Using a standardized protocol to collect data about wildlife roadkill in French directions of national roads

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Introduction

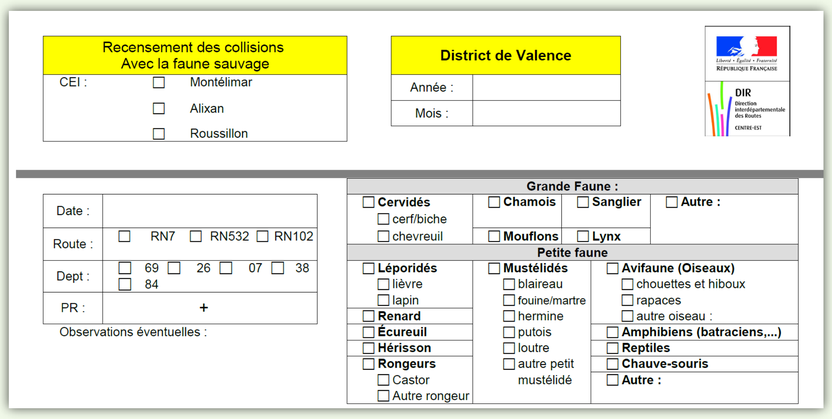
Roads have various effects on the environment and they contribute to the loss of habitat and to their fragmentation. Mortality caused by collisions between animals and vehicles is a negative consequence of roads on wildlife. To reduce this effect, we have to quantify it by enhancing knowledge and data collection. Some studies have shown that roadkills could be aggregated along roads (Clevenger et al, 2003). Identifying these areas can allow the implementation of appropriate mitigation measures.

In France, the study of wildlife collisions is growing. Many initiatives exist but few use a standardized protocol. This type of protocol would allow providing reliable data and identifying roadkill aggregation areas. From 2009 to 2014, the MNHN[1] conducted a first experience with the DIR Est and the University of Franche-Comté that has permitted the test of a protocol. We simplified this first protocol and then we are currently extending it to other structures. Now, 6 French directions of national roads (DIR) are implementing this protocol on their road network.

Protocol (Billon et al, 2015a)

Who	Roads maintainers
When	During their daily maintenance survey
Where	On the road pavement
What	Wild animal carcasses
Why	To detect wildlife roadkill hotspots

Collected data:
- → Date
- → Location (XY coordinates)
- → Species group (at least)
- → Species (if possible)



Recensement des collisions Avec la faune sauvage

CEI : ☐ Montélimar ☐ Alixan ☐ Roussillon

District de Valence — Année : — Mois :

DIR Direction interdépartementale des Routes CENTRE-EST

Date :	
Route :	☐ RN7 ☐ RN532 ☐ RN102
Dept :	☐ 69 ☐ 26 ☐ 07 ☐ 38 ☐ 84
PR :	+

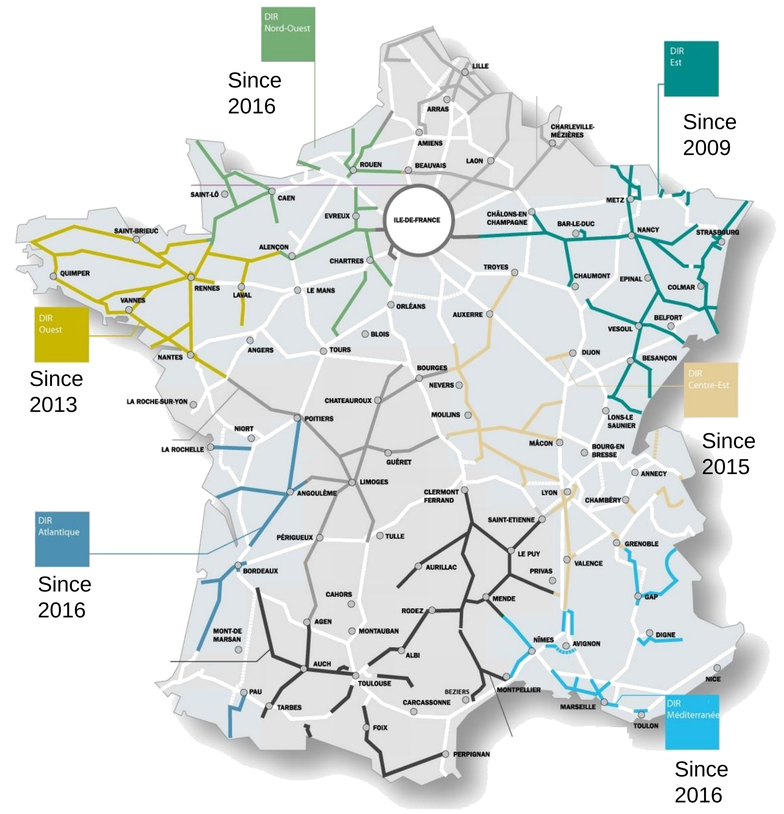
Observations éventuelles :

Grande Faune :			
☐ Cervidés ☐ cerf/biche ☐ chevreuil	☐ Chamois	☐ Sanglier	☐ Autre :
	☐ Mouflons	☐ Lynx	

Petite faune		
☐ Léporidés ☐ lièvre ☐ lapin	☐ Mustélidés ☐ blaireau ☐ fouine/martre ☐ hermine ☐ putois ☐ loutre ☐ autre petit mustélidé	☐ Avifaune (Oiseaux) ☐ chouettes et hiboux ☐ rapaces ☐ autre oiseau :
☐ Renard		☐ Amphibiens (batraciens,...)
☐ Écureuil		☐ Reptiles
☐ Hérisson		☐ Chauve-souris
☐ Rongeurs ☐ Castor ☐ Autre rongeur		☐ Autre :

Survey sheet completed by road maintainers (Source: DIR Centre-Est)

How ? Road maintainers complete a survey sheet when they meet a dead wild animal, Data are compiled in a GIS database that is transmitted by the DIR to the MNHN[1], for spatial analysis.

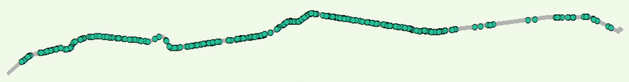


6 French directions of national roads implement the protocol.

Statistical and spatial analysis (Billon et al, 2015b)

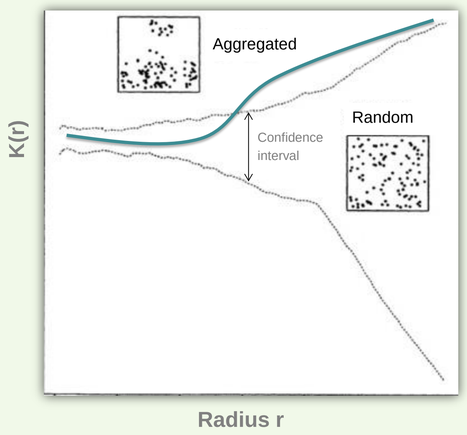
Step 1: Calculation of Ripley's K function to detect aggregation patterns

Road data and Roadkill data



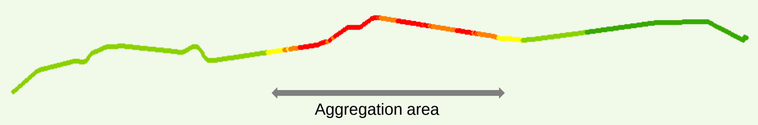
$$K(r) = \frac{Average\ number\ of\ neighboring\ points}{Points\ density}$$

Result of the K function



Step 2: Mapping of aggregation areas with a density estimation method

If the result of the K function shows an aggregated pattern, significant aggregations areas are mapped with a kernel density estimation.



Tool used: SIRIEMA Software (Coelho et al, 2014).

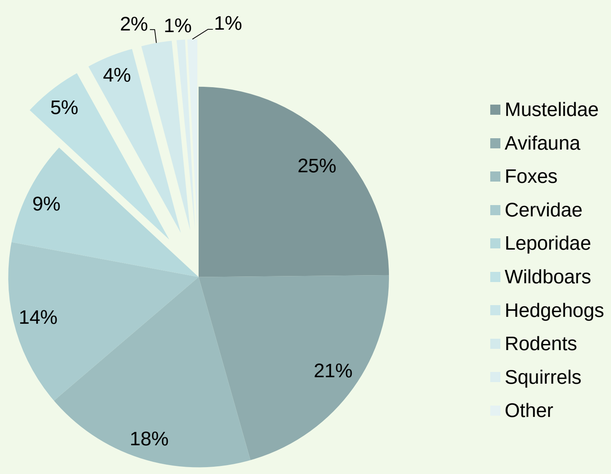
Example of the DIR Centre-Est[2]

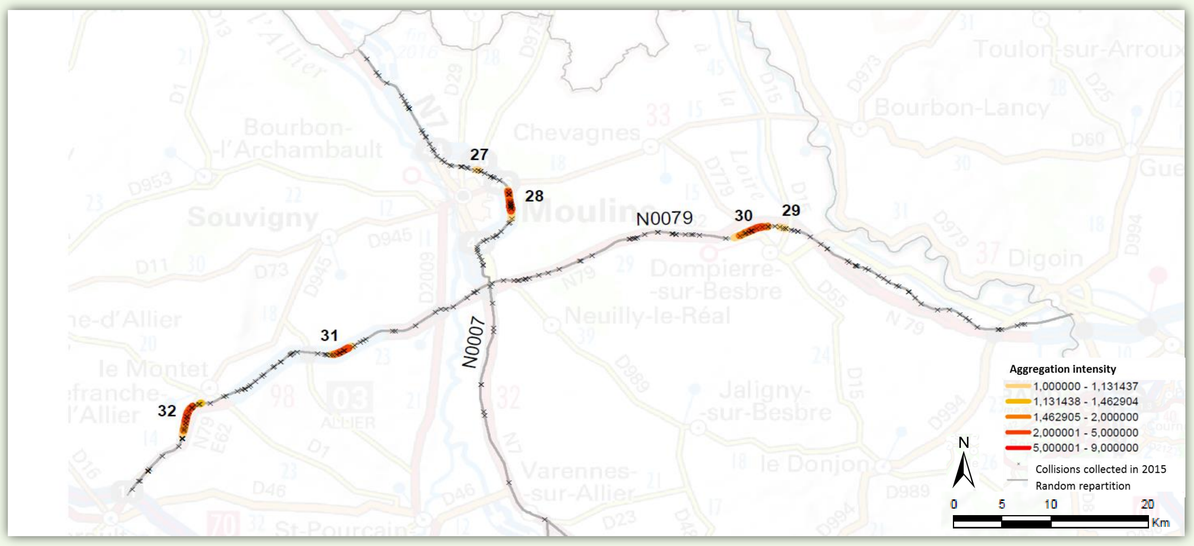
One year of data collection in 2015:

- → 1550 collisions collected
- → 43 significant aggregation areas detected

Results:
- ➔ One general map of the studied roads
- ➔ One map per district and per species group

Distribution of wildlife collisions per species group in 2015





Aggregations areas for all species – District of Moulins – DIR Centre-Est

Discussion:

This method is based on the distance between points. Results don't allow to identify the precise location but they give us an estimation of the zone. Thus, several years of collection will be necessary to confirm results.

The collected data will allow the constitution of a database covering a large part of the national road network and will supply reliable data to studies concerning the ecological transparency of roads.

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