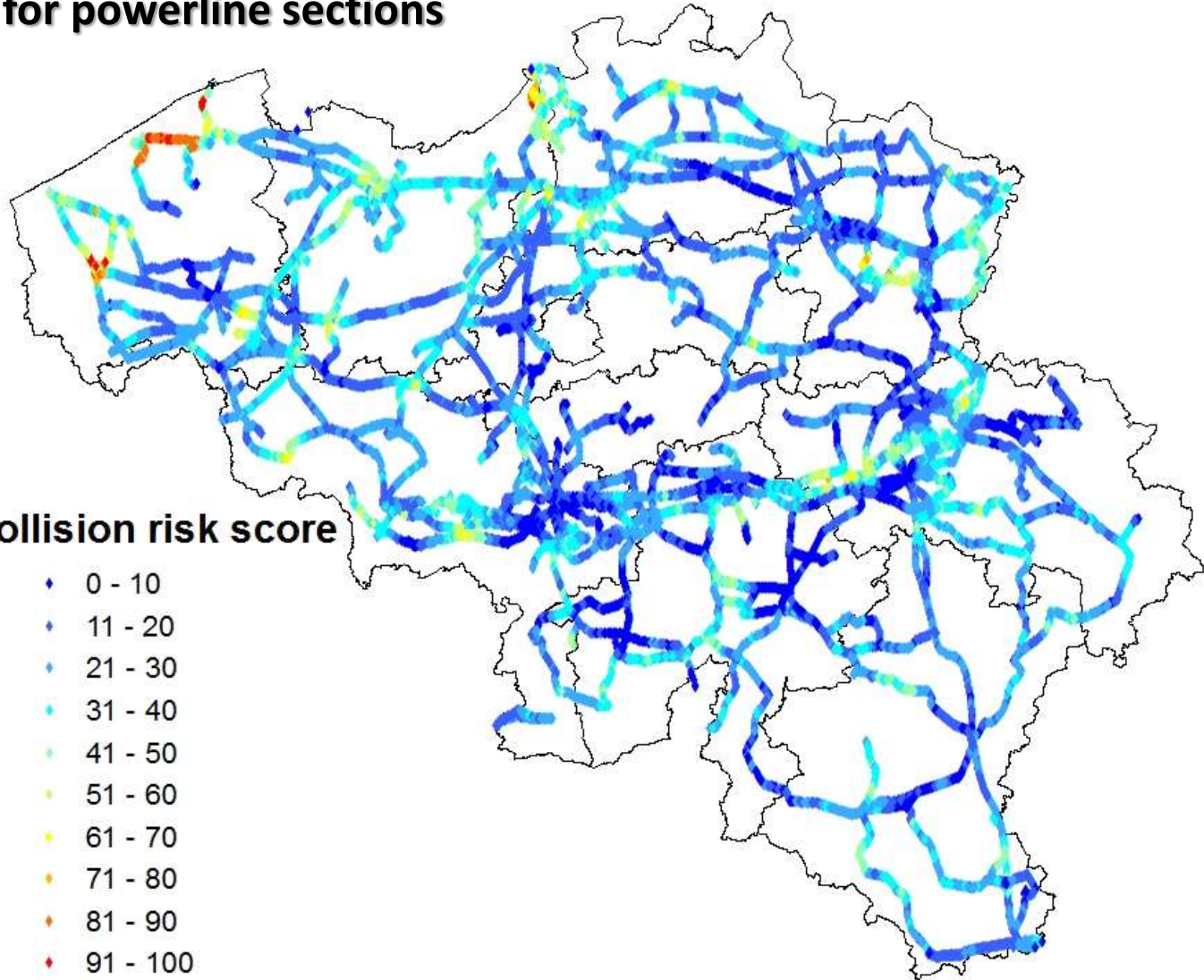
« Landscape map » of the collision risk
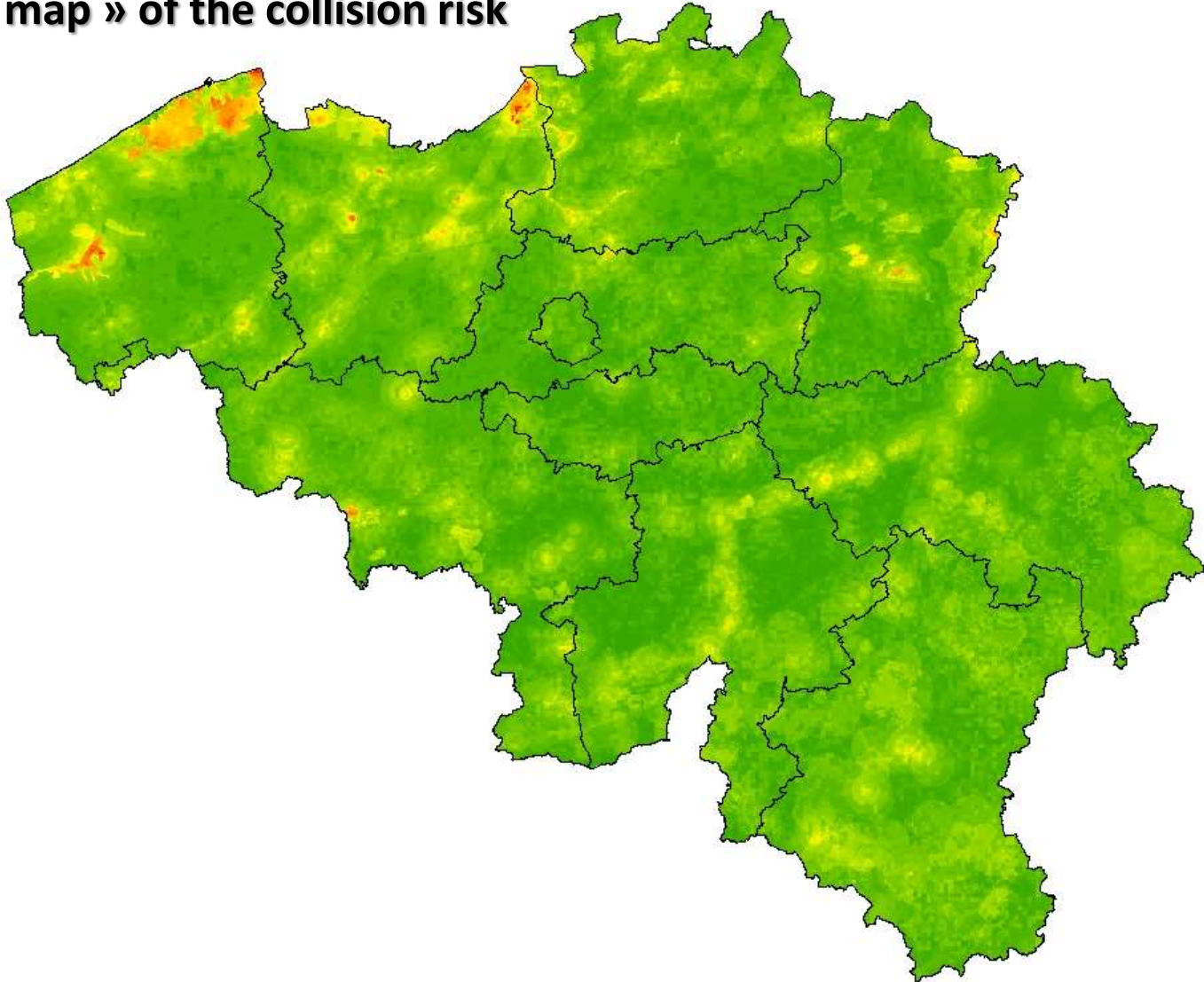
« Risk score » for powerline sections

Bird collision risk score

- ◆ 0 - 10
- ◆ 11 - 20
- ◆ 21 - 30
- ◆ 31 - 40
- ◆ 41 - 50
- ◆ 51 - 60
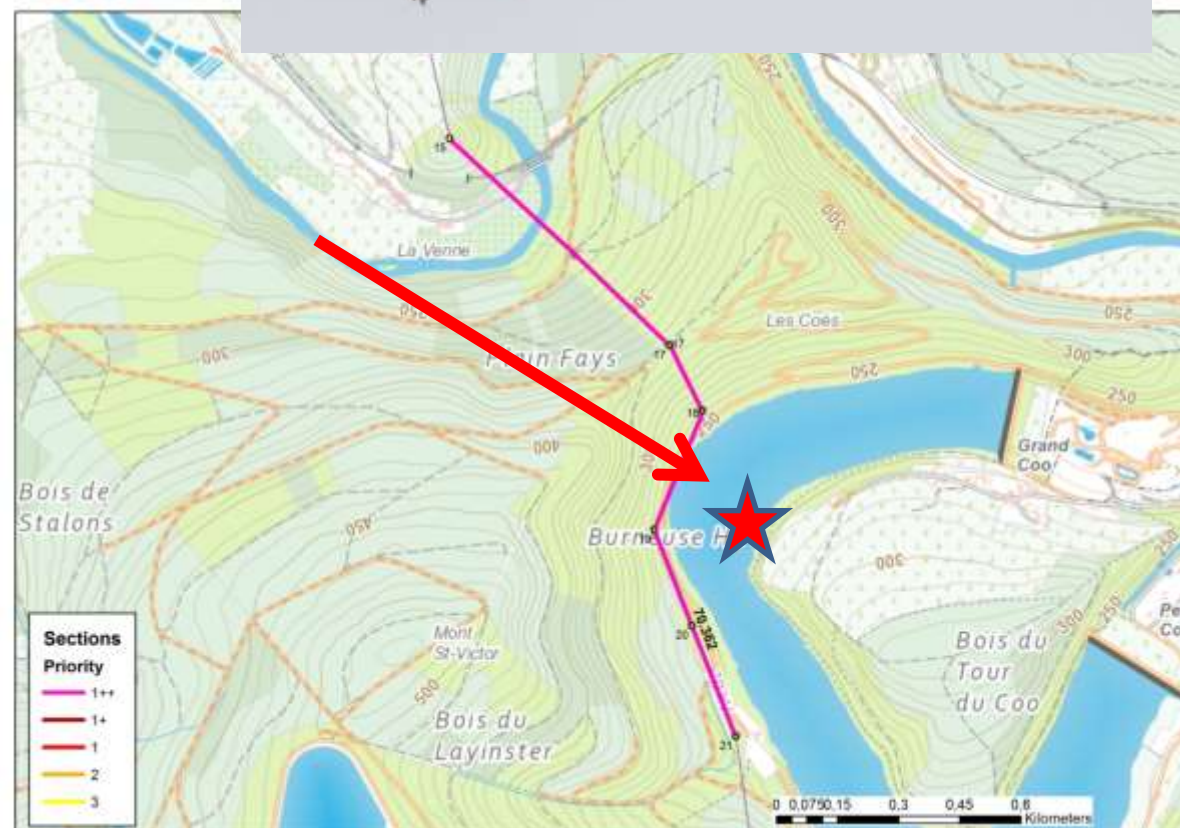- ◆ 61 - 70
- ◆ 71 - 80
- ◆ 81 - 90
- ◆ 91 - 100

2. On-site expert assessment

Important roost site of Goosander :

Field survey to identify flyway from feeding place to roost

2. On-site expert assessment

Local birdwatcher knowledge: Common Crane staging place

© F Renard

3. Citizen-Science call for data

Nature Portal Observation.org :

Recording of detected powerline victims

3. Citizen-Science call for data

3. Citizen-Science call for data

City	Toponym	Theoretical risk assessment	Number of detected victim
Ertvelde	Walprij	1++	43
Munsterbilzen	Munsterbos	1++	11
Merelbeke	Liedermeerspark	3	10
Oudenaarde	Doornikse	1++	9
Tienen	Bezinkingsputten	1+	8
Diksmuide	IJzerbroeken	1++	7
Kallo-Doel	Groot Rietveld	1++	7
Kallo-Doel	Rietmoerassen	1++	5
Zandvliet	Groot	1	5
Oudenaarde	Stad	1+	5
Londerzeel	Marselaer	1++	5
Bornem	Noordelijk Eiland	1+	4
Kallo-Doel	Rietmoerassen	1+	3
Waarmaarde	Waarmaarde	1	3

Verbelen D. & Swinnen K., 2018. Vogels onder hoogspanning in België: een stand van zaken en een kijk door de trailcam. Rapport Natuurpunt Studie 2018/4, Mechelen

In conclusion

Complementary data sources should be mobilized to point out hot spot: monitoring, casual records, focus field research

New focus species can emerge for field information: (woodcock case)

Long-term collaboration between grid operator and bird society is crucial

Value for birdwatchers: their data can bring new action on powerline

Thank you to all contributing observers !