Road mitigation: How effective are our measures?

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Trust – Understand – Commit
Are they being used?
Trust – Understand – Commit
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.
Toads and their tunnels
Only 40% passes

- Number of toads that approach the road: 789
- Number of successful crossings through the tunnels: 314
- Number of toads that ended up on the road: 212
- Number of unsuccessful crossings - toads that turned around: 263
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

T1: 54% reduction
T2: 88% reduction

After correction based on controls:
T1: 51% (range 32-62%)
T2: 88% (range 83-90%)

* = p < 0.05
** = p < 0.01
Fence end sites

![Graph showing roadkill (n/km/yr) before and after the construction of fences. The graph compares two fence end sites: Fence end site 1 and Fence end site 2. The data is presented for the periods 2005-2008 (Before) and 2009-2014 (After). The graph indicates a decrease in roadkill at Fence end site 1 and an increase at Fence end site 2, with no significant change (ns) at each site. The distances for the fence end sites are specified as 0.9 km each.](image-url)

- **Before (2005-2008)**:
  - Fence end site 1: Decrease
  - Fence end site 2: Increase

- **After (2009-2014)**:
  - Fence end site 1: No significant change (ns)
  - Fence end site 2: No significant change (ns)
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 we overdo it
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 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 because of differences among structures in their design, goals, target species, landscape and road condition.

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 evaluate a minimum of actual rate of use and minimum expected rate of use.
15.4 Use data from counted 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 method for each species.
15.6 The timing, frequency and duration of the monitoring should allow for rigorous estimation of crossing structure use.
15.7 Measure explanatory variables to enable a comprehensive analysis of the monitoring data compared to 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 important but limited understanding of their function. Adapting the guidelines presented in this chapter will improve the quality of each monitoring program as well as permit robust meta-analyses to optimise design, implementation and management of wildlife crossing structures at much broader spatial scales.

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 allow cross roads and other linear infrastructures. However, there is still much to learn about their effectiveness in 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, 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 road construction.
16.4 Adapt a study design that allows for rigorous conclusions.
16.5 Use model simulations to determine the best sampling scheme.
16.6 Select mitigation patches 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 Unlike survey methods that monitor multiple species simultaneously.
Obrigado!

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