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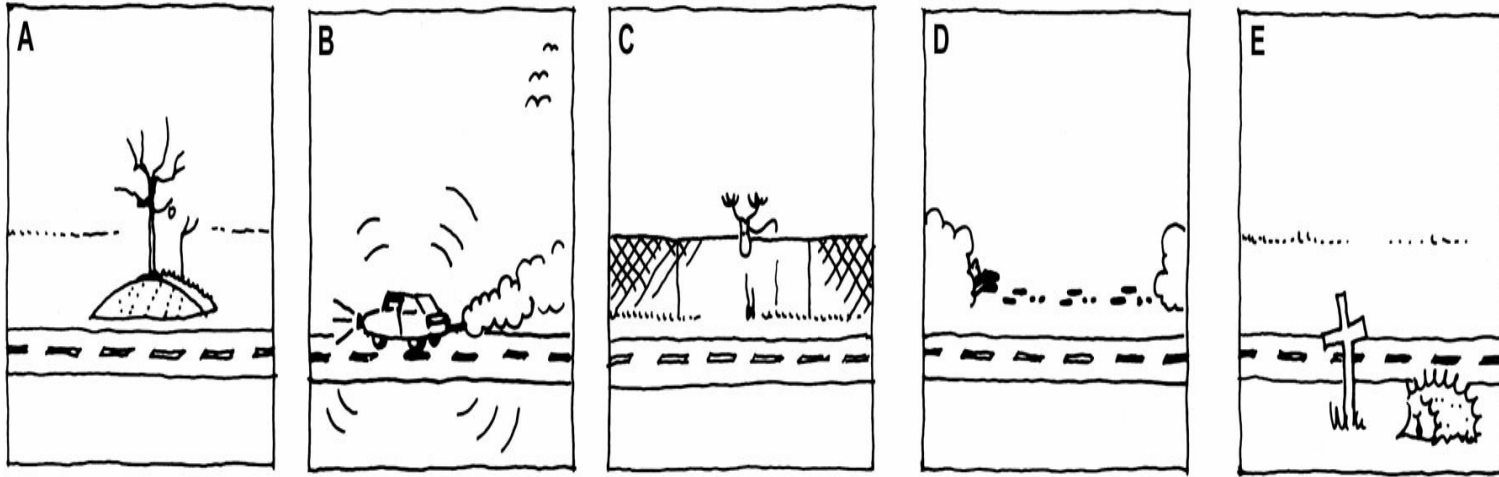
Norwegian

Public Roads Administration

Mitigating the road transportation environmental impacts

Bjørn Iuell, senior engineer
Environmental Strategy Section
Road Development Department
Directorate of Public Roads

Ecological effects of roads and road traffic



- A. Habitat loss**
- B. Pollution/disturbance**
- C. Barriers**
- D. Corridors**
- E. Fauna casualties**

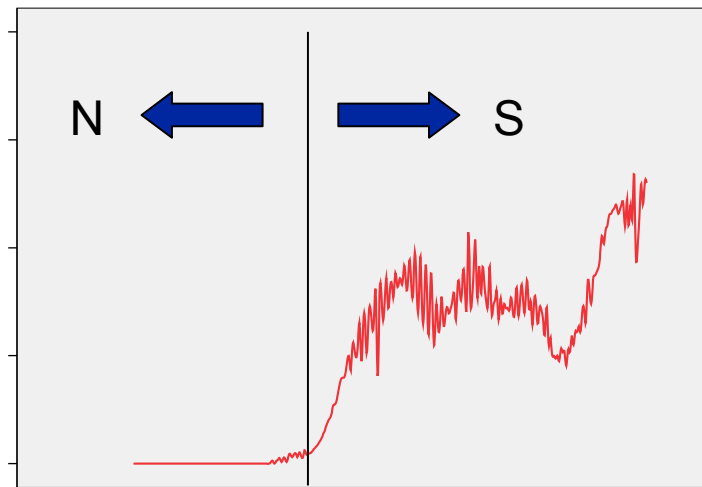
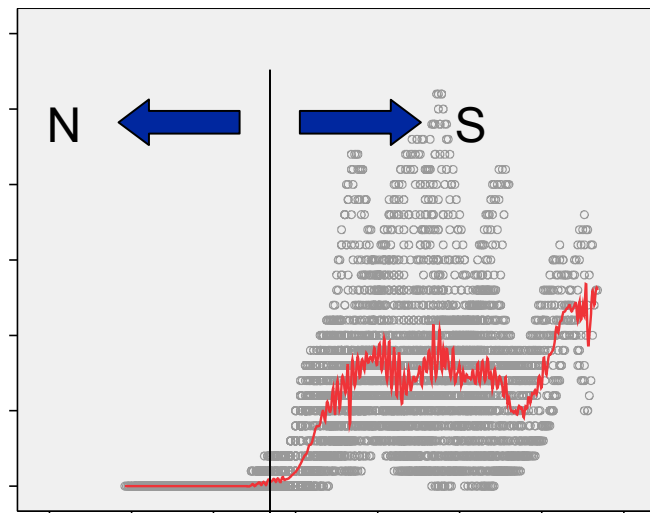
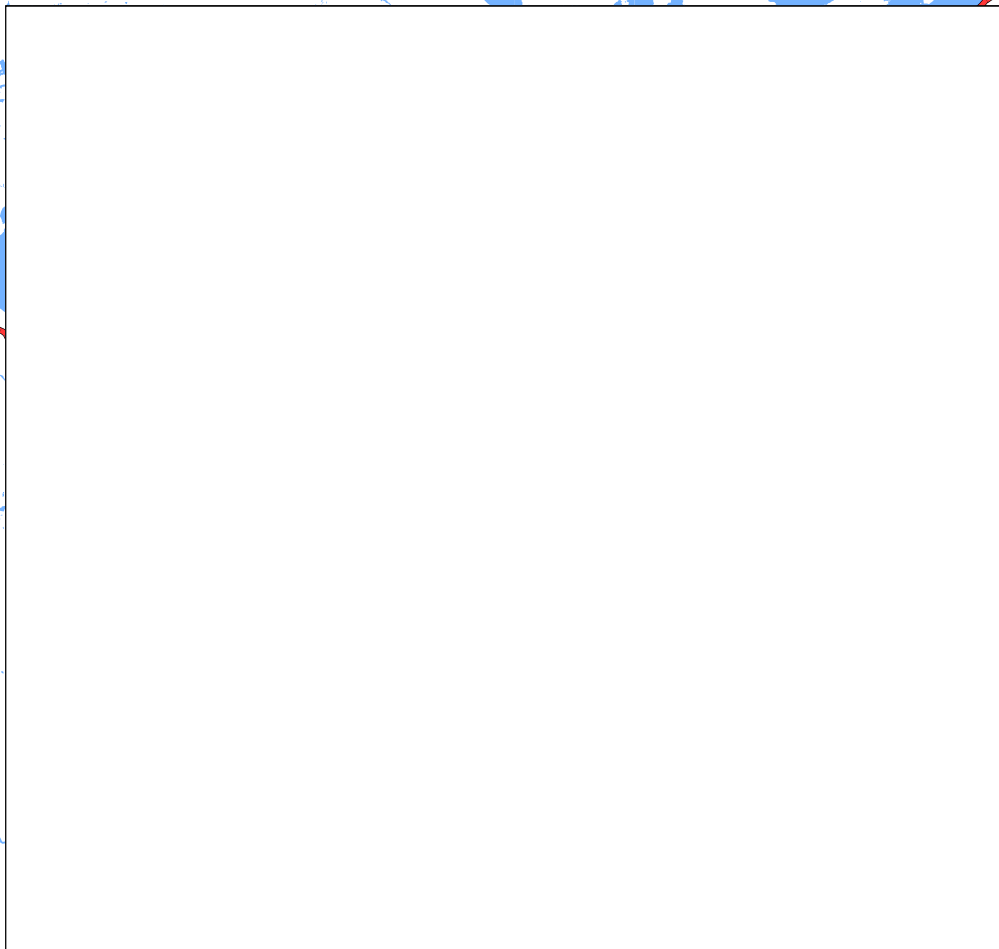


A. Habitat loss

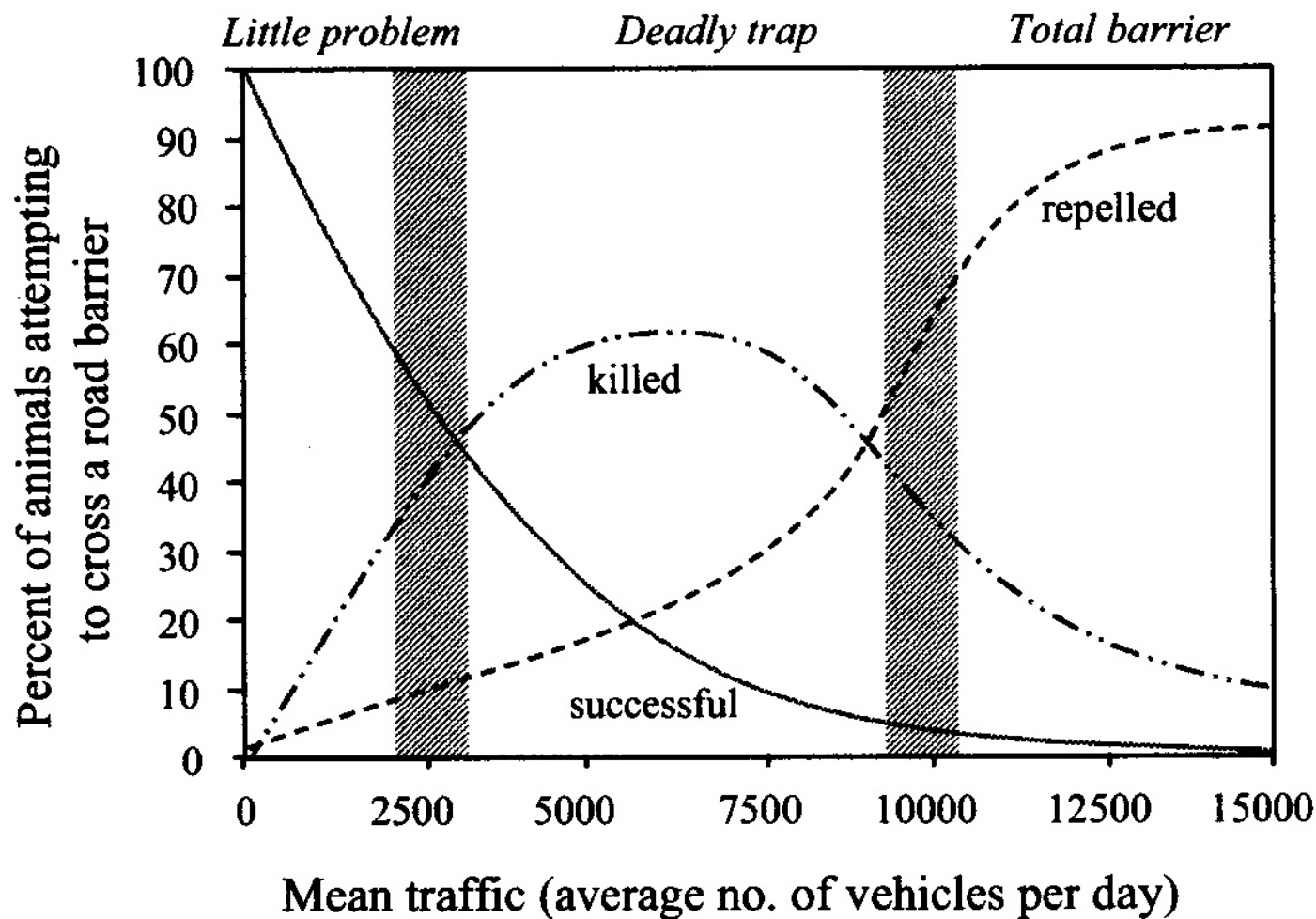


B. Pollution/Disturbance

The wild reindeer/roe of the cross-country



C. Barriers



C. New corridors



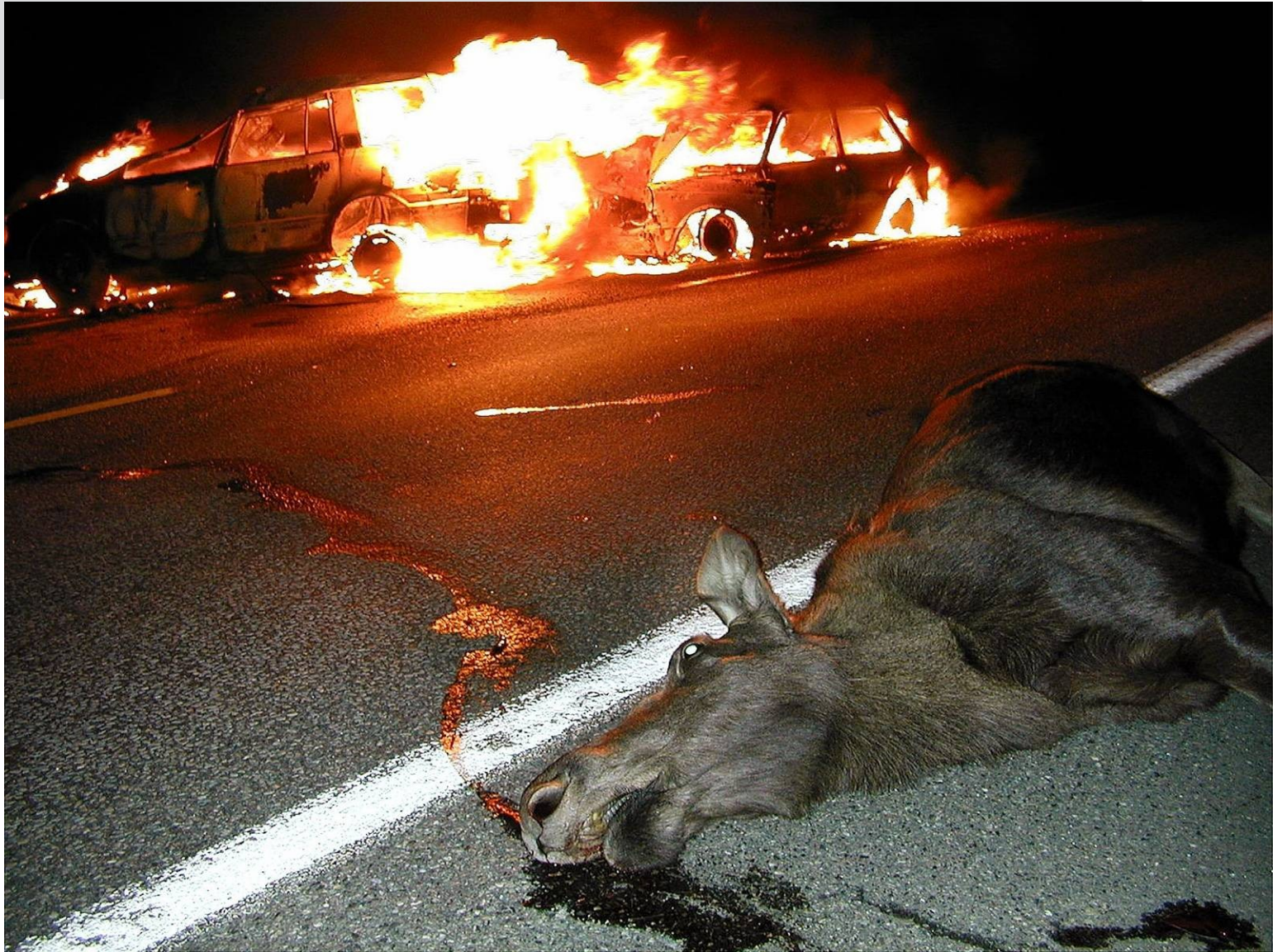
Sept-01



May 2003

E. Fauna casualties





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Norwegian Public Roads Administration

Foto: Helge Corneliusen, Fædrelandsvennen

Wildlife warning signs seldom have any effect on driving behaviour, but it happens.



Moose on the road, Norway

Wildlife fence, height: 230 cm



Fragmentation due to transport infrastructure

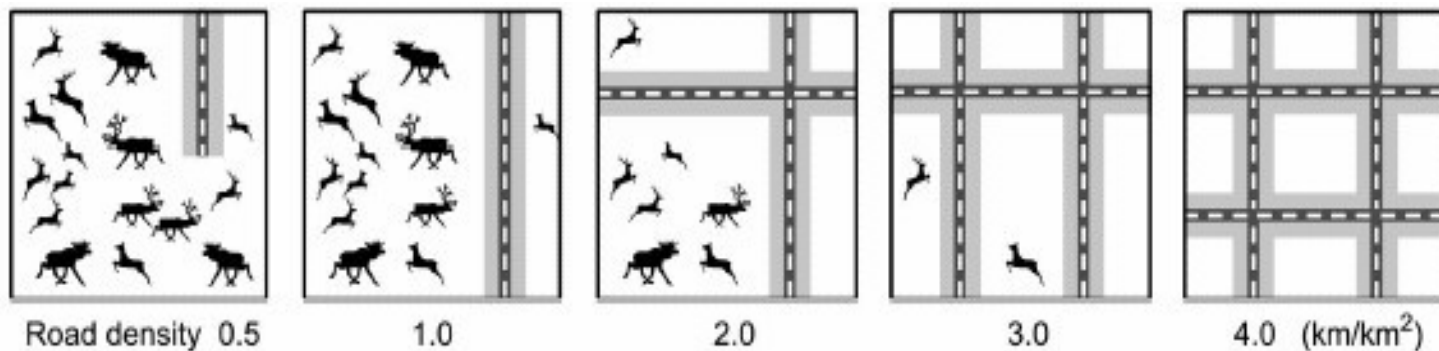


A36 Alsace, France



Habitat fragmentation

Splitting of natural habitats and ecosystems into smaller and more isolated patches.



Habitat fragmentation due to transportation infrastructure can lead to local extinction of species when the patches become smaller than the minimum habitat size.



COST 341

Habitat Fragmentation due to Transportation Infrastructure

WILDLIFE AND TRAFFIC
A European Handbook for Identifying Conflicts
and Designing Solutions



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Norweg

KNNV Publishers



European
Co-operation
in the Field of Scientific
and Technical Research



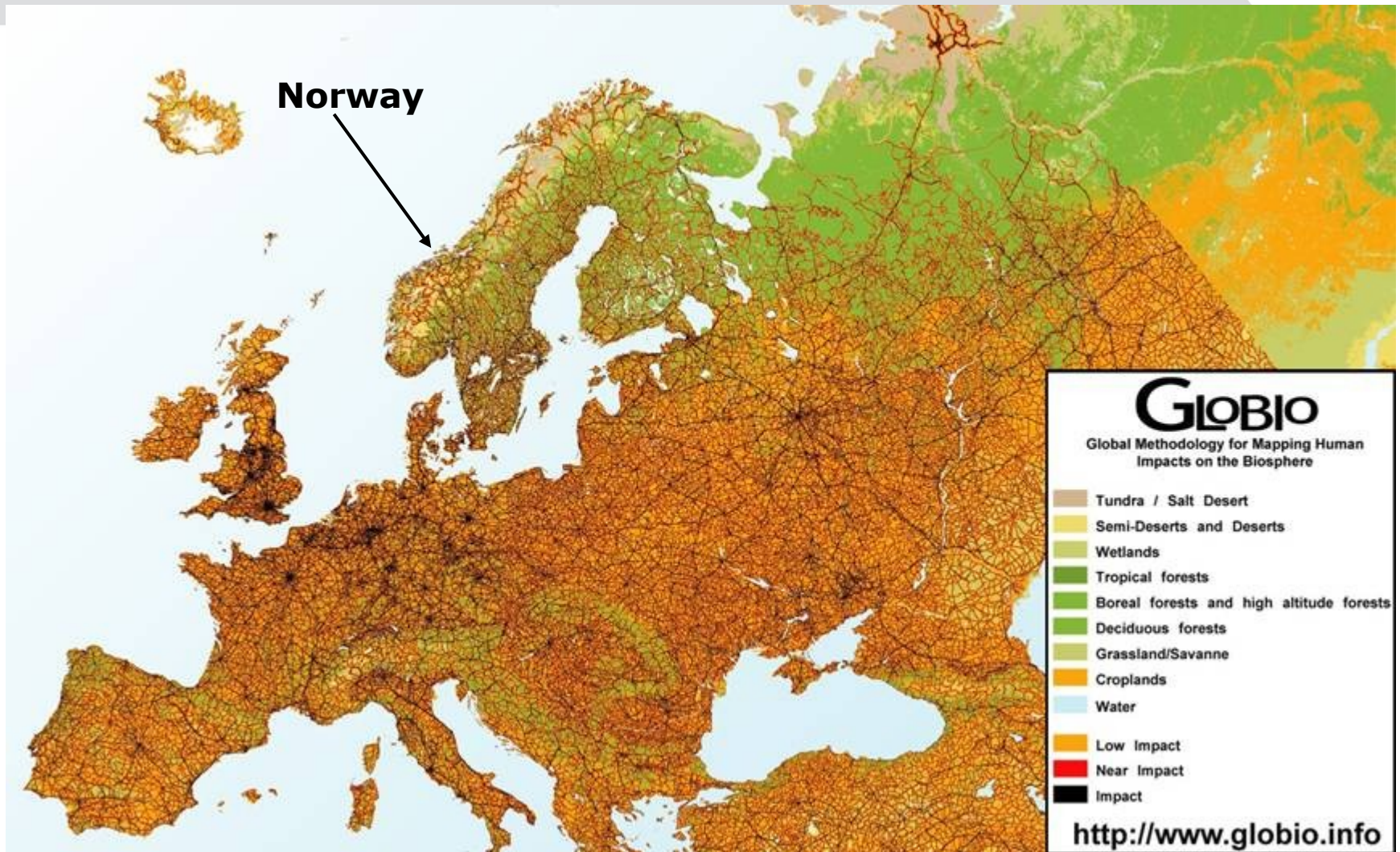
COST Action 341

- **CO-operation in the field of Scientific and Technical research**
- **33 member countries**
- **COST 341: Habitat fragmentation due to transportation infrastructure**
- **Start 1998, closing 2003**
- **16 countries (Belgium, Denmark, France, The Republic of Ireland, Cyprus, The Netherlands, Norway, Portugal, Romania, Spain, Switzerland, Sweden, The Czech Republic, The United Kingdom, Hungary, Austria)**

Internet: <http://www.cordis.lu/cost-transport/src/cost-341.htm>

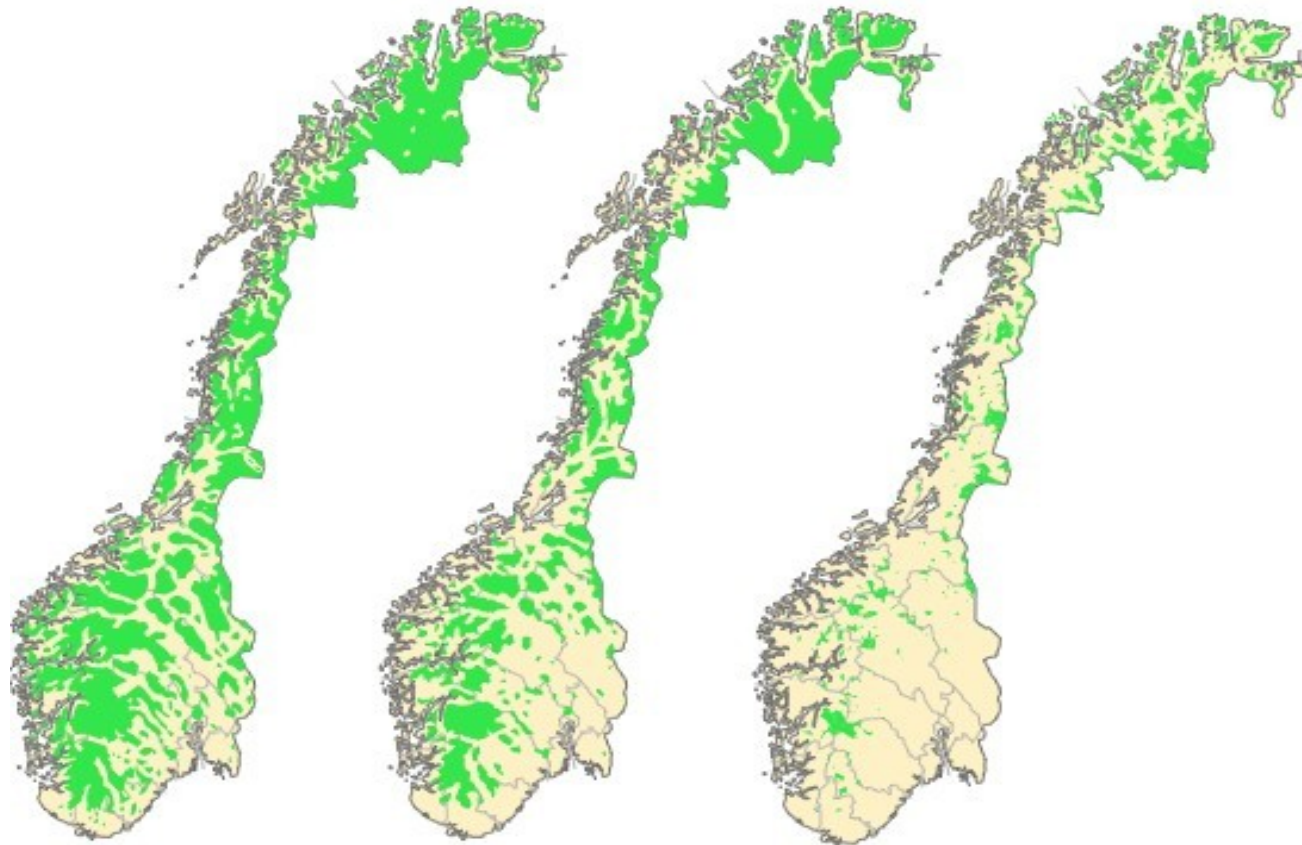


Human impact on European nature



Wilderness areas in Norway

Areas more than 5 km from nearest technical installation



1900

1940

1998

Kilde: Brun, M. NOU-1996 / Statens kartverk - Miljøenheten 1999. Redaksjonell bearbeiding og grafisk produksjon: Statens kartverk - Miljøenheten 1999



The Approach of the Handbook

Avoidance



Minimisation



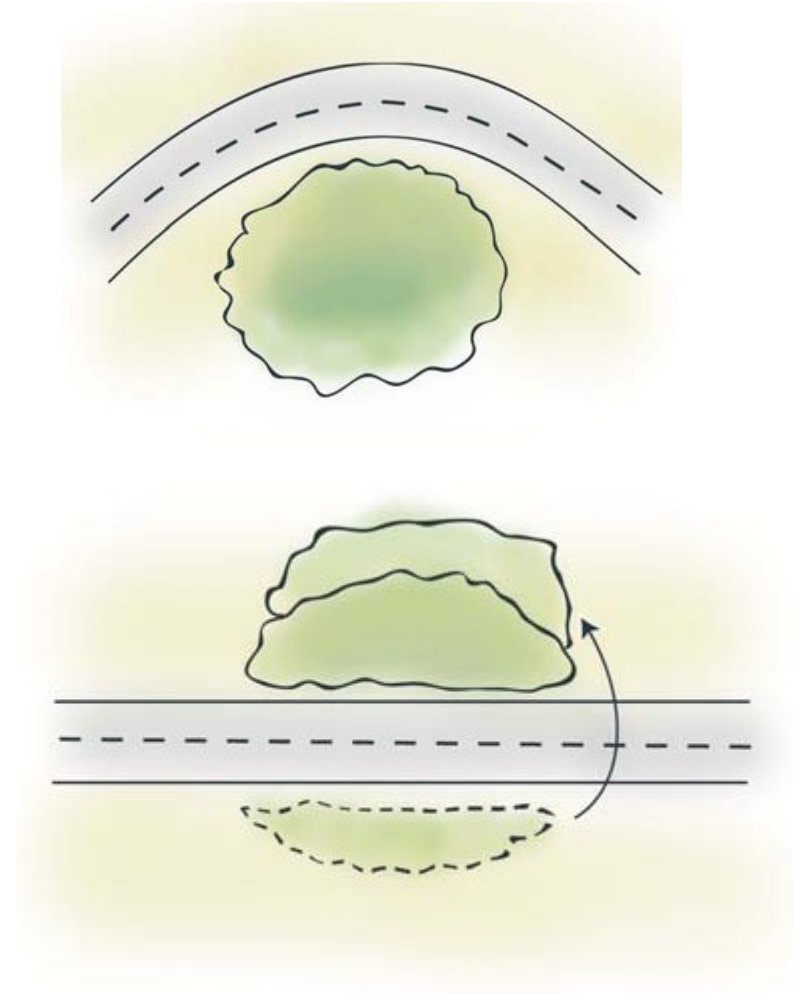
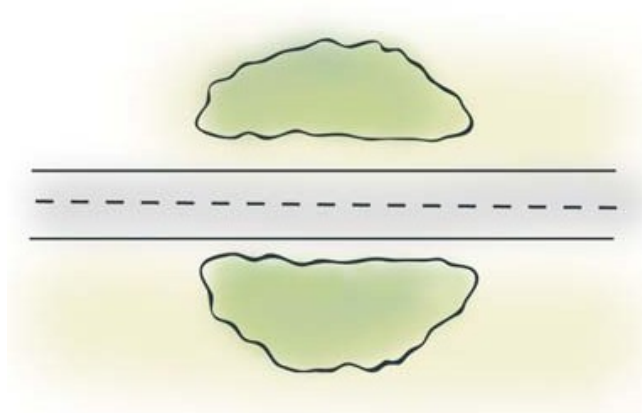
Mitigation



Compensation



Avoid – Mitigate - Compensate

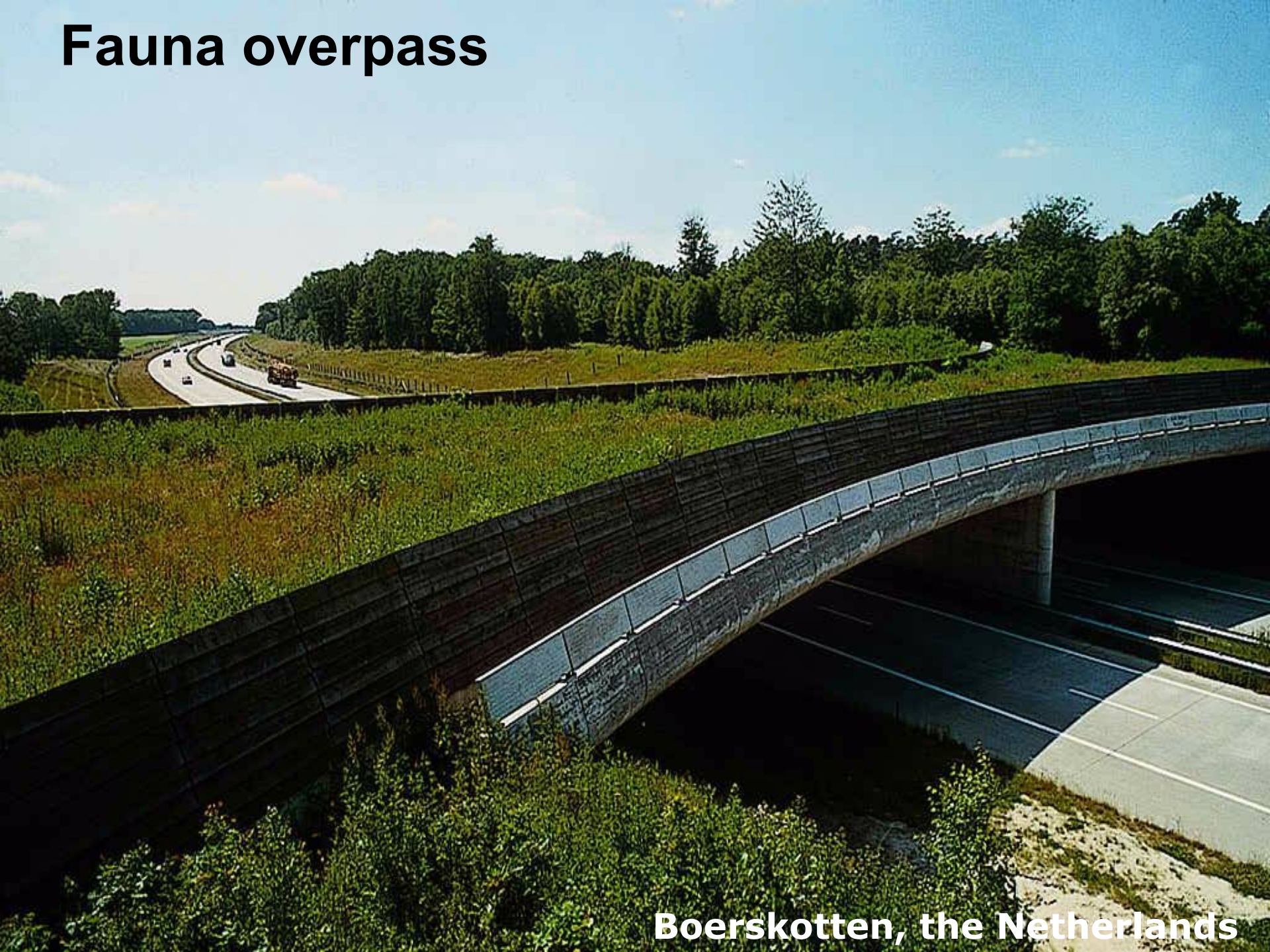


Fauna overpass



**Woeste Hoeve,
The
Netherlands**

Fauna overpass



Boerskotten, the Netherlands

Wolverine Pass, Banff National Park



Fauna overpass



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Norwegian Public Roads Administration

Gardermoen, Hw 174, Norway

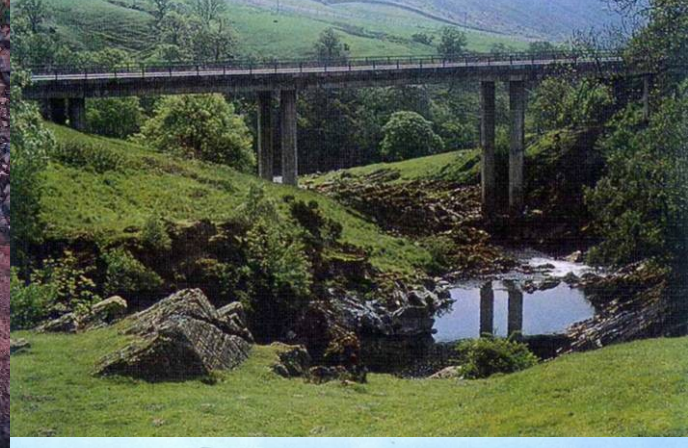
Tunnel under nature area



Bridge instead of embankment

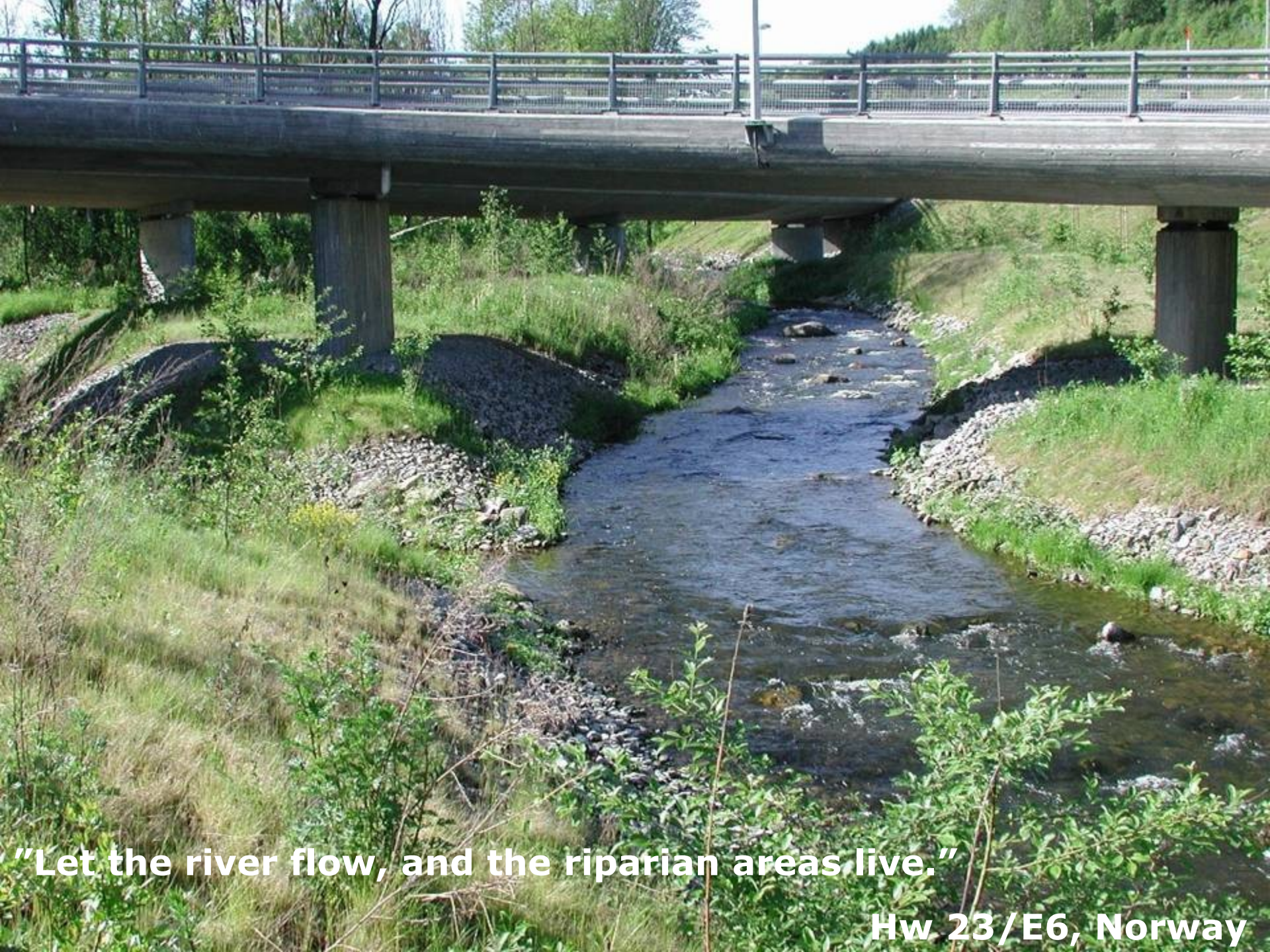


Under passes



Pipes and culverts must be ecologically designed





"Let the river flow, and the riparian areas live."

Hw 23/E6, Norway

The permeability concept

- **The primary objective is to maintain the permeability of the transportation infrastructure for wildlife, to ensure the connectivity of the habitats at a larger scale.**
- **Both new and existing infrastructure is considered.**
- **Considers not only the transportation infrastructure.**



Ecological compensation

- **Creating, restoring or enhancing nature qualities in order to counterbalance ecological damage.**
- **Measures should balance the ecological damage, aiming for a 'no-net-loss' situation that benefits both habitats and their associated species.**



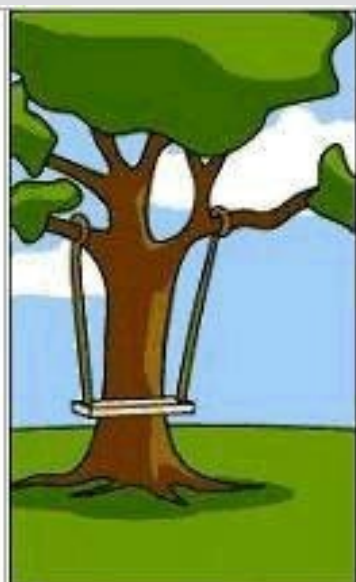
Monitoring/Evaluation

- **To detect failures in the installation, construction or maintenance of measures.**
- **To establish if the mitigation measures fulfil their purpose.**
- **To evaluate if the measures provide long term mitigation for the species and the habitats.**





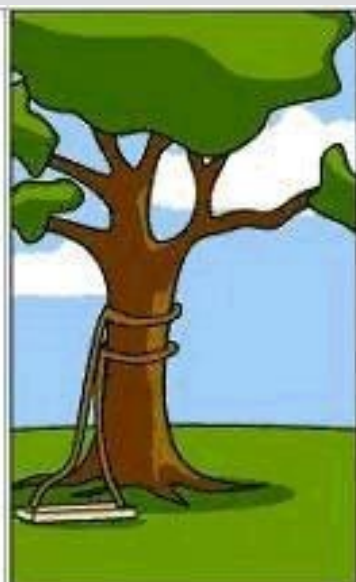
How the customer explained it



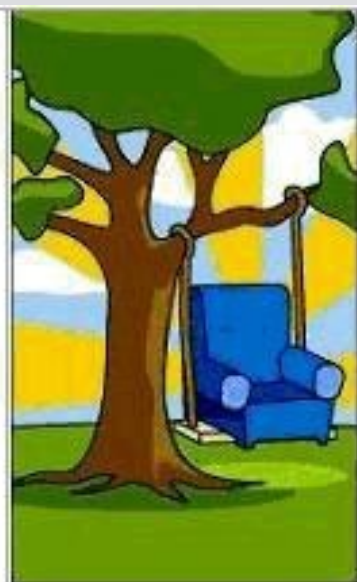
How the project leader understood it



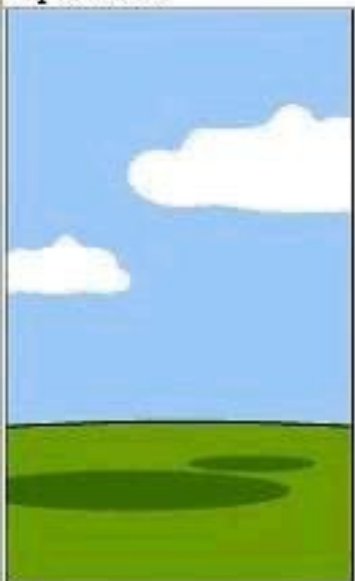
How the analyst designed it



How the programmer wrote it

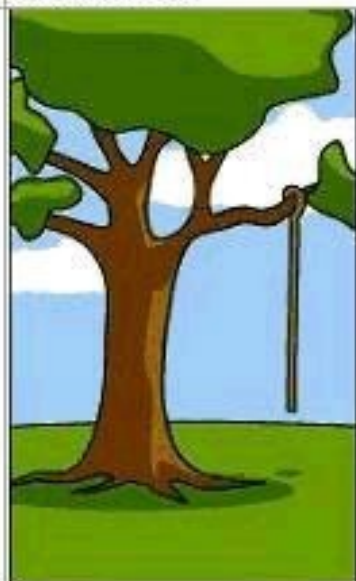


How the sales executive described it



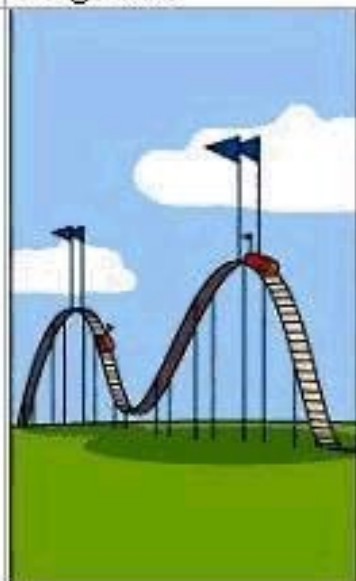
How the project was documented

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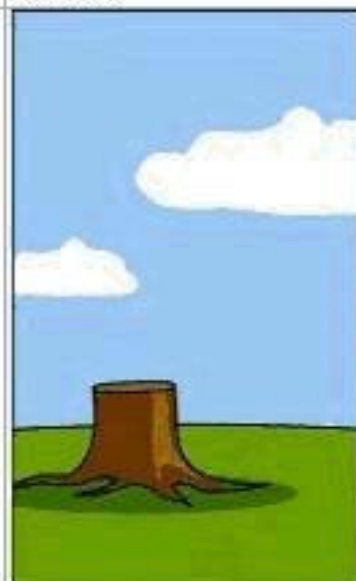


What operations installed

Norwegian Public Roads Administration



How the customer was billed



How the helpdesk supported it



What the customer really needed





Objectives for monitoring

- **avoid repeating mistakes**
- **provide new information for improving the design of mitigation measures**
- **identify the measures with an optimum relation between cost and benefit**
- **save money for future projects**



Monitoring methodes



COST 341

Fragmentación del hábitat causada
por las infraestructuras de transporte

FAUNA Y TRÁFICO

Manual europeo para la identificación
de conflictos y el diseño de soluciones



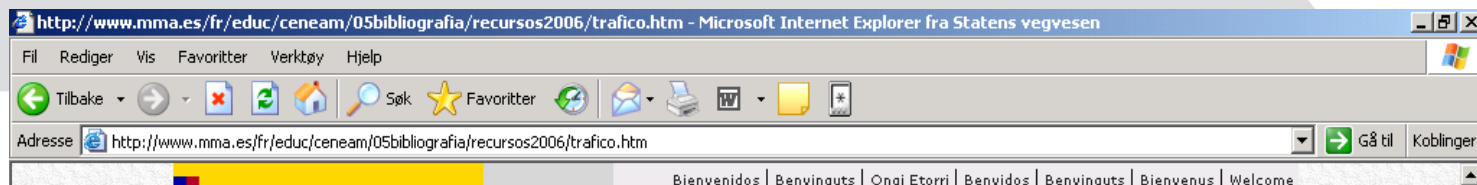
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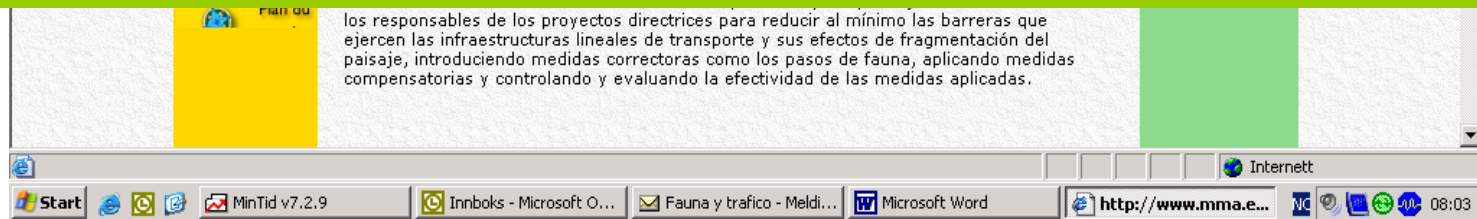
Norweg

http://www.mma.es/fr/educ/ceneam/05bibliografia/recursos2006/trafico.htm



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INFORMACIÓN: Centro de Publicaciones del Organismo
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28005 Madrid
Tel: 91 5964943





Thank you! Gracias!