

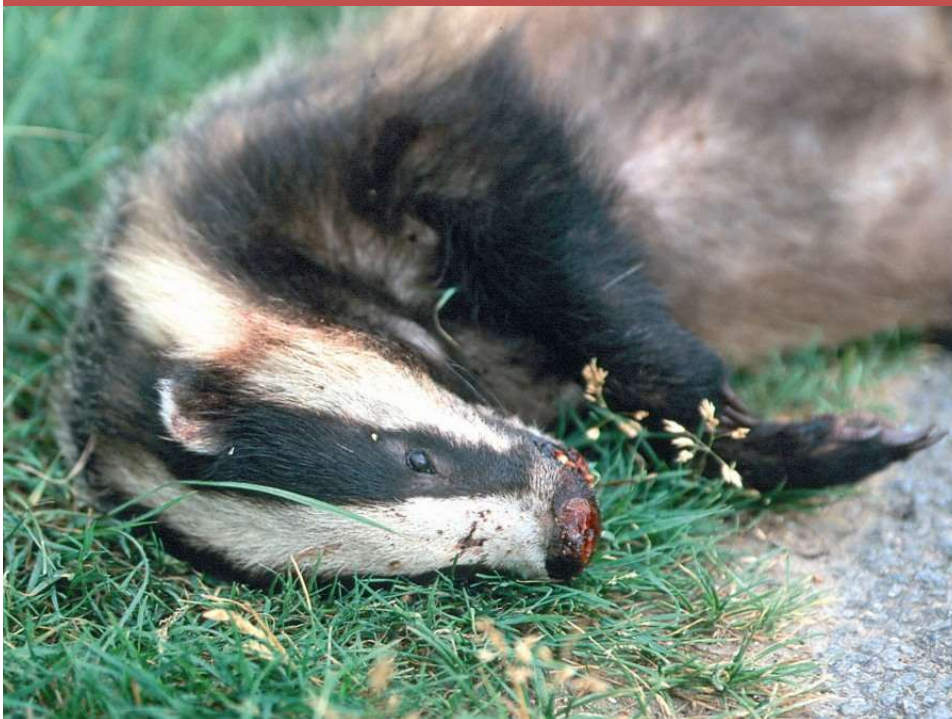
Road mitigation: How effective are our measures?

Edgar van der Grift

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











Are they being used?









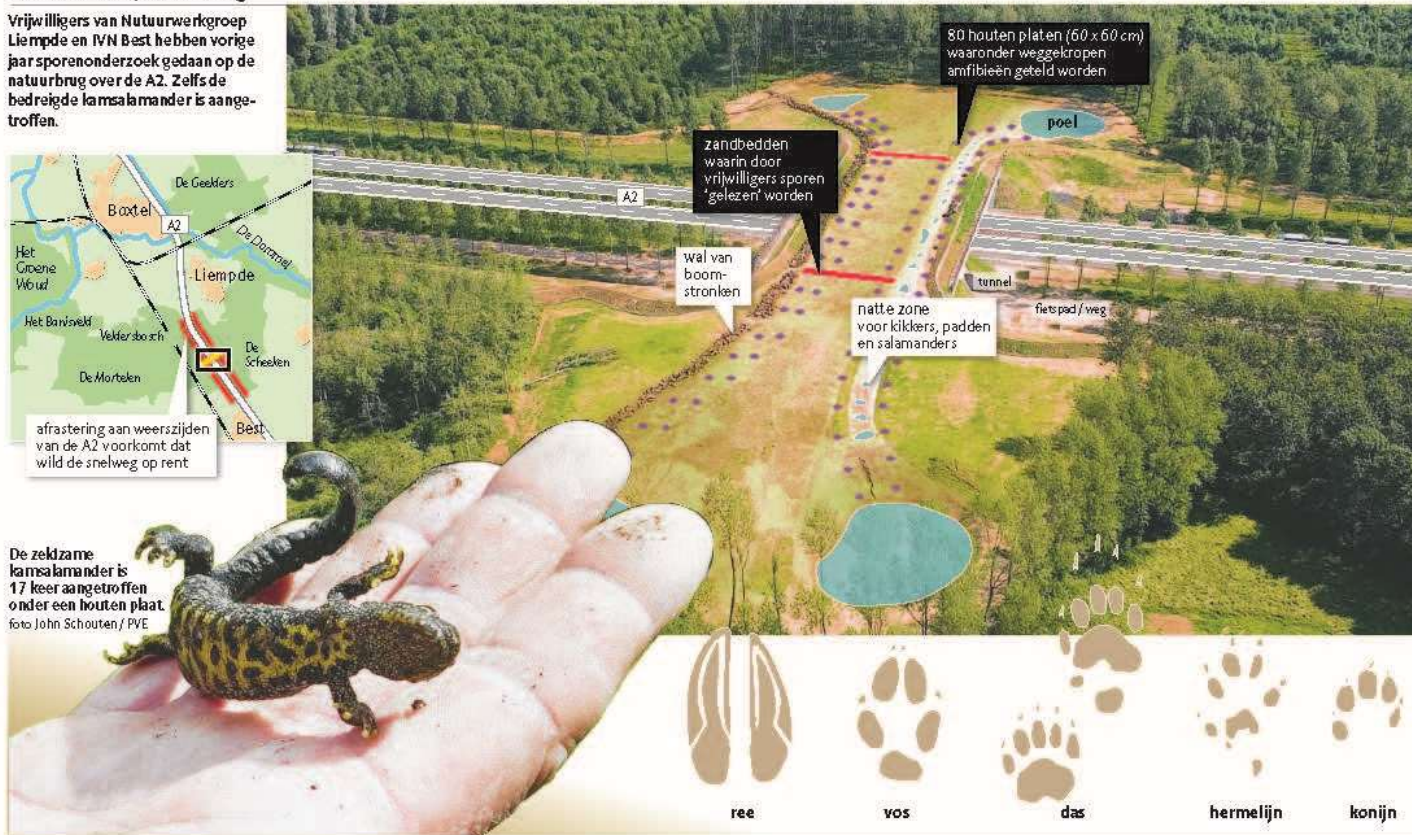
Animals accept and use crossing structures quickly and the number of animals are often higher than expected

Dieren tellen op natuurbrug

Vrijwilligers van Natuurwerkgroep Liempde en IVN Best hebben vorige jaar sporenonderzoek gedaan op de natuurbrug over de A2. Zelfs de bedreigde kamsalamander is aangetroffen.



De zeldzame kamsalamander is 17 keer aangetroffen onder een houten plaat.
foto John Schouten / PVE



Zoogdierwaarnemingen op sporenbedden

zoogdieren	toeslag*	toeslag*
bosmuis	1	-
bruine rat	2	-
bunzing	15	4
das	3	1
egel	17	9
hermelijn	10	5
kleine marter	3	2
konijn	3	-
mol	15	6
muis	2	-
ree	91	64
steenmarter	1	1
vos	27	14
wezel	1	-
hond	12	12
kat	7	3

mensen	toeslag*	toeslag*
op atb-fiets	-	1
op motorfiets	1	1
op quad	-	1
te paard	-	1
wandelaar	15	18

gegevens van 31/03/2006 tot 19/09/2006

Amfibie waarnemingen (onder houten platen)

gewone pad	163
groene kikker	44
poelkikker	10
bruine kikker	709
kamsalamander	17
kleine watersalamander	12
meerkikker	1
bastaardkikker	2

gegevens van 30/03/2006 tot 15/11/2006

* Indien een dier een bezoek brengt wordt de natuurbrug niet overgestoken.

inloggraphic: Julius Winternans/bron: Al tern, Rijkswaterstaat

Discovery of new animal species !



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





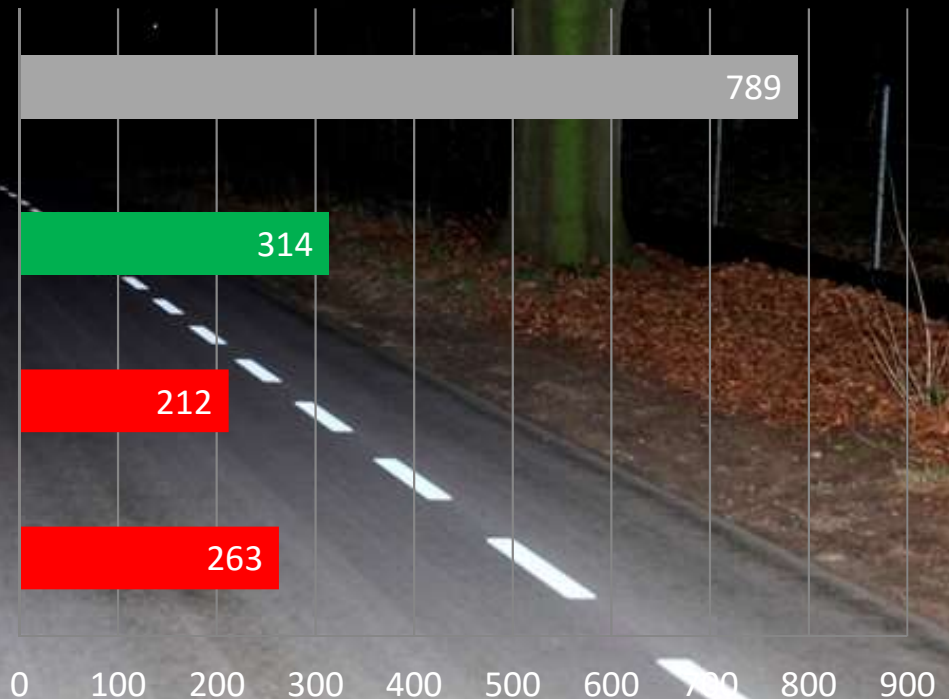
Foto: Siebe Swart

Toads and their tunnels



Only 40% passes

- Number of toads that approach the road
- Number of succesful crossings through the tunnels
- Number of toads that ended up on the road
- Number of unsuccesful crossings - toads that turned around

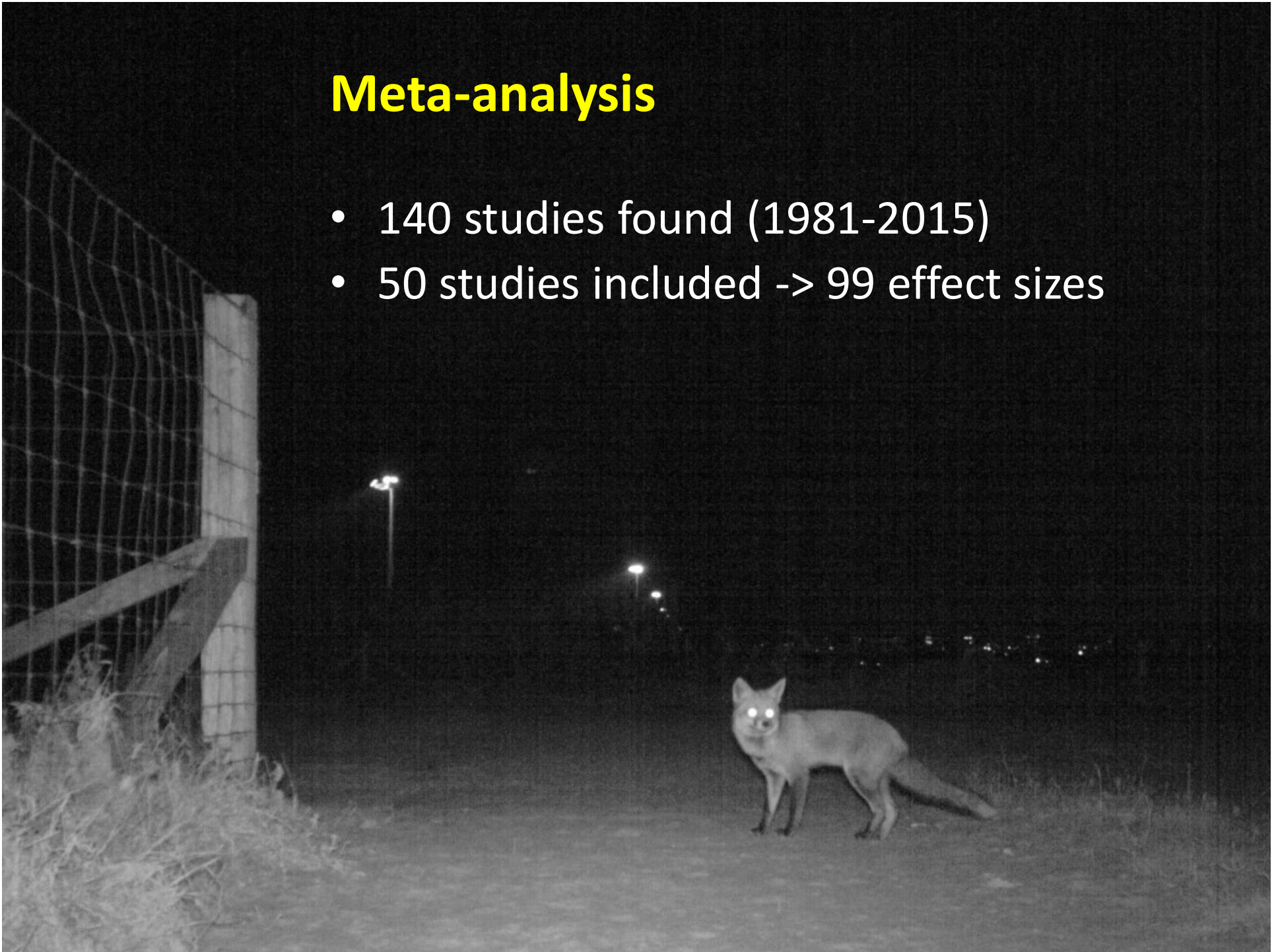


Are they effective in reducing roadkill?



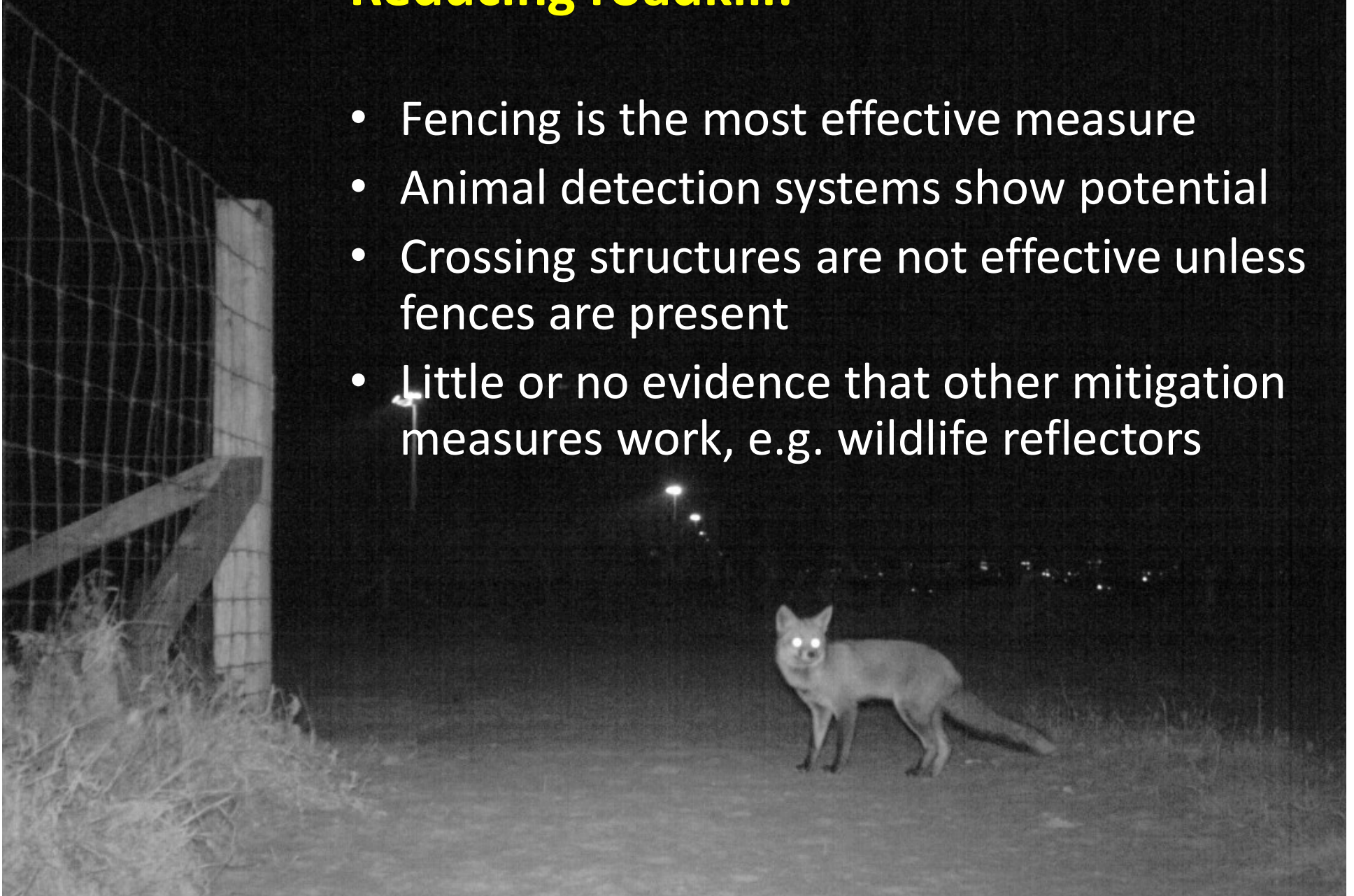
Meta-analysis

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



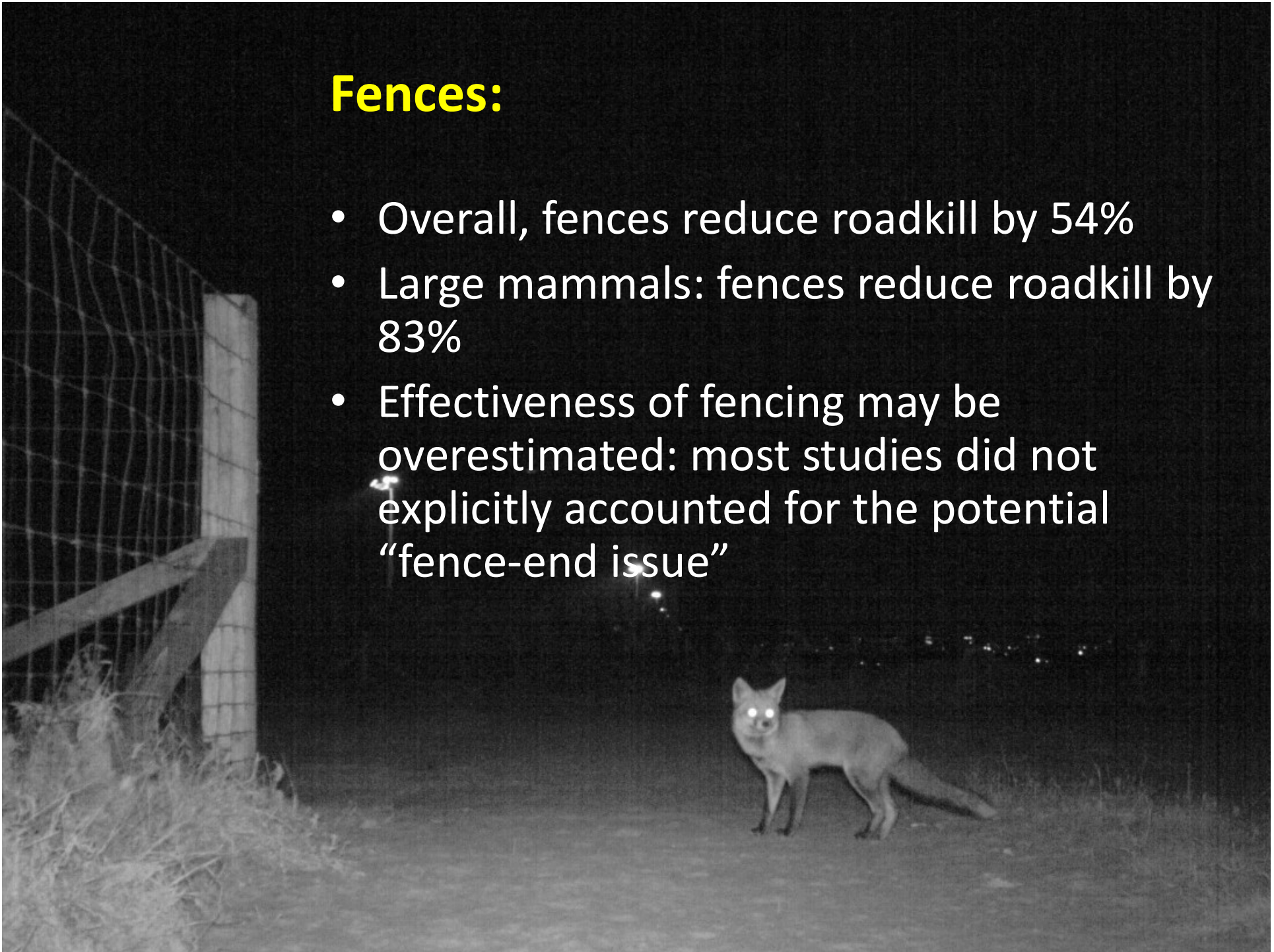
Reducing roadkill:

- 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 account for the potential “fence-end issue”



Example: Netherlands

roe deer population



highway N227 (10 km)



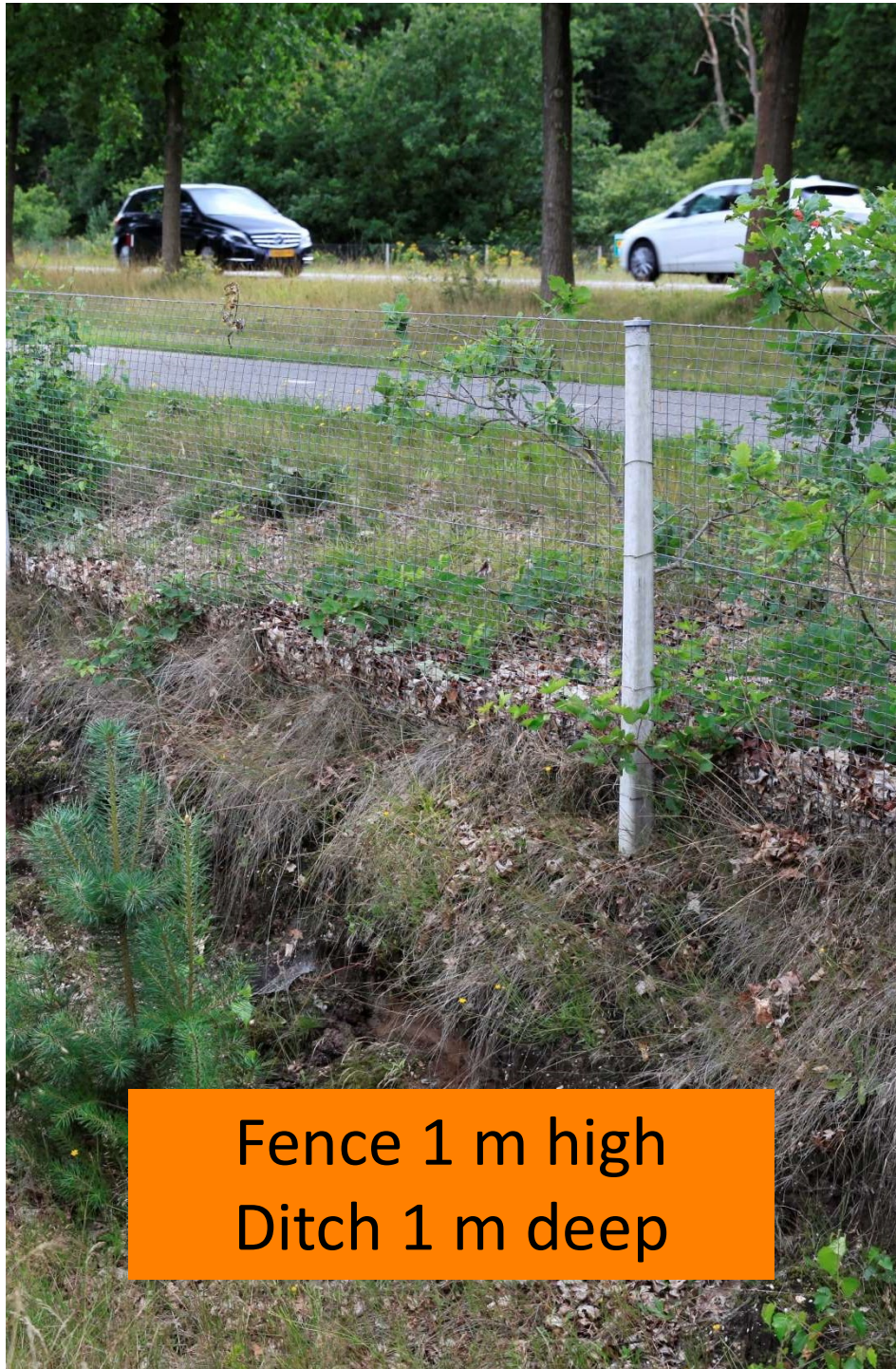
~25 deer killed per year



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

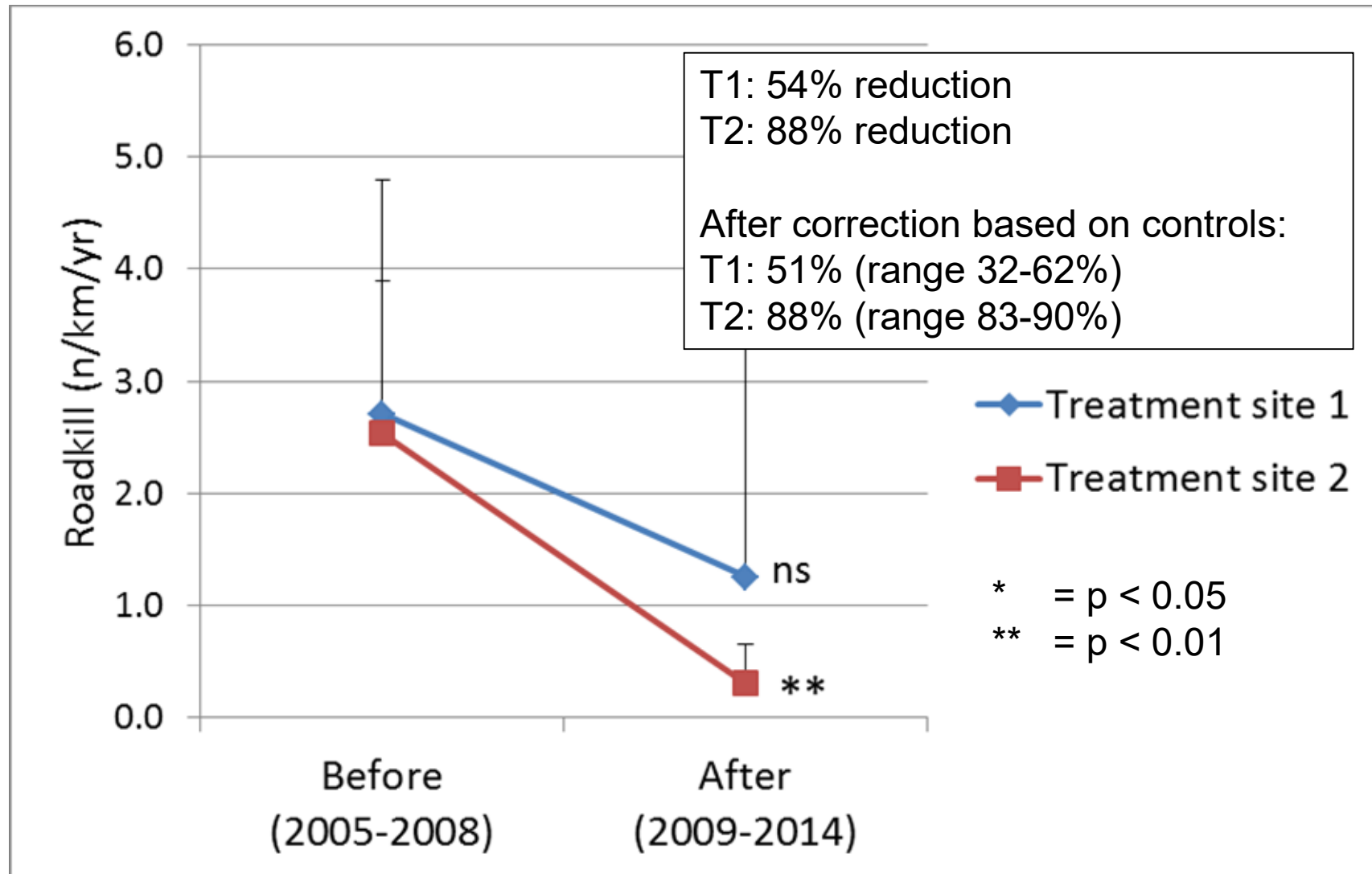


Fence 2 m high
No ditch

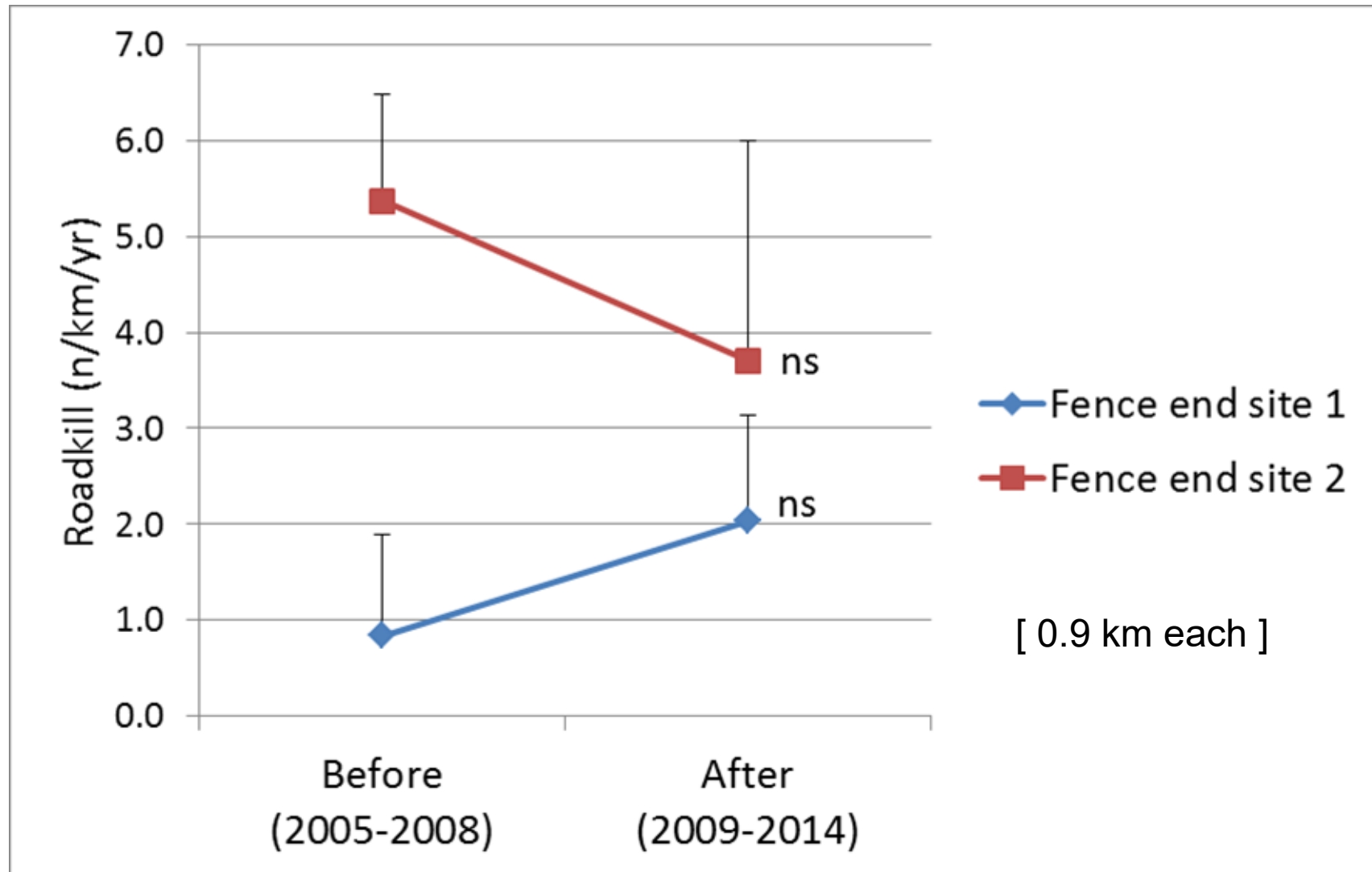



Two control sites, resp. 1.9 and 1.7 km long

Road mitigation effectiveness



Fence end sites



A photograph of a muddy, brownish-grey ground surface. Several animal tracks are visible. In the upper center, there is a small, dark, irregular track. Below it, towards the bottom center, is a larger, more distinct track with four clear, dark, rounded toe impressions. To the left of this larger track is another smaller, less distinct track. The ground is uneven, with some small green plants and dry twigs scattered around. The text "Investments in a few good but costly studies should be preferred above numerous poor studies at low costs" is overlaid in red, bold, sans-serif font in the center of the image.

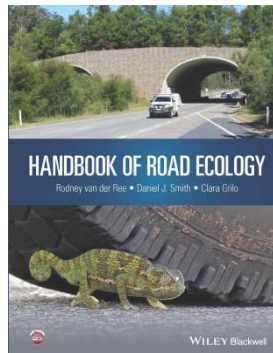
**Investments in a few good but costly studies should
be preferred above numerous poor studies at low
costs**

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 they play an important role in the conservation of biodiversity. Measuring the rate of use by wildlife is an important first step in almost every evaluation of wildlife crossing structures. Unfortunately, the majority of studies on the use of crossing structures by wildlife lack a proper study design which limits the quality or reliability of findings. The design and methods of each study to evaluate the use of crossing structures must be tailored to the specific conditions 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 use.
- 15.4 Use data from control plots to estimate the minimum expected rate of use of a crossing structure.
- 15.5 Select survey methods that monitor multiple species simultaneously and use more than one survey method for each species.
- 15.6 The timing, frequency and duration of the monitoring should allow for rigorous estimates of crossing structure use.
- 15.7 Measure explanatory variables to enable a comprehensive analysis of the monitoring data.
- 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 limited understanding of their function. Adopting the guidelines presented in this chapter will improve the quality 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.

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Companion website: www.wiley.com/go/vanderree/roadecology

Chapter 16

GUIDELINES FOR EVALUATING THE EFFECTIVENESS OF ROAD MITIGATION MEASURES

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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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