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Road mitigation: How effective are our measures?

Edgar van der Grift

LIFE-LINES Seminar, Evora, Portugal, June 2, 2016

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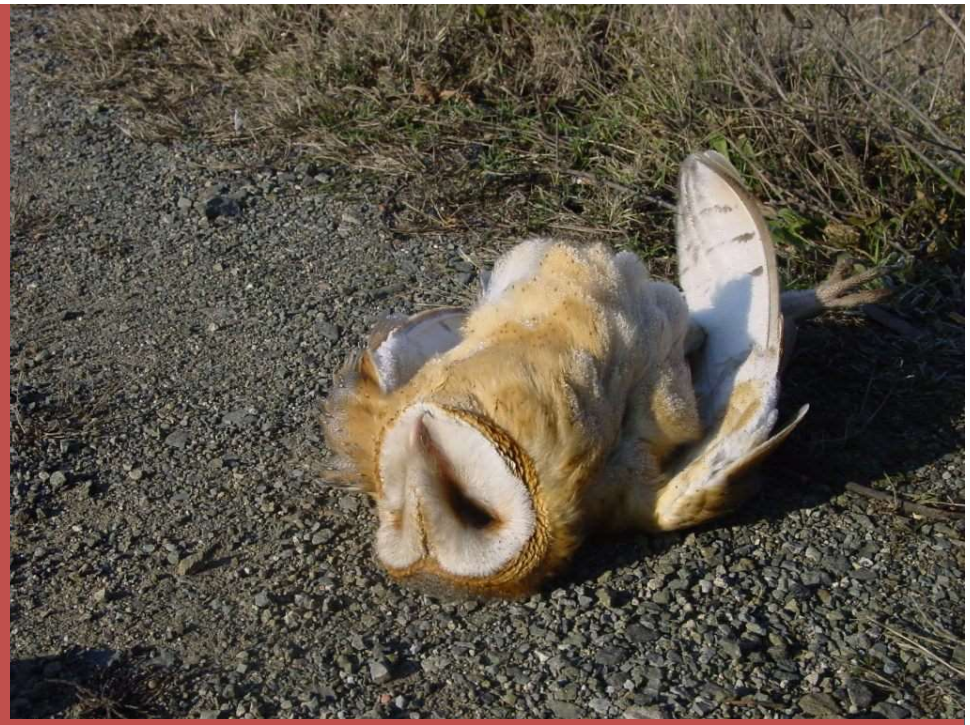
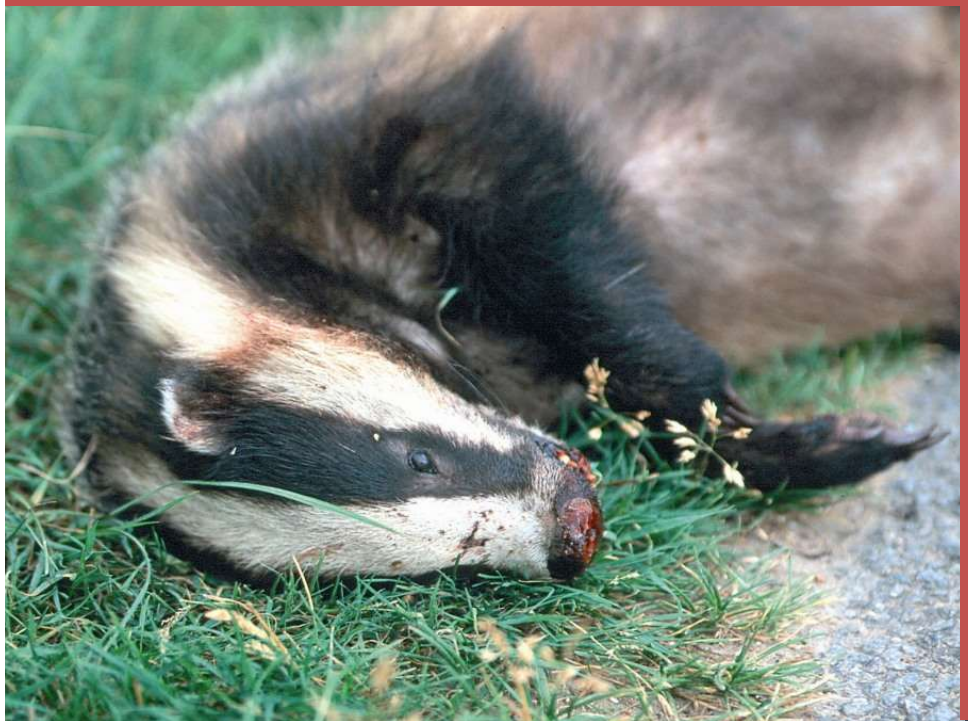
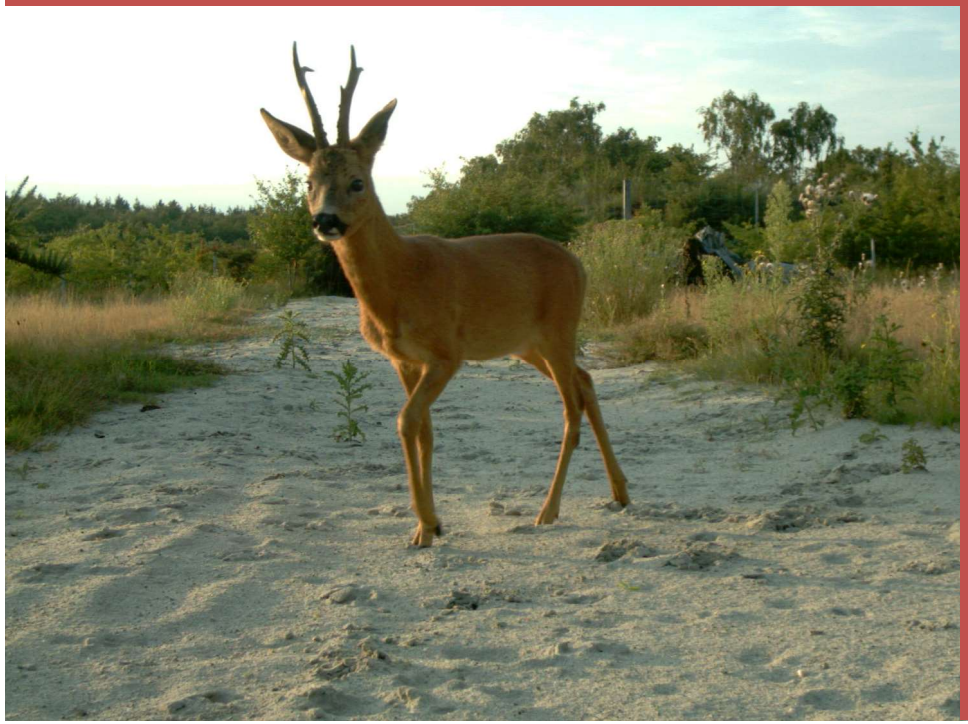
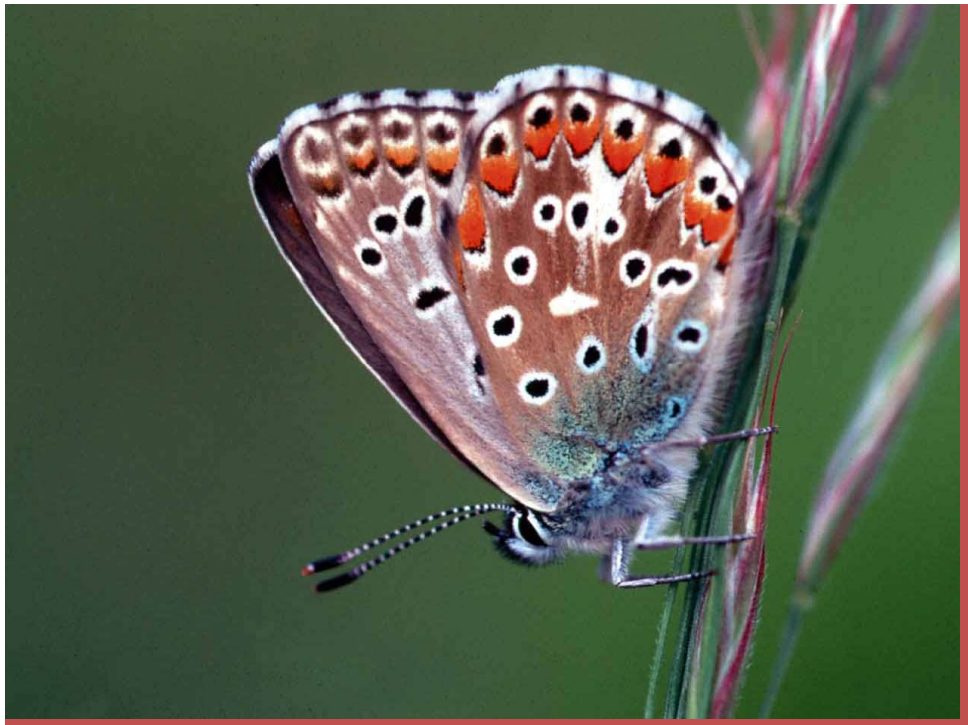


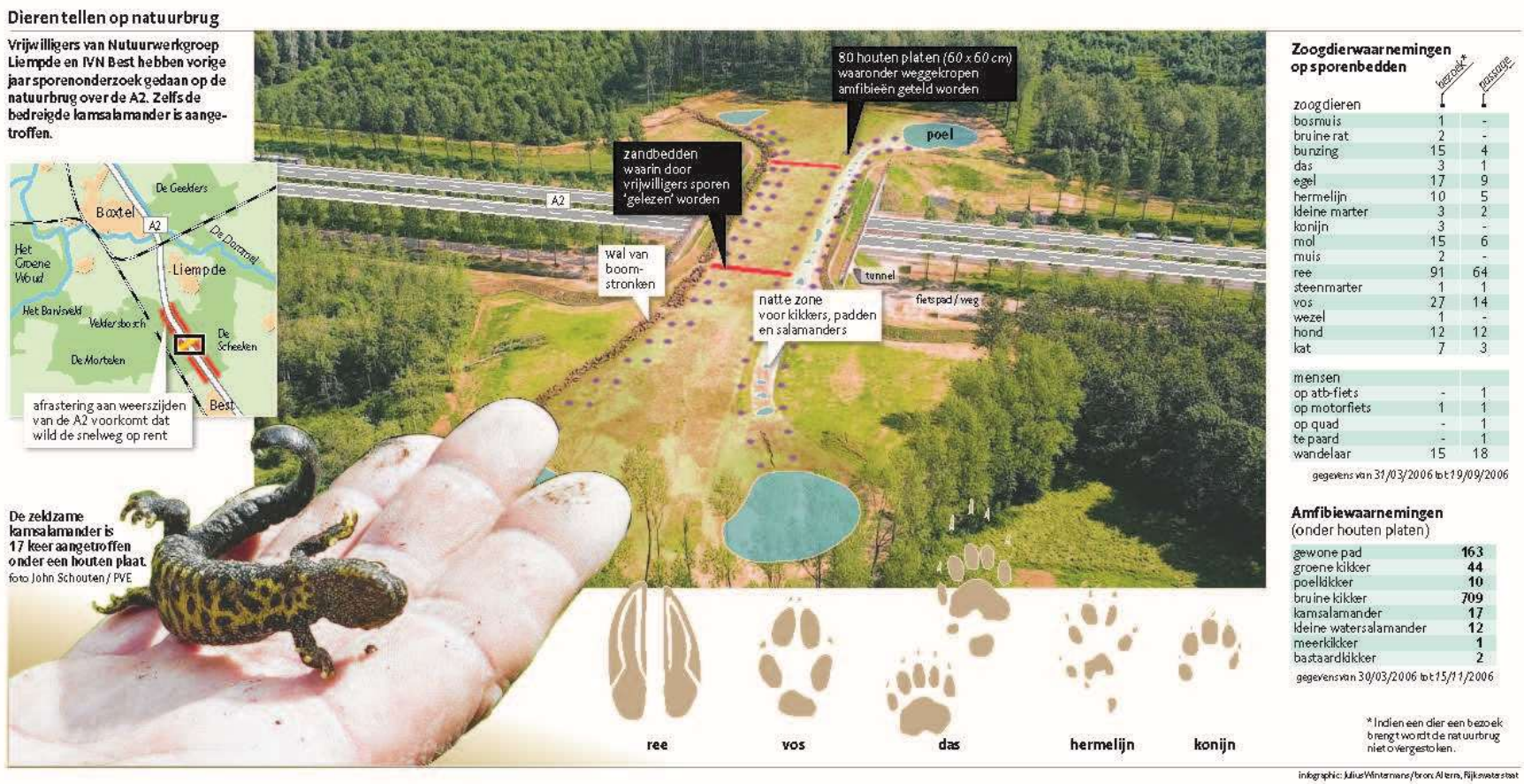



Are they being used?





Animals accept and use crossing structures quickly and the number of animals are often higher than expected



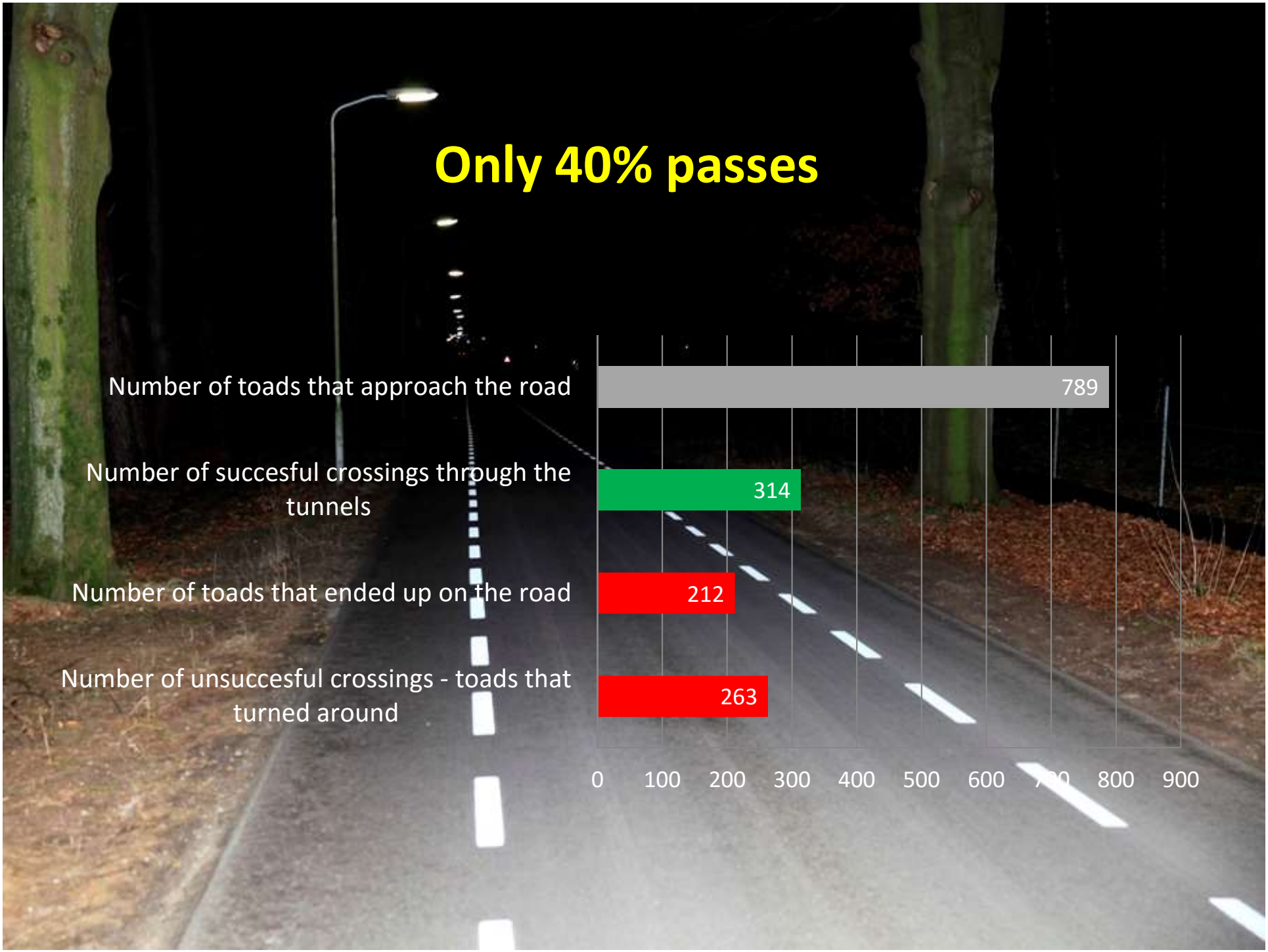

Discovery of new animal species !

Don’t be satisfied if you found out that animals use your crossing structure


Foto: Siebe Swart

Toads and their tunnels

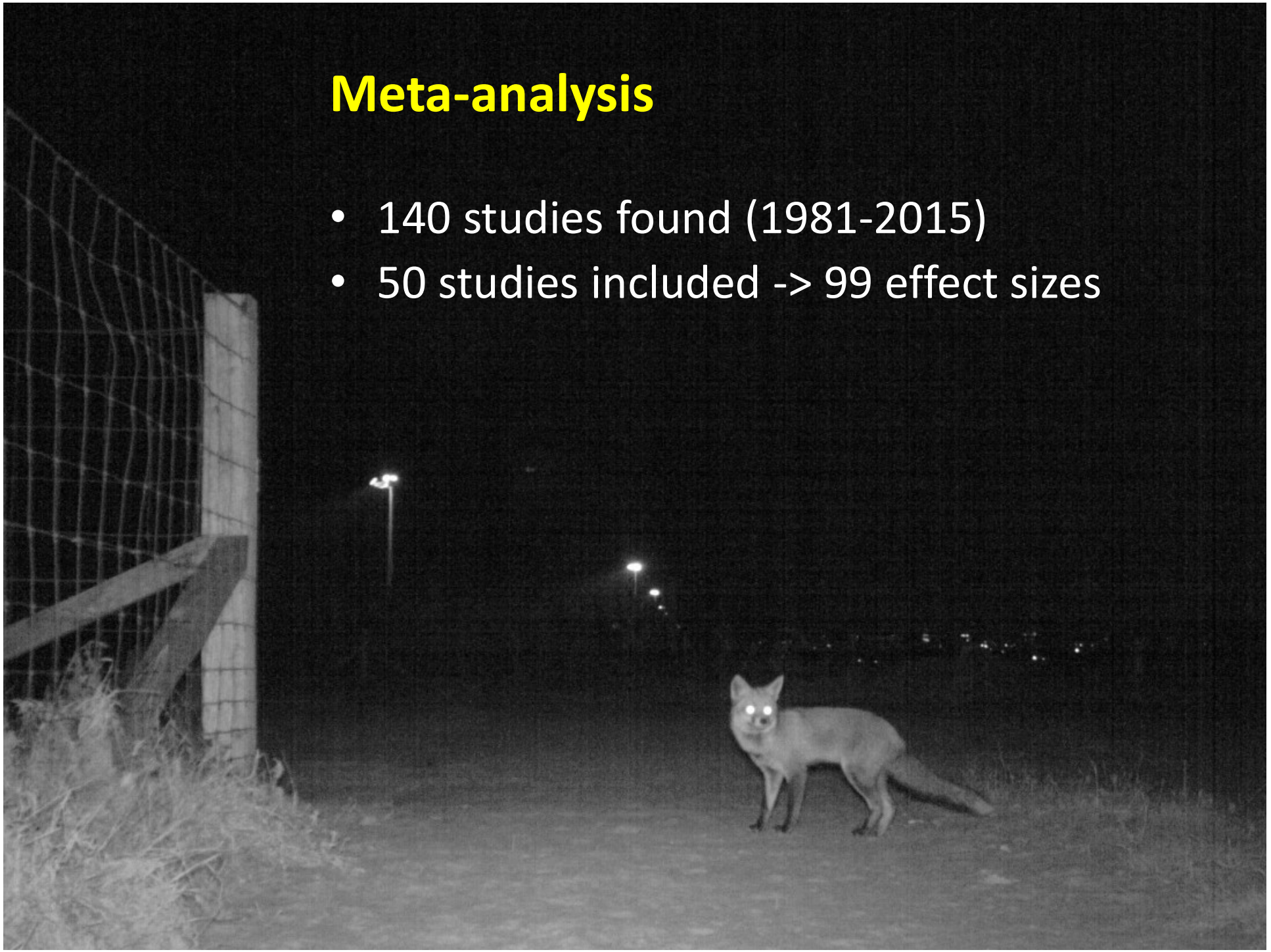
Only 40% passes

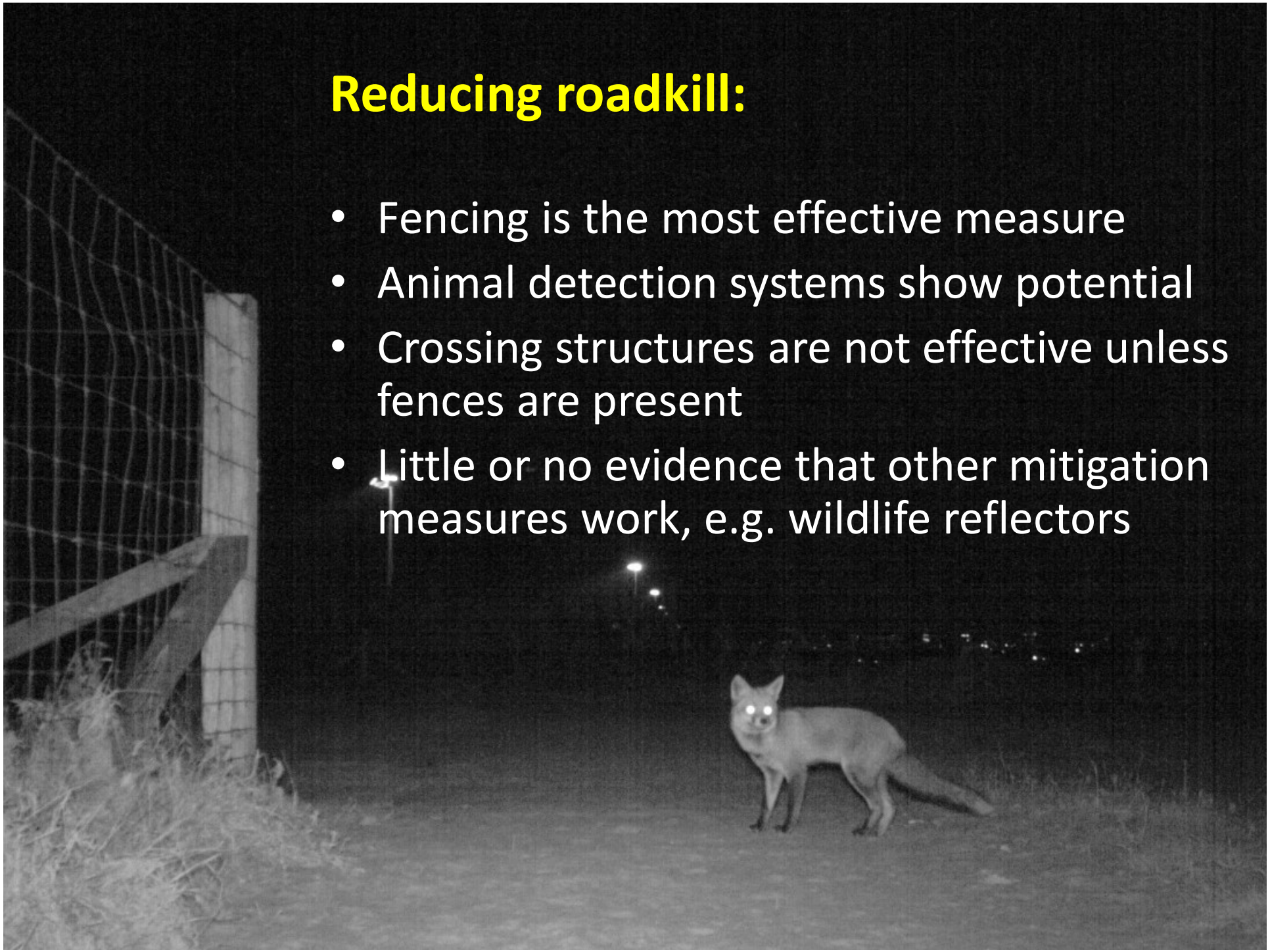


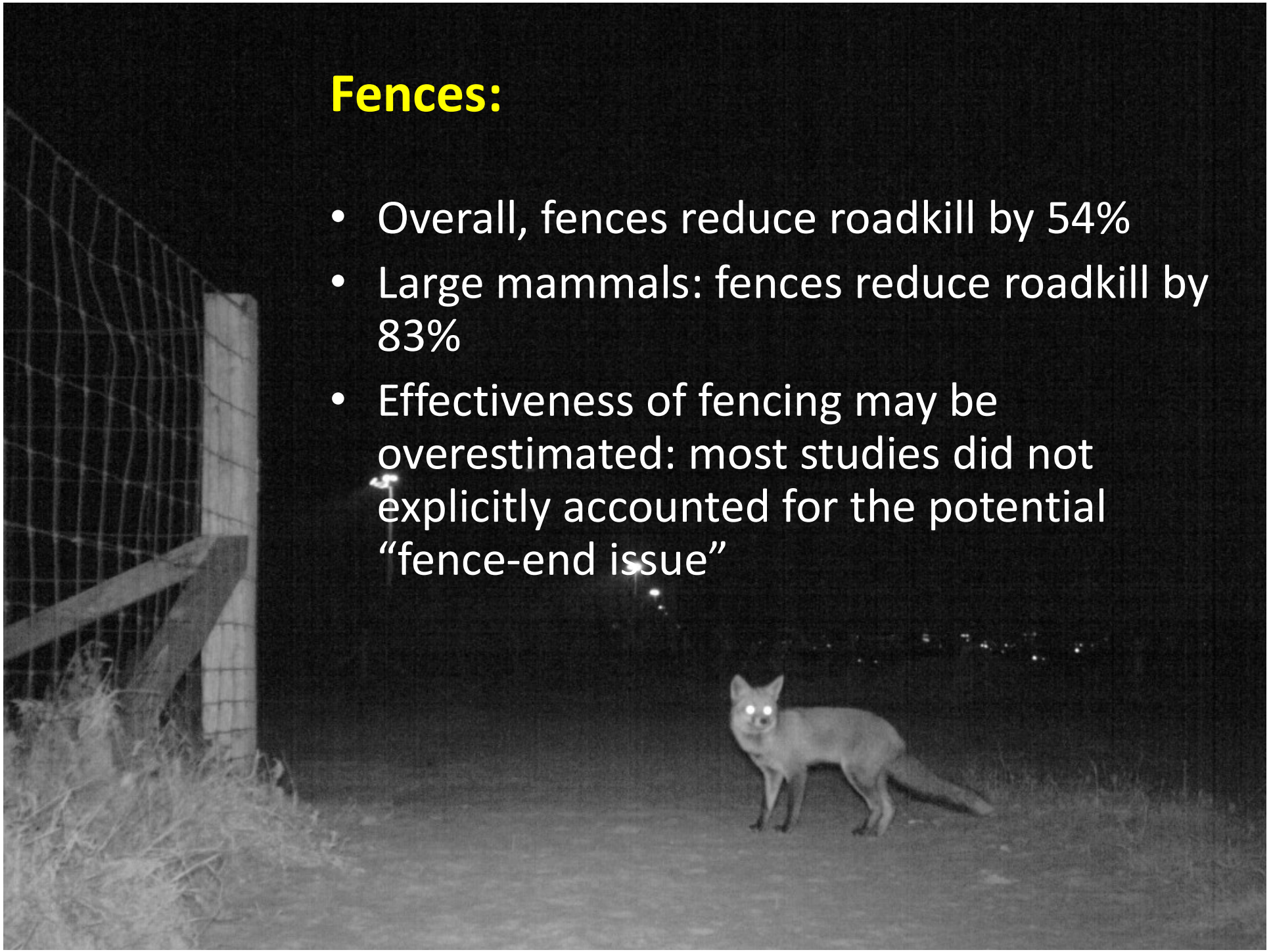

Are they effective in reducing roadkill?

Meta-analysis

- 140 studies found (1981-2015)
- 50 studies included -> 99 effect sizes




Reducing roadkill:
• Fencing is the most effective measure
• Animal detection systems show potential
• Crossing structures are not effective unless fences are present
• Little or no evidence that other mitigation measures work, e.g. wildlife reflectors


Fences:
• Overall, fences reduce roadkill by 54%
• Large mammals: fences reduce roadkill by 83%
• Effectiveness of fencing may be overestimated: most studies did not explicitly accounted for the potential "fence-end issue"

Example: Netherlands

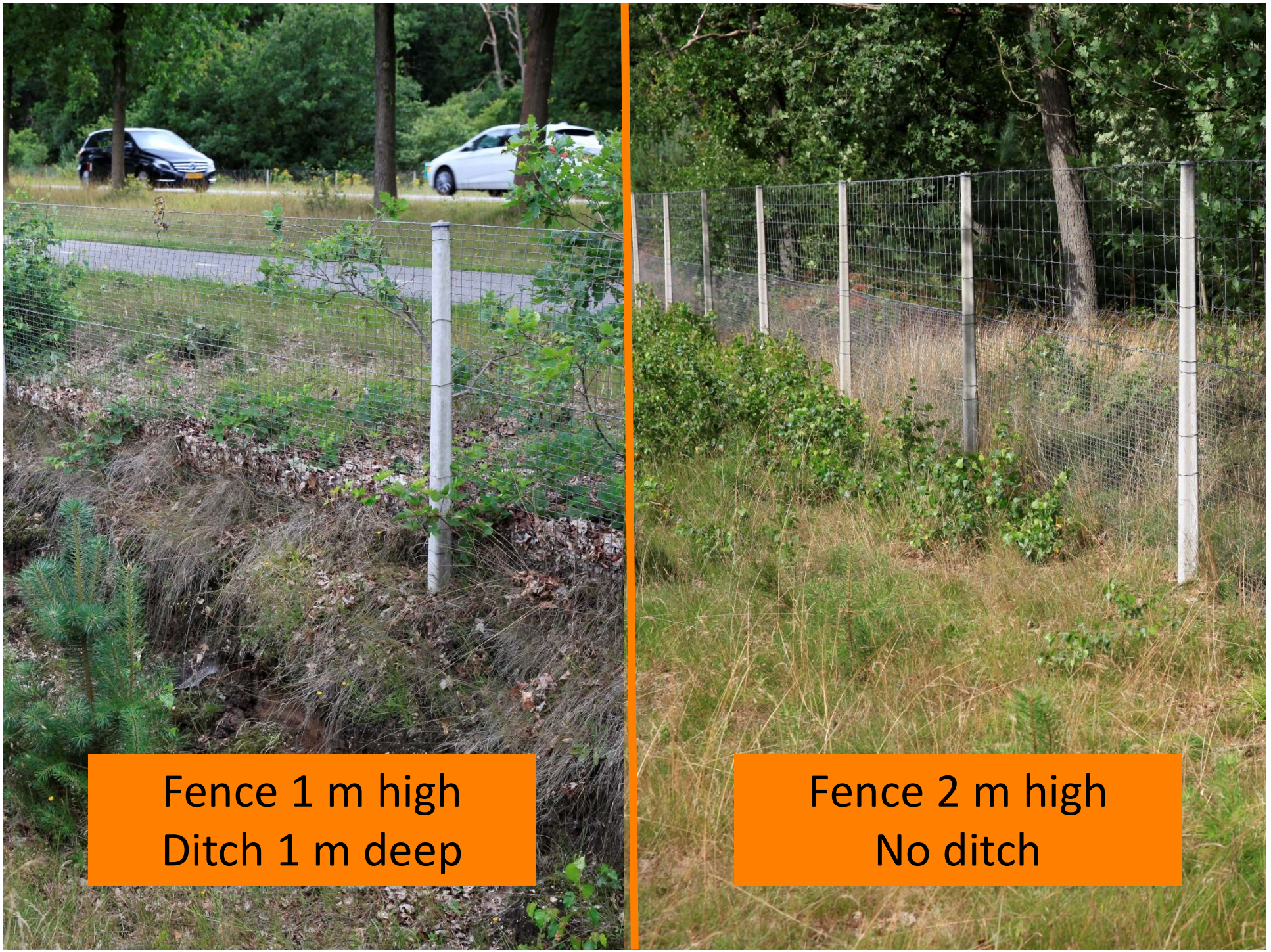
roe deer population

highway N227 (10 km)

~25 deer killed per year

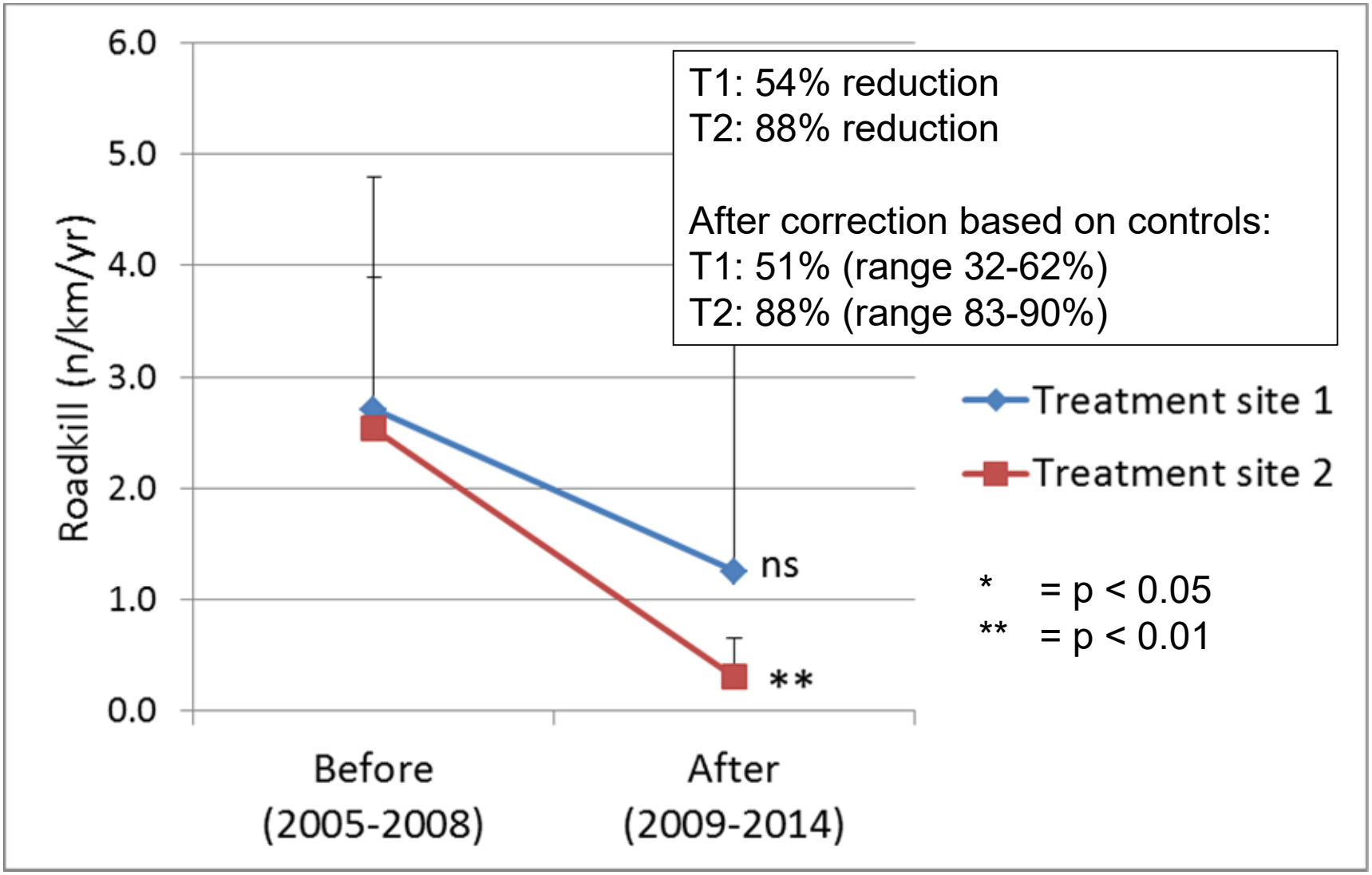
Mitigated in 2009

Treatment site 1: fence on one side of the road (0.4 km)
Treatment site 2: fences on both sides of the road (2.8 km)

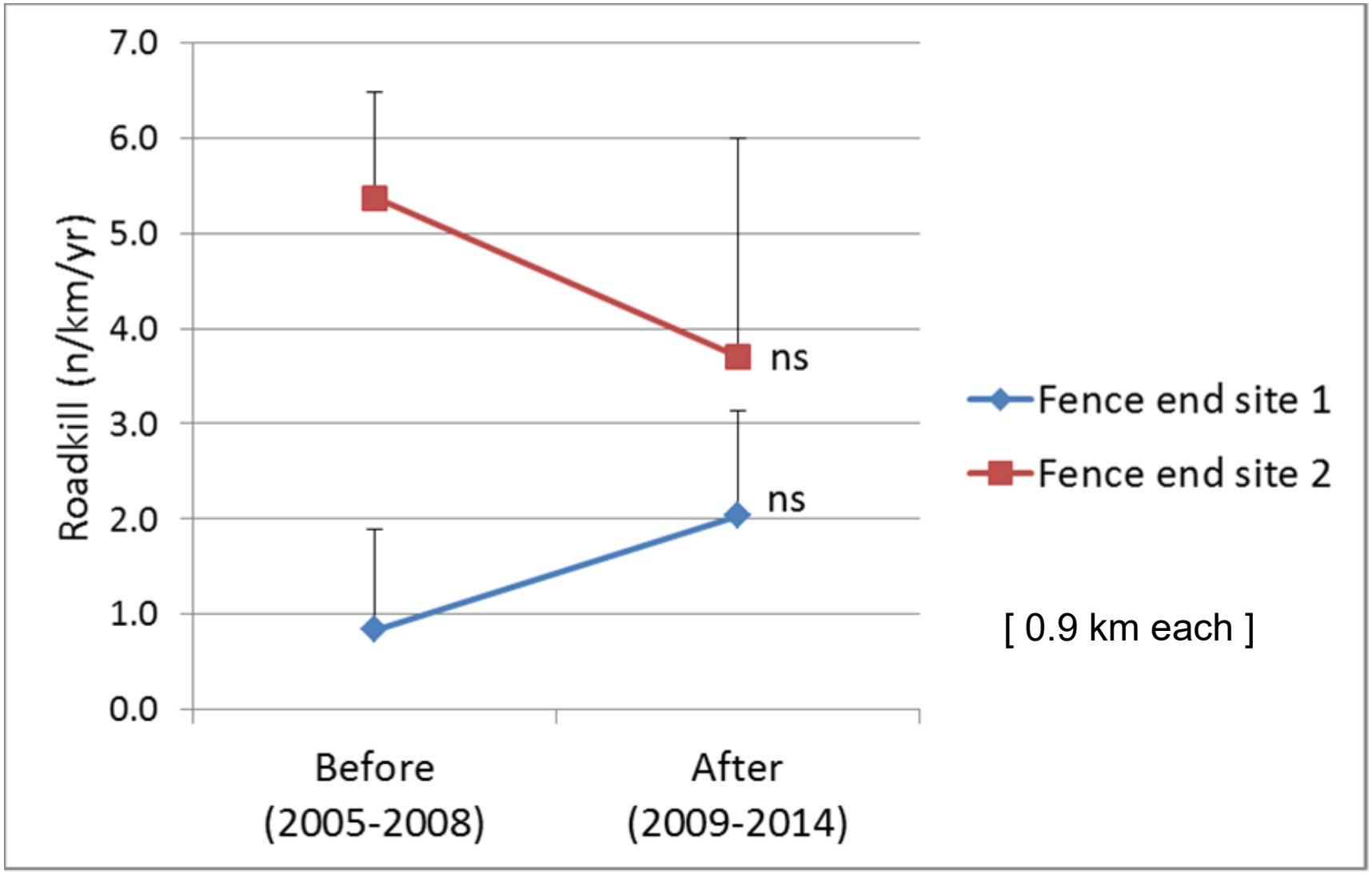

Fence 1 m high
Ditch 1 m deep
Fence 2 m high
No ditch


Two control sites, resp. 1.9 and 1.7 km long

Road mitigation effectiveness



Fence end sites

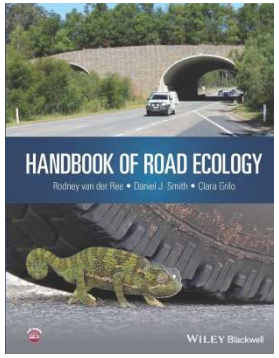



Investments in a few good but costly studies should be prefered above numerous poor studies at low costs

Why should we bother?

- We may lose populations/species if not effective
- We may lose money if not effective
- We may lose money if there is a better way
- We may lose money if if we overdo it

More info



Chapter 15

GUIDELINES FOR EVALUATING USE OF WILDLIFE CROSSING STRUCTURES

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SUMMARY

Wildlife crossing structures help animals cross safely under or over roads or other linear infrastructure and h
play an important role in the conservation of biodiversity. Measuring the rate of use by wildlife is an im
tant first step in almost every evaluation of wildlife crossing structures. Unfortunately, the majority of studi
the use of crossing structures by wildlife lack a proper study design which limits the quality or reliability o
findings. The design and methods of each study to evaluate the use of crossing structures must be tailor-m
because of differences among structures in their design, goals, target species, landscape and road conditions
15.1 Identify and describe the target species for the wildlife crossing structure being evaluated.
15.2 For each target species, define the intended type and frequency of use.
15.3 Design the study to enable a comparison of actual rate of use and minimum expected rate of u
15.4 Use data from control plots to estimate the minimum expected rate of use of a crossing structu
15.5 Select survey methods that monitor multiple species simultaneously and use more than one su
method for each species.
15.6 The timing, frequency and duration of the monitoring should allow for rigorous estimate
crossing structure use.
15.7 Measure explanatory variables to enable a comprehensive analysis of the monitoring data
comparison of crossing structure functioning.
15.8 Thorough analysis, reporting and sharing of data are critical.
Taken individually, each study of the use of crossing structures by wildlife provides an important but l
understanding of their function. Adopting the guidelines presented in this chapter will improve the qu
of each monitoring programme as well as permit robust meta-analyses to optimise design, placement
management of wildlife crossing structures at much broader spatial scales.

Handbook of Road Ecology, First Edition. Edited by Rodney van der Ree, Daniel J. Smith and Clara Grilo.

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Chapter 16

GUIDELINES FOR EVALUATING THE EFFECTIVENESS OF ROAD MITIGATION MEASURES

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[3]Department of Geography, Planning and Environment, Concordia University Montreal, Montréal, Québec, Canada

SUMMARY

Wildlife crossing structures – underpasses and overpasses – have been constructed around the world and are used by many species of wildlife to safely cross roads and other linear infrastructures. However, there is still much to learn about their effectiveness at contributing to the preservation of biodiversity. How many and what kinds of structures do we need to reach the goals of mitigation? Without clear insights into the effectiveness of wildlife crossing structures, we run the risk of losing wildlife populations (or even species) and wasting money. The evaluation of the effectiveness of mitigation requires a good experimental design and should be incorporated into road planning.
16.1 Identify and describe the target species and goals of mitigation.
16.2 Monitor target species that are likely to demonstrate statistically significant effects with comparatively little sampling effort in space and/or time.
16.3 Select parameters of interest that are most closely related to the outcome of real concern.
16.4 Adopt a study design that allows for rigorous conclusions.
16.5 Use model simulations to determine the best sampling scheme.
16.6 Select mitigation sites to be monitored based on the objective(s) of the evaluation.
16.7 Choose control sites based on the goals of mitigation.
16.8 Measure explanatory variables that provide the best possible estimates of mitigation effectiveness.
16.9 Utilise survey methods that monitor multiple species simultaneously.

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