



Barn Owl (*Tyto alba*) and Long-Eared Owl (*Asio otus*) Mortality Along Motorways in Bourgogne-Champagne: Report and Suggestions

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The purpose of the study was to find where and why two species of owls were killed by traffic along motorways. Three different factors have an important influence on the mortality of the two owl species: the biotops crossed by motorways, the road elevation and the presence of small rodents, the Common Vole (*Microtus arvalis*) being most numerous. In order to limit the mortality caused by motorways, it is proposed to let the bordering vegetation grow naturally.

Roadway-caused mortality of wildlife is a significant issue worldwide. Often, the impacts to wildlife occur along specific portions of roadways. Surveys along the roadways can identify these portions and identify the wildlife species being the most greatly impacted. Then, the management of roadside vegetation can help to reduce this negative impact.

STUDY AREA AND METHODS

The study area is located in the northeast of France, over the regions of Burgundy, Champagne, and Lorraine (fig. 1). It concerns

305 km of motorways, from Dijon (Burgundy) to Toul (Lorraine) and from Dijon to Saint-Thibault (Champagne). Because of lack of data, 46.1 km of road were not evaluated (discontinuous line figure 2). The distance

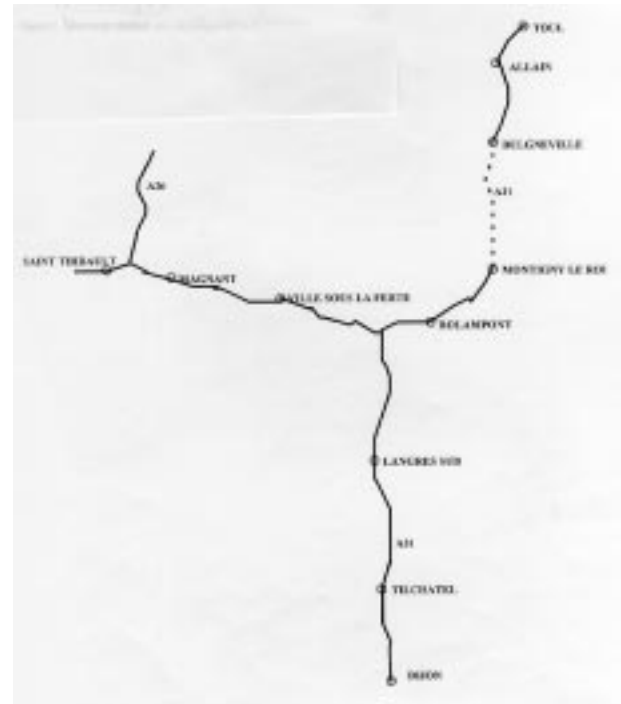


Figure 2.—Owl mortality on motorways studied in northeastern France.



Figure 1.—Study area (black), in the northeast of France, over the regions of Burgundy, Champagne, and Lorraine.

studied is exactly 517.8 km (258.9 x 2 sides of the motorway). The study was conducted from November 1991 to December 1995. Dead animals were collected systematically along the motorway three times daily. The animals were placed in plastic bags and frozen for positive identification. Detailed notes were taken denoting the date, species, and specific location along the motorway where the animals were found. Measurements were also made on the length and weight of the animals, as well as on their sex, age, and stomach contents. The roadway crossed four major biotypes including forests, cereal fields, meadows, and sand pits. These biotops were subsequently divided into 100 or 500 m segments depending on the number of victims.

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RESULTS

Twenty-two mammal and reptile species (table 1) and 46 bird species (table 2) were collected. Carnivores represented 82.5 percent of the mammals and owls and diurnal raptors accounted for 81.5 percent of the birds. The Barn Owl (*Tyto alba*) and the Long-eared Owl (*Asio otus*) were the birds most killed by the motorway traffic. Most notably, the predators of small rodents were disproportionately represented in the sample of the animals collected. In part, this is due to the situation where road-way margins were providing the grassland habitat which supported high numbers of voles.

Table 1.—Mammal and reptile species collected along motorways studied in northeastern France.

Mammals	Total
<i>Felis sylvestris</i>	434
Domestic cat	109
<i>Vulpes vulpes</i>	415
<i>Meles meles</i>	50
<i>Martes martes</i>	100
<i>Martes foina</i>	61
<i>Martes</i> sp.	150
<i>Putorius putorius</i>	17
<i>Mustela erminea</i>	4
<i>Mustela nivalis</i>	2
<i>Lepus capensis</i>	36
<i>Oryctolagus cuniculus</i>	24
<i>Lepus/Oryctolagus</i>	168
<i>Sciurus vulgaris</i>	18
<i>Myocastor coypus</i>	14
<i>Ondatra zibethicus</i>	3
<i>Rattus</i> sp.	19
<i>Arvicola terrestris</i>	1
Total	1,625
Other "prey"	
<i>Capreolus capreolus</i>	42
<i>Sus scrofa</i>	3
Domestic pig	3
Dog	7
<i>Erinaceus europaeus</i>	316
Snake	3
Total	374

Table 2.—Bird species collected along motorways studied in northeastern France.

Birds	Total
<i>Tyto alba</i>	674
<i>Asio otus</i>	300
<i>Strix aluco</i>	53
<i>Athene noctua</i>	1
<i>Buteo buteo</i>	213
<i>Falco tinnunculus</i>	48
<i>Falco columbarius</i>	1
<i>Milvus milvus</i>	7
<i>Milvus migrans</i>	2
<i>Accipiter gentilis</i>	1
<i>Accipiter nisus</i>	1
<i>Phasianus colchicus</i>	51
<i>Perdix perdix</i>	77
<i>Coturnix coturnix</i>	2
<i>Scolopax rusticola</i>	1
<i>Anas platyrhynchos</i>	2
<i>Ardea cinerea</i>	1
<i>Podiceps cristatus</i>	1
<i>Podiceps nigricollis</i>	1
<i>Gallinula chloropus</i>	5
<i>Fulica atra</i>	4
<i>Vanellus vanellus</i>	19
<i>Larus ridibundus</i>	7
<i>Rissa tridactyla</i>	2
<i>Alcedo atthis</i>	3
<i>Pluvialis apricaria</i>	1
Domestic hen	2
Domestic duck	1
Domestic pigeon	3
Carrier pigeon	10
<i>Columba palumbus</i>	7
<i>Columba oenas</i>	1
<i>Columba</i> sp.	18
<i>Streptopelia decaocto</i>	4
<i>Streptopelia turtur</i>	2
<i>Corvus corone</i>	23
<i>Garrulus glandarius</i>	6
<i>Pica pica</i>	1
<i>Sturnus vulgaris</i>	1
<i>Turdus merula</i>	26
<i>Turdus philomelos</i>	2
<i>Turdus viscivorus</i>	2
<i>Turdus iliacus</i>	1
<i>Turdus</i> sp.	2
<i>Picus viridis</i>	2
<i>Caprimulgus europaeus</i>	1
<i>Cuculus canorus</i>	1
<i>Emberiza citrinella</i>	2
<i>Aves</i> sp.	2
Total	1,598



The locations of Barn Owls and Long-eared Owls were analyzed, relative to the amount (i.e., availability) of roadway sections bordered by forests, cereal fields, meadows and sand pits. The owls were found along sections of roadway bordered by cereal fields in greater proportion to their availability and found along sections of roadway bordered by forests less than their availability (X^2 test $P < 0.05$, table 3).

The engineering of the roadway was also a factor contributing to owl mortality. The situation where the roadway surface was higher or at the same level of the bordering terrain was unfavorable to the owls. Many fewer owls were found in situations where the roadway surface was set below that of the surrounding terrain. (X^2 test $P < 0.05$ for the Barn Owl only, table 4).

Concerning the mortality of both owl species, the X^2 test shows a significant difference ($P < 0.05$) between the areas rich in voles and the poor ones (table 5).

CONCLUSION

It clearly appears that both species of owls are not just killed by crossing the motorway, but rather that they are attracted by the voles living in the borders. Not only do they take a risk when crossing the motorway perpendicularly, but also when flying along the route linearly in quest of small mammals. They are mostly hit by the vehicle's displacement of air and die of it or are incurably wounded (broken wing) and finished off by the following vehicles.

Table 3.—*The influence of the different biotops on the mortality of owls along motorways in northeastern France.*

Biotops	Distance		Barn Owl		Long-eared Owl	
	km	%	n	%	n	%
Forests	155.1	30.0	117	20.0	32	13.9
Cereal fields	251.4	48.5	356	60.9	165	71.8
Meadows	99.3	19.2	102	17.4	33	14.3
Sand pits	12	2.3	10	1.7	0	0.0
Total	517.8	100.0	585	100.0	230	100.0

Table 4.—*The influence of road elevation on the mortality of owls along motorways in northeastern France.*

Road elevation	Distance		Barn Owl		Long-eared Owl	
	km	%	n	%	n	%
Favorable	229.7	44.4	187	32.0	85	37.0
Not favorable	288.1	55.6	398	68.0	145	63.0
Total	517.8	100.0	585	100.0	230	100.0

Table 5.—*The influence of habitat (poor or rich in voles) on the mortality of owls along motorways in northeastern France.*

Voles habitat	Distance		Barn Owl		Long-eared Owl	
	km	%	n	%	n	%
Poor	257.3	49.7	154	26.3	58	25.2
Rich	260.5	50.3	431	73.7	172	74.8
Total	517.8	100.0	585	100.0	230	100.0

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In order to reduce the Barn Owl's and the Long-eared Owl's mortality due to the motorways (and this may apply to roads in general) a solution consists in preventing the small rodents that live in immediate proximity from being reachable, either by letting the bordering vegetation grow naturally or by planting short bushes which would decrease prey availability and lead owls towards other areas which may be rich in prey, but surely less dangerous.

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