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Towards sustainable networks

Setting priorities in restoring habitat connectivity across transportation infrastructure

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IENE Conference
November 13-15, 2003
Brussels, Belgium

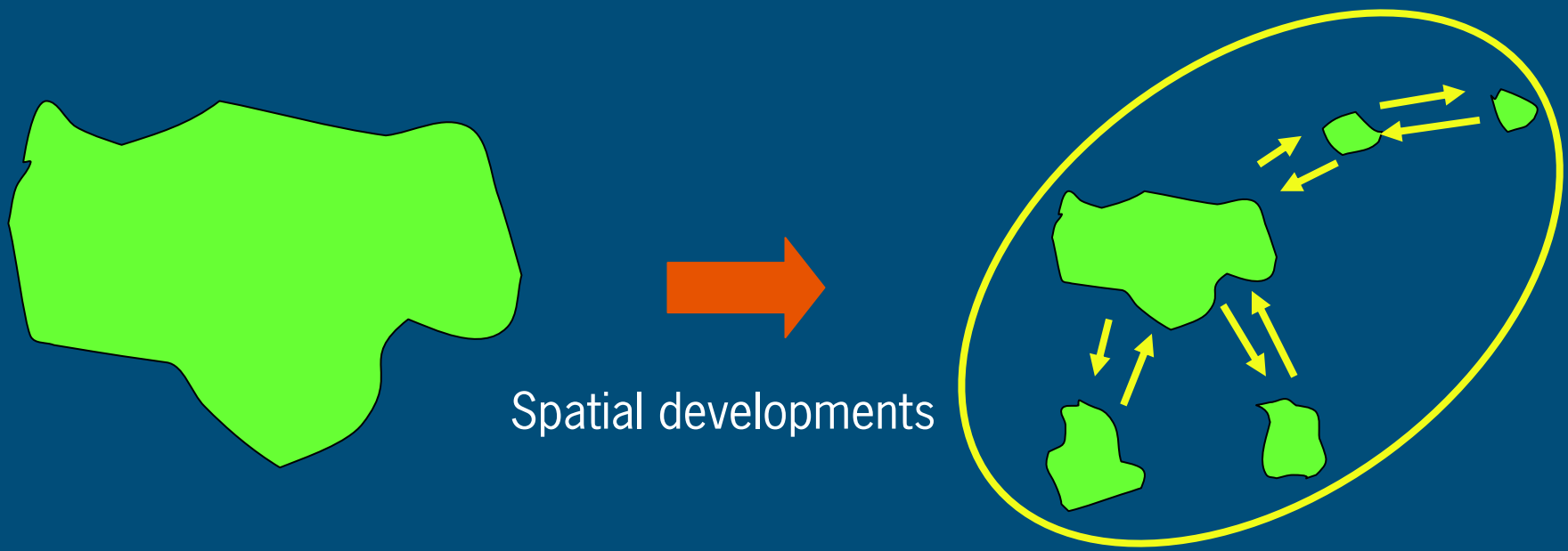
Aim of presentation

- Introduction of method to assess locations for wildlife crossing structures, using population viability as indicator

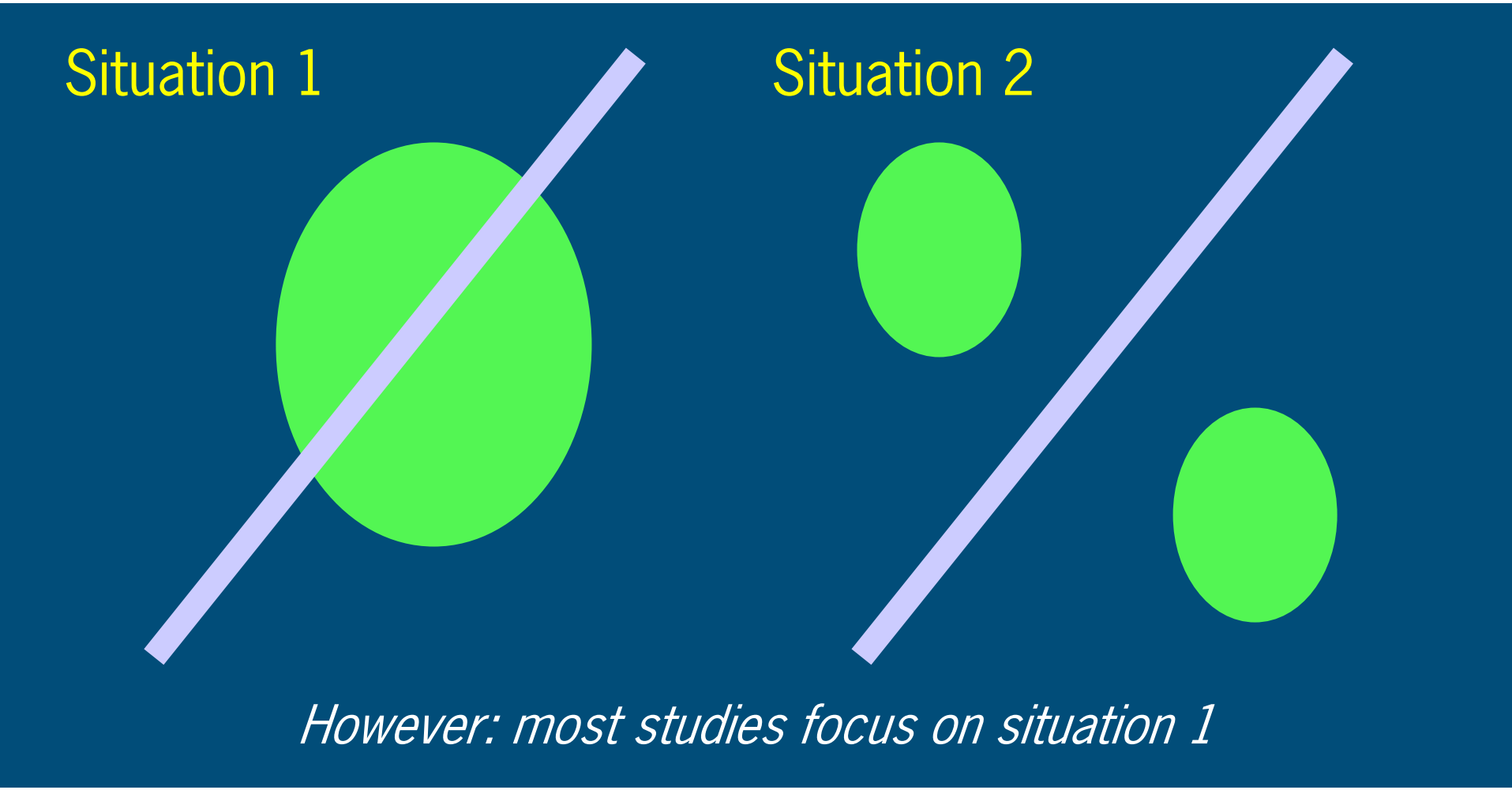
Statement:

Population viability analysis is indispensable to set proper (ecological) priorities for the construction of wildlife crossing structures

Why a new method?



Population viability affected in both 1 and 2



However: most studies focus on situation 1

Limitations existing indicators

Example: Road kill data

However:

- no road kill does not mean no (fragmentation) problem

And:

- road kill does not necessarily indicate a problem for the (survival of a) population

The method applied

Case study:

Assessment of defragmentation locations at main infrastructure in the Netherlands

Funded by:

Dutch Ministry of Transportation
Dutch Ministry of Agriculture, Nature management and Fisheries
Dutch Ministry of Spatial Planning, Housing and the Environment

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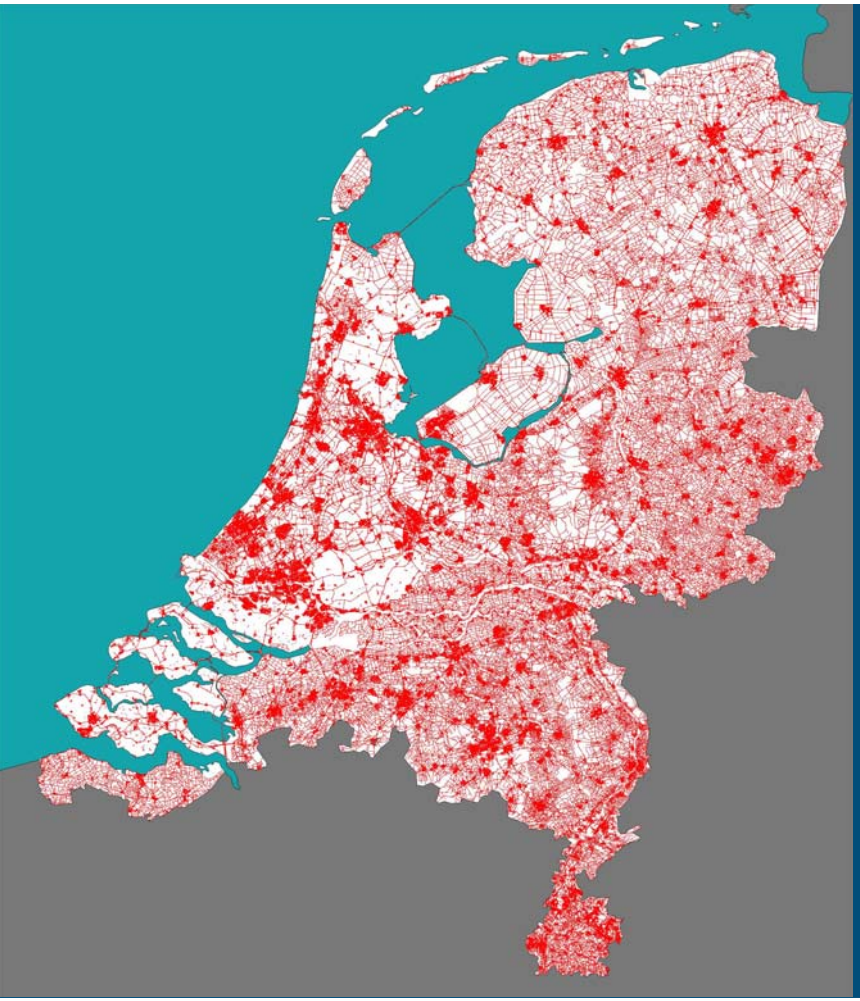
Problem?



The Netherlands:

- circa 34.000 km^2
- >16 million people
- 470 people/km^2
- 9.5% urban area
- 3.4 km/km^2 paved road

Research questions

At what locations do roads, railroads or waterways significantly affect population viability?

And:

Which of these locations should be mitigated first?

Approach

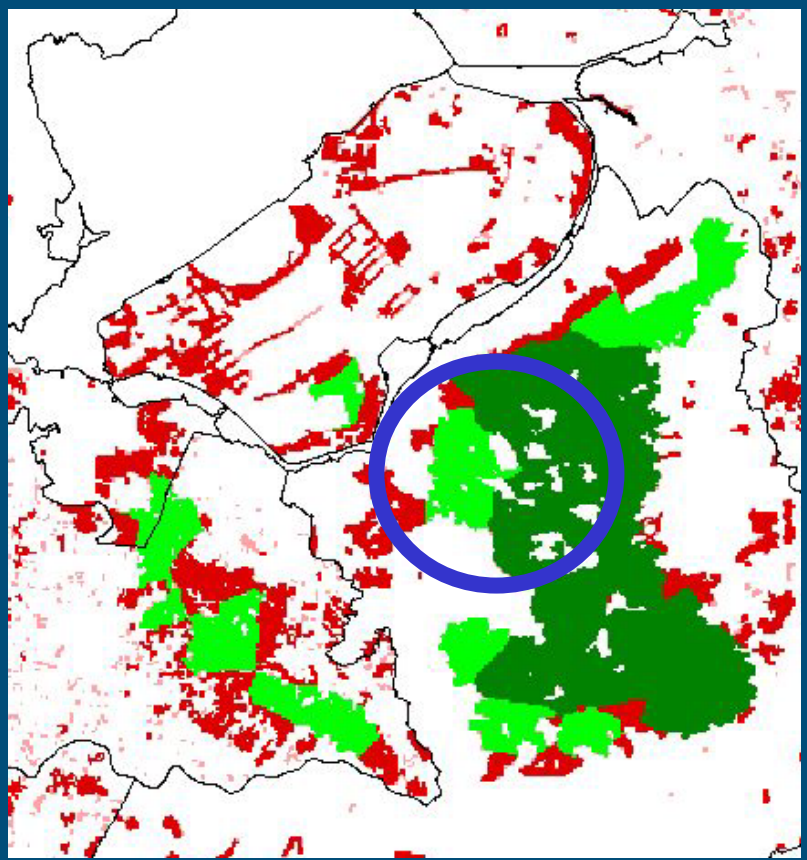
Assessment of locations where wildlife crossing structures cause a shift in population viability

- Population viability analysis in situation with infrastructure
- Population viability analysis in situation without infrastructure
- Comparison of both situations → identification of locations
- Quantification ecological profit → setting priorities

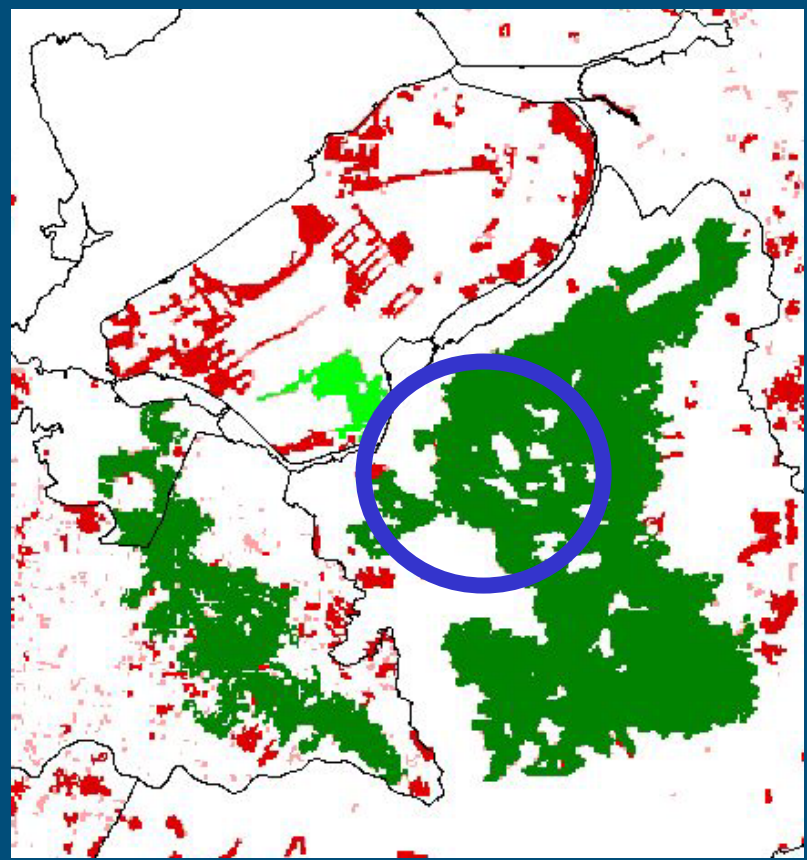
Example: model species ‘slow worm’

not viable viable highly viable

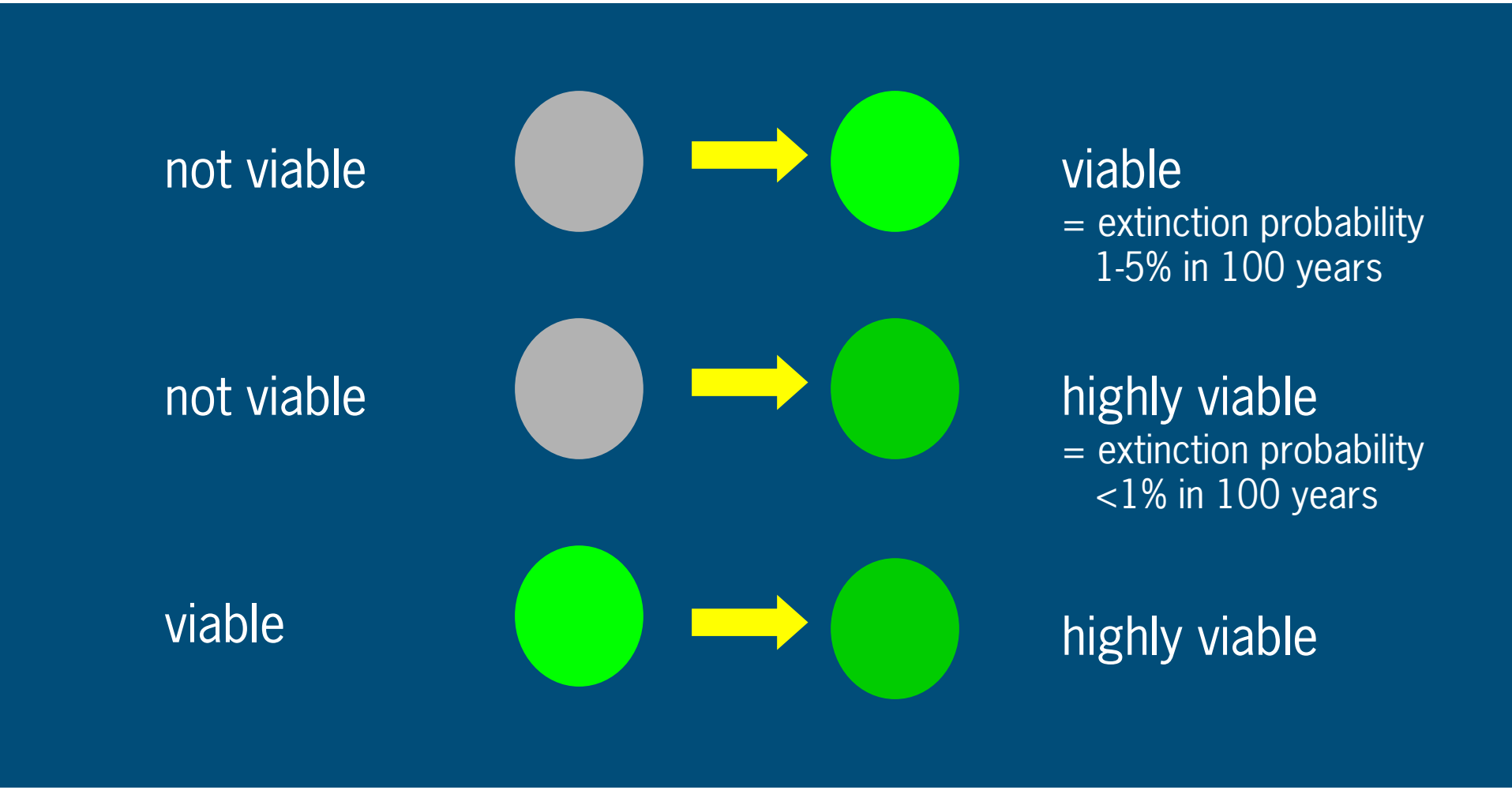
with infra



without infra

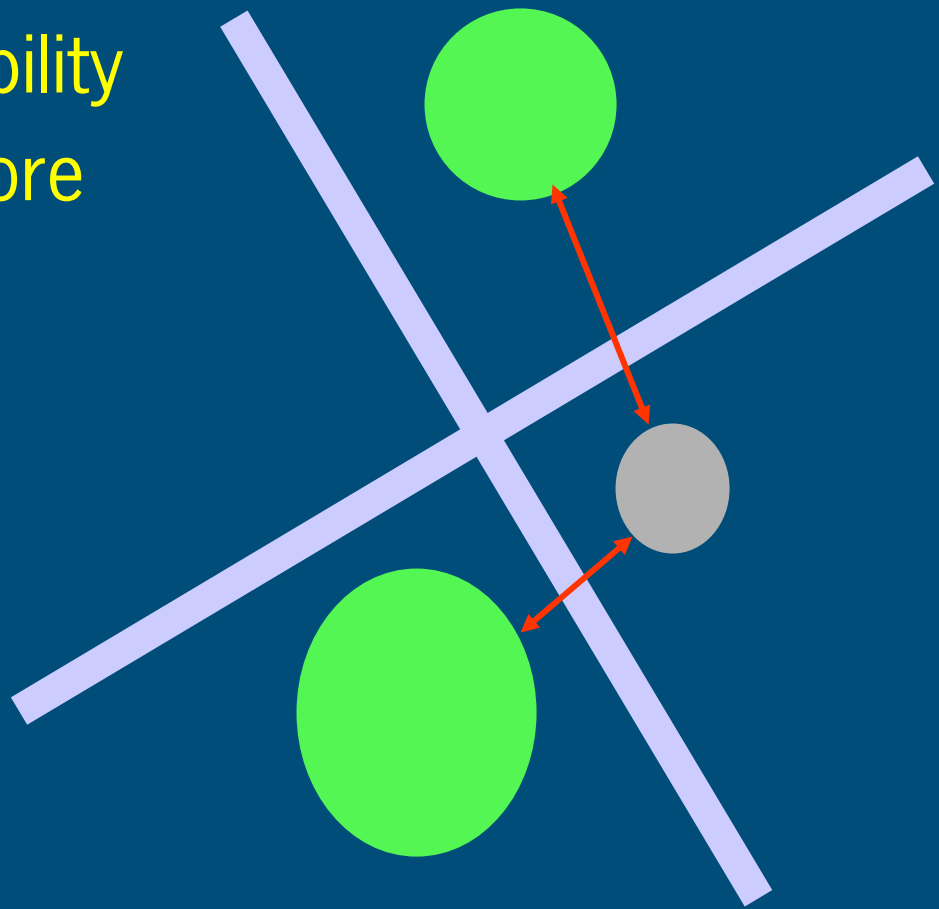


Identifying defragmentation locations



Identifying defragmentation locations

What if change in viability can be reached in more than one way?

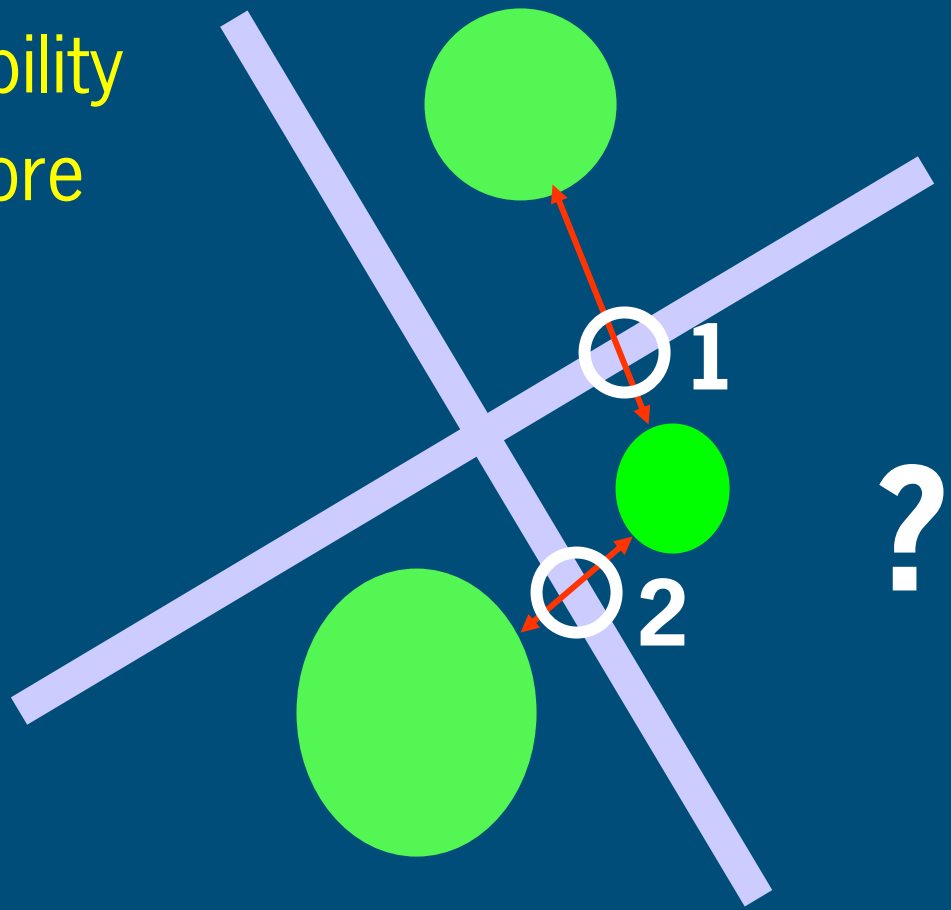


viable

not viable

Identifying defragmentation locations

What if change in viability can be reached in more than one way?



viable

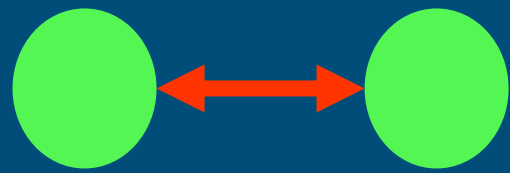
not viable

Identifying defragmentation locations

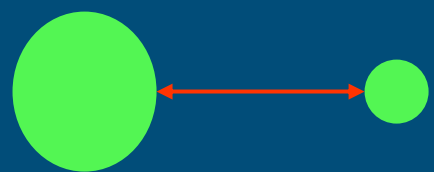
Indicator: network connectivity (degree of exchange)

Connectivity determined by:

- size source population
- size target population
- distance
- resistence intermediate landscape
  - land use, infrastructural barriers
  - mitigation measures

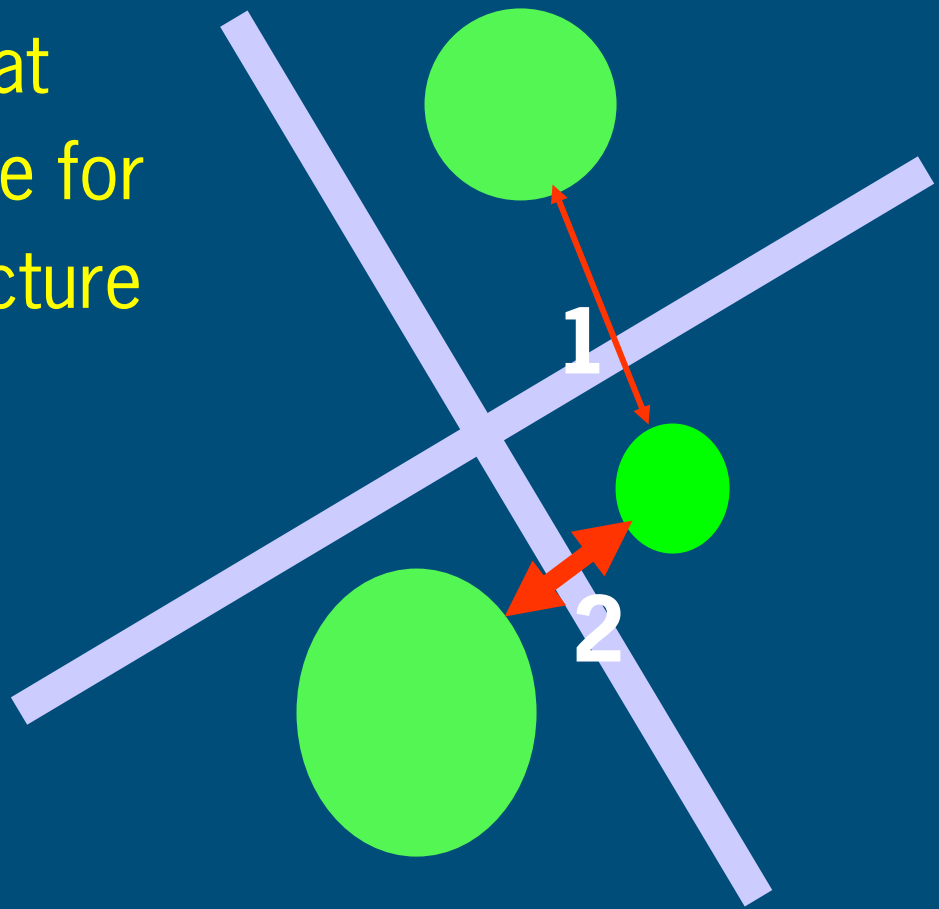


Is better than:



Identifying defragmentation locations

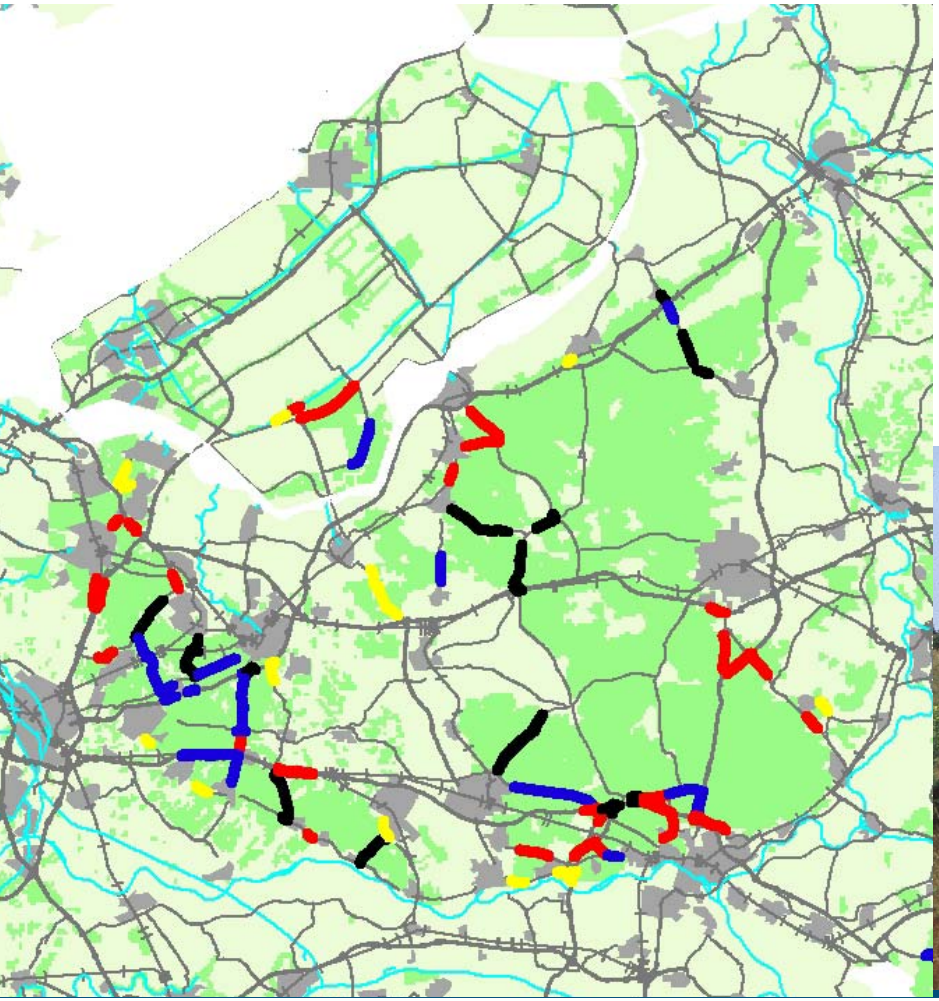
Highest connectivity at location 2 → best site for wildlife crossing structure



viable

not viable

Defragmentation locations ‘slow worm’



1
2
3
4
5

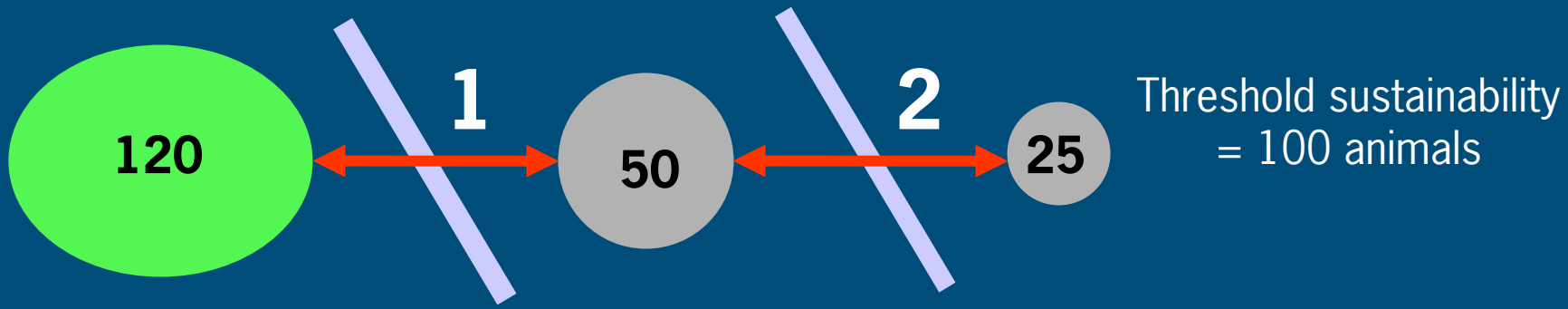
low priority

high priority

Setting priorities

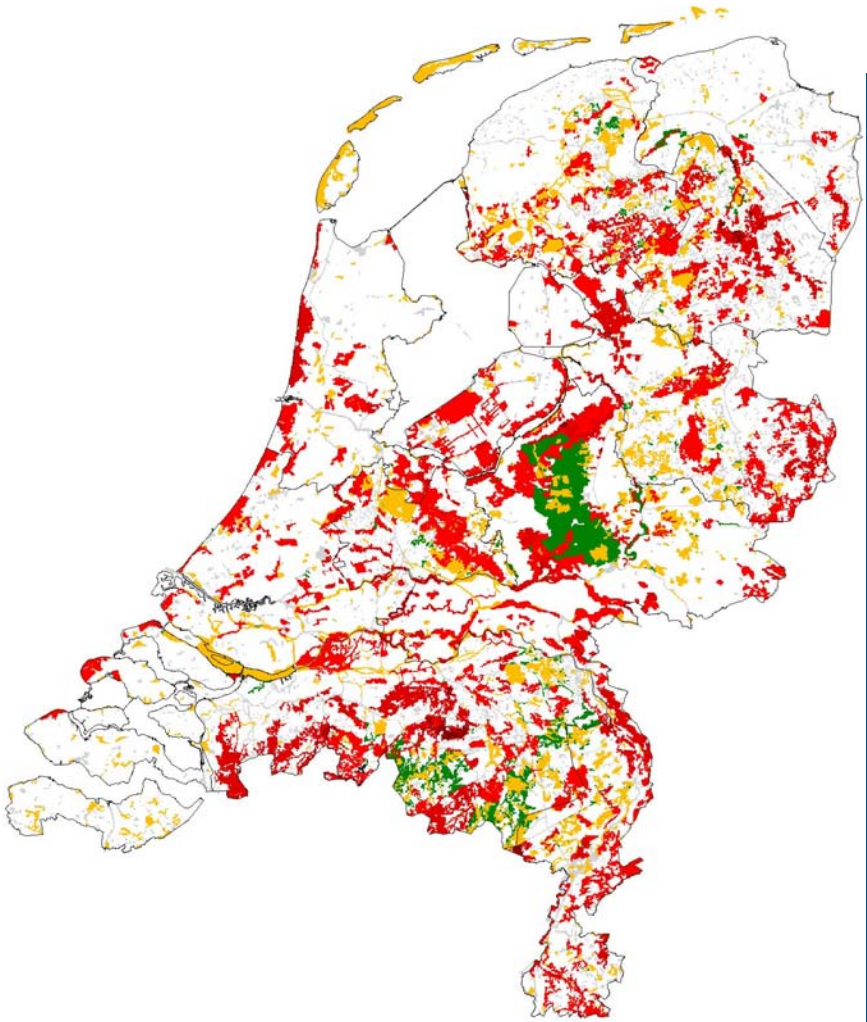
Criteria:

1. Direct or secundairy change in habitat sustainability



2. Ecological profit: extent of improvement of population viability

Potential improvement network populations



No problem

No improvement

Improvement for 1 species

Improvement for >1 species

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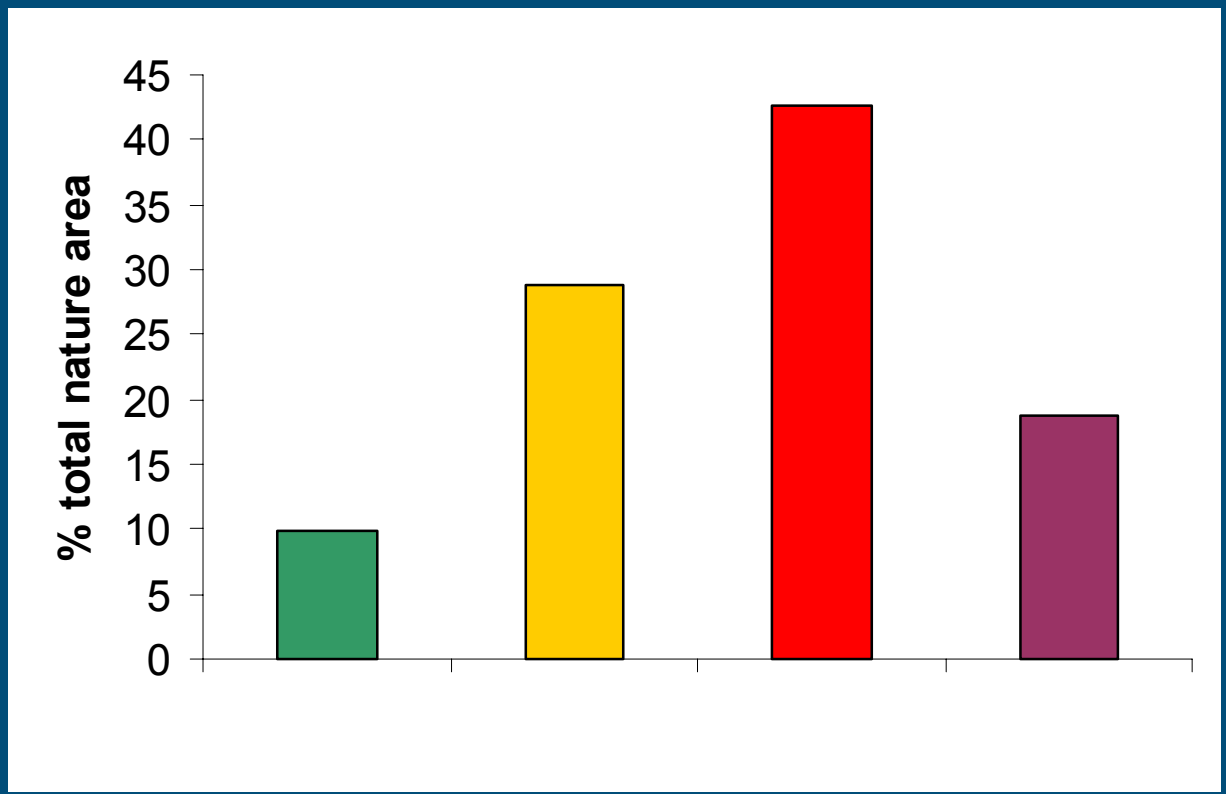
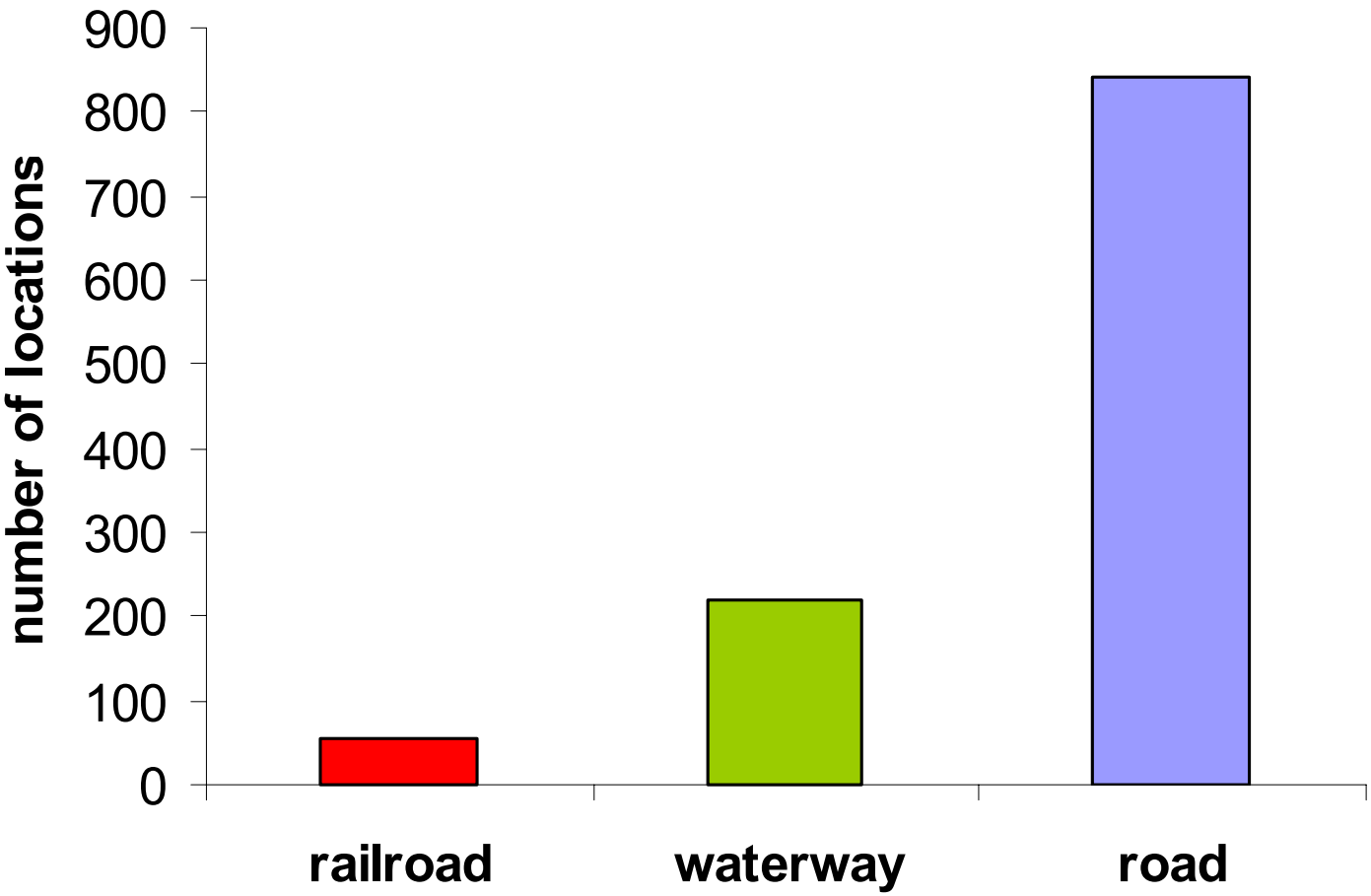
In numbers:

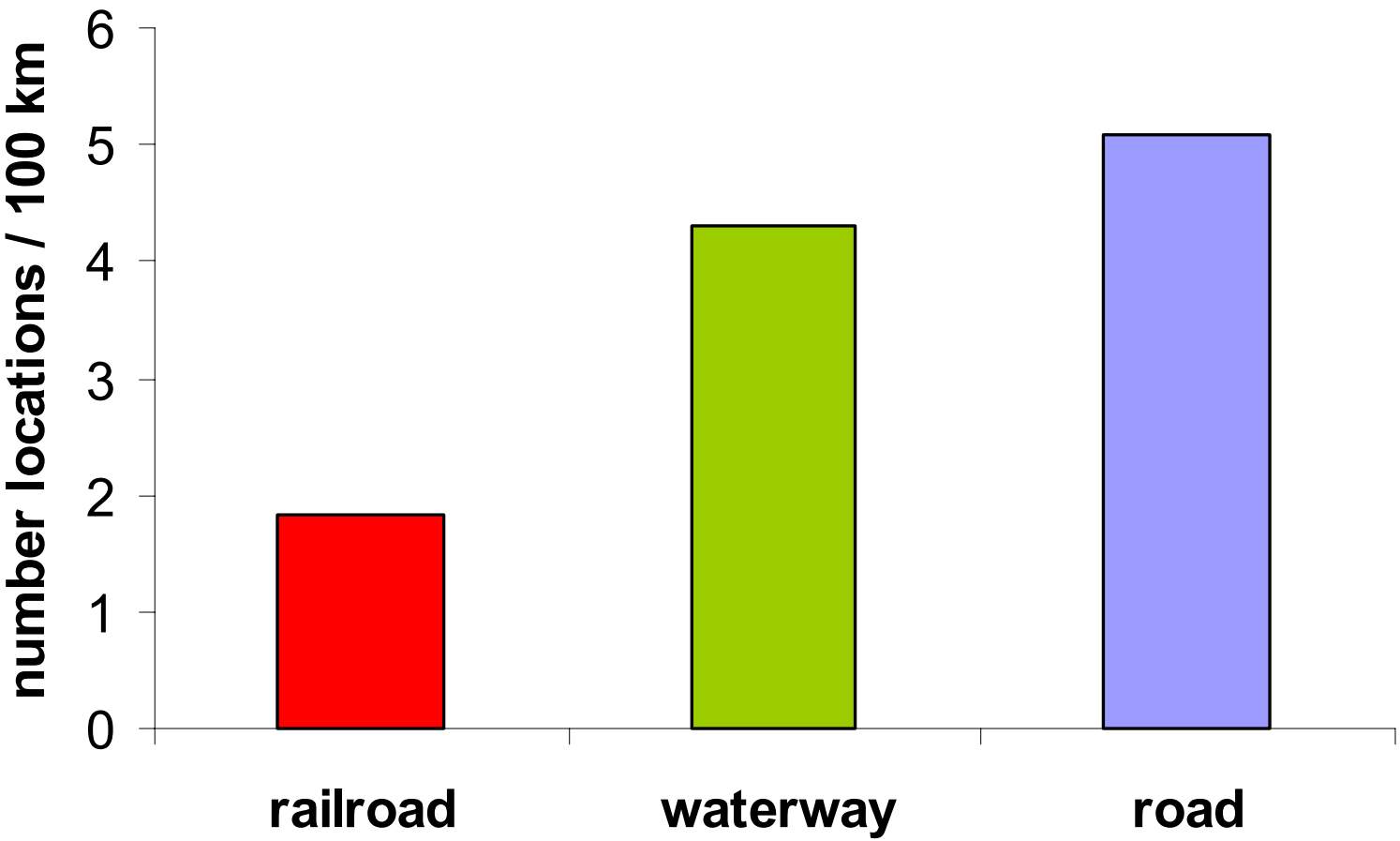


- no problem
- no improvement
- improvement: 1 species
- improvement: >1 species

Differences between infrastructure



Differences between infrastructure



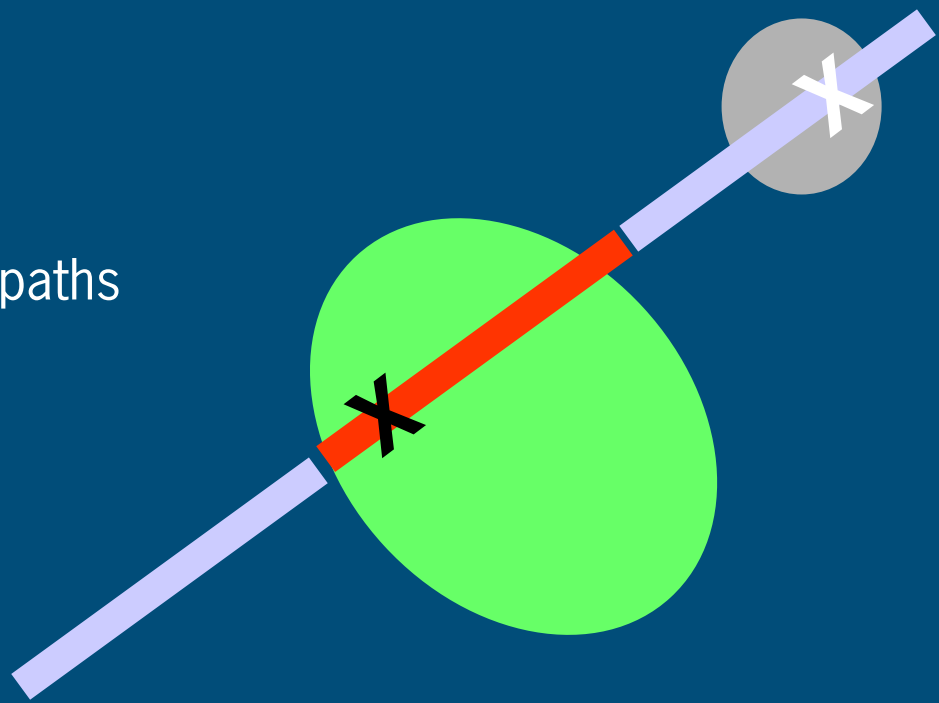
Comparison with expert judgement

Our method

Expert judgement

Where to construct wildlife crossing structures?

- Use population viability analysis as starting point
- Specify locations by:
  - road kill information
  - location animal migration paths
  - landscape features
  - .....



Conclusions

- Population viability analysis is a practical tool to assess defragmentation locations
- It also helps to prioritise mitigation actions, based on quantified ecological benefits
- Population viability indicator can be best used in combination with other indicators (e.g. road kill data), and expert judgement

Thanks to:

Stakeholders:

- Jantien Heydeman (Ministry V&W)
- Astrid Schippers (Ministry LNV)

Expert committee:

- Hans Bekkker (Rijkswaterstaat DWW)
- Louis Fliervoet (ExpertiseCentrum LNV)

Project team Alterra:

- Rogier Pouwels, Rien Reijnen, Jan Kalkhoven, Harold Kuipers
- Sipko Hensen, Fabrice Ottburg, Rene Jochem, Janien van der Greft

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