



# Safer railways for wildlife

– video documentation of animal-train encounters

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TRAFIKVERKET



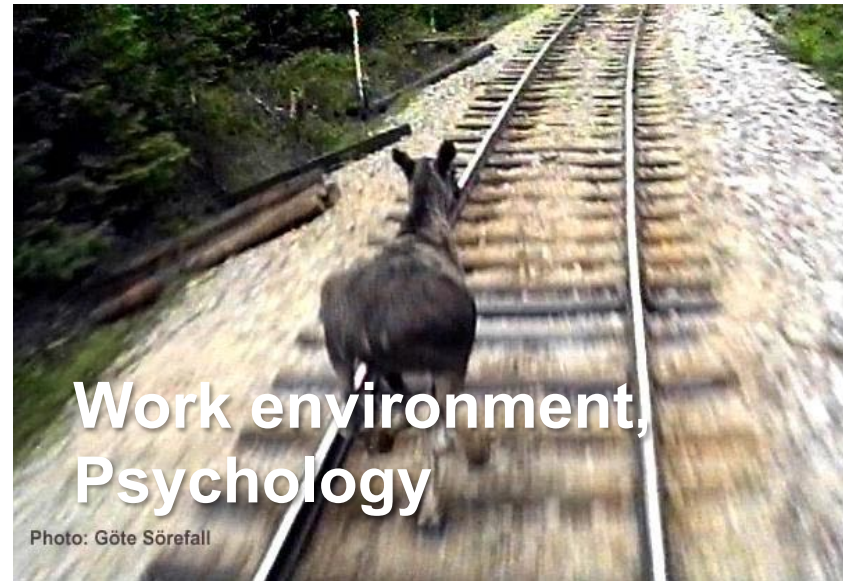






## Traffic safety, Economy

Photo: EuroMaint



## Work environment, Psychology

Photo: Göte Sörefall



## Wildlife management, Conservation

Photo: Daniel Ligne

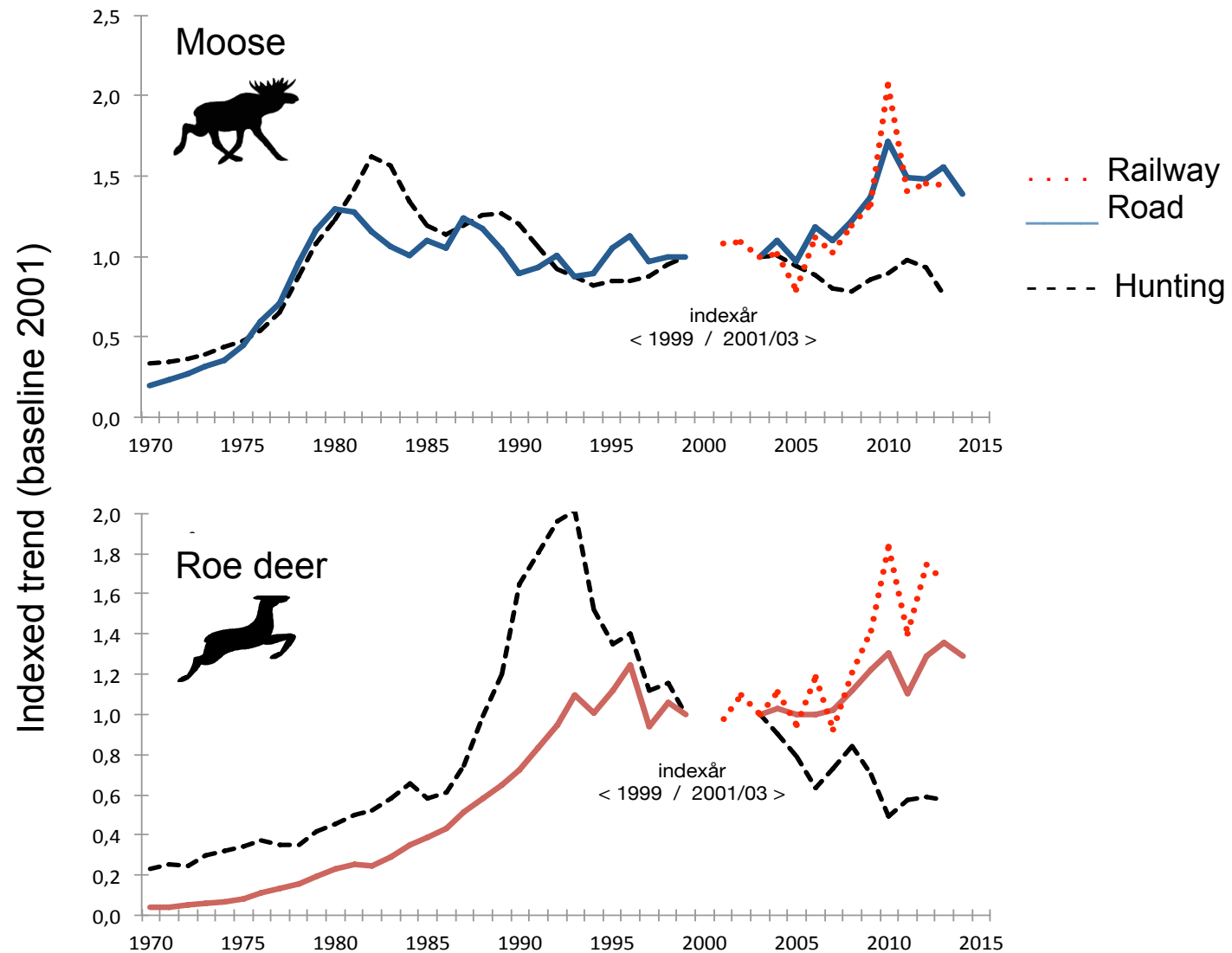


## Animal welfare, Ethics

Photo: Ole Henrik Foppfjell

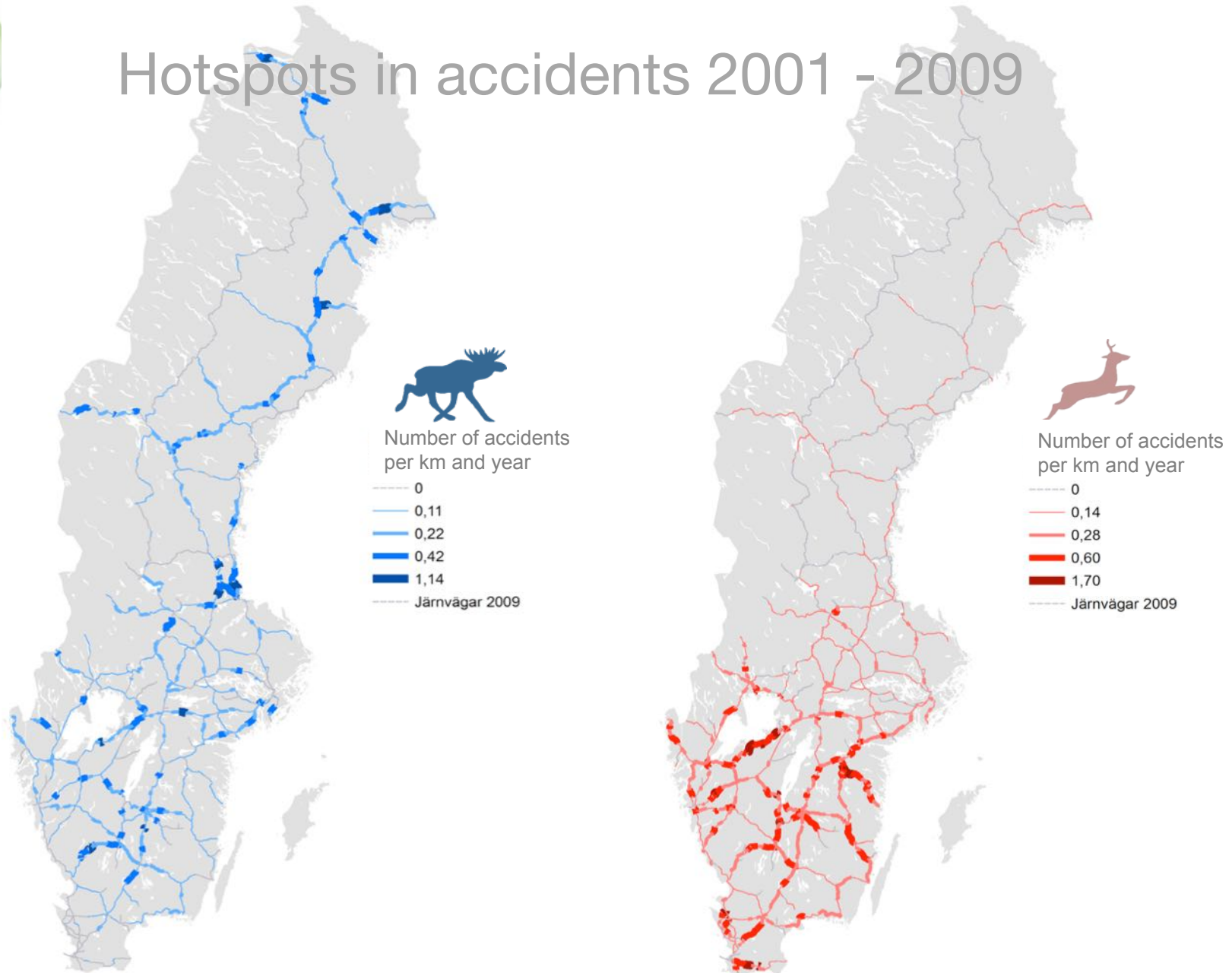


# Collisions with wildlife increase





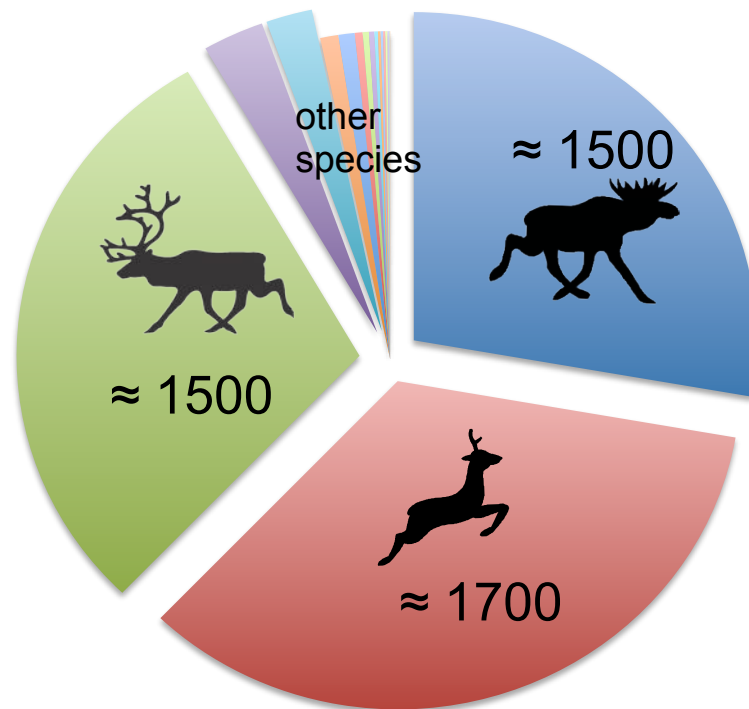
# Hotspots in accidents 2001 - 2009



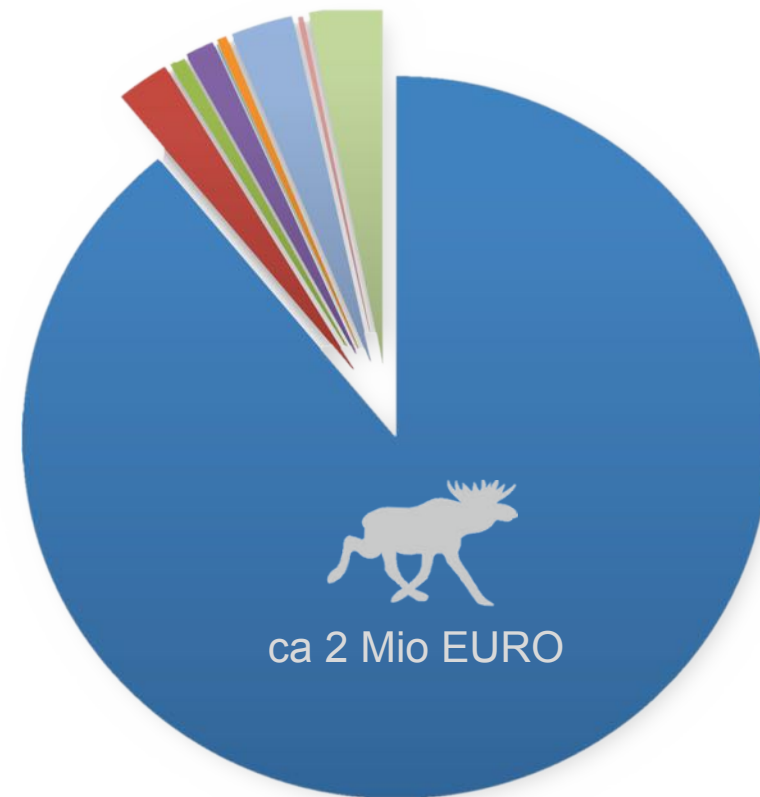




## Collisions with trains per year



## Repair costs for SJ per year



*Not all incidents are reported ...*



# Costs of delays in train traffic

• Train 579 collides with moose and must be replaced

• Damages to front and connection = 630 000 SEK

• Train out of duty for 2 days

• Train is delayed by 164 min.

• 6 other passenger trains are delayed with 37-164 min.

• 1120 passengers are delayed with a total of 103260 min.

• Cost of delays = 960 000 SEK

• Total cost of incident =  
ca. 200 000 €

• Train 984 collides with moose and must be replaced

• Damages to front and connection = 720 000 SEK

• Train out of duty for 3 days

• 290 passengers evacuate to train 910 after 85 min. delay

• 4 other passenger trains are delayed with 30-90 min.

• 1290 passengers are delayed with more than 64500 min.

• Cost of delays = 600 000 SEK

• Total cost of incident =  
ca. 150 000 €





# Risk factors



- Population size
- Train frequency
- Train speed
- Landscape
- Other infrastructure
- Snow depth



- Weather
- Forage
- No protection
- ...







# Immediate causes

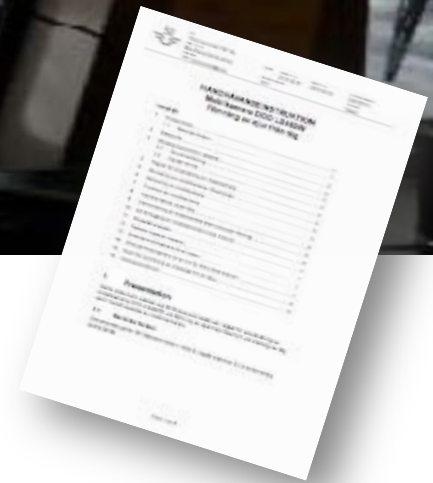
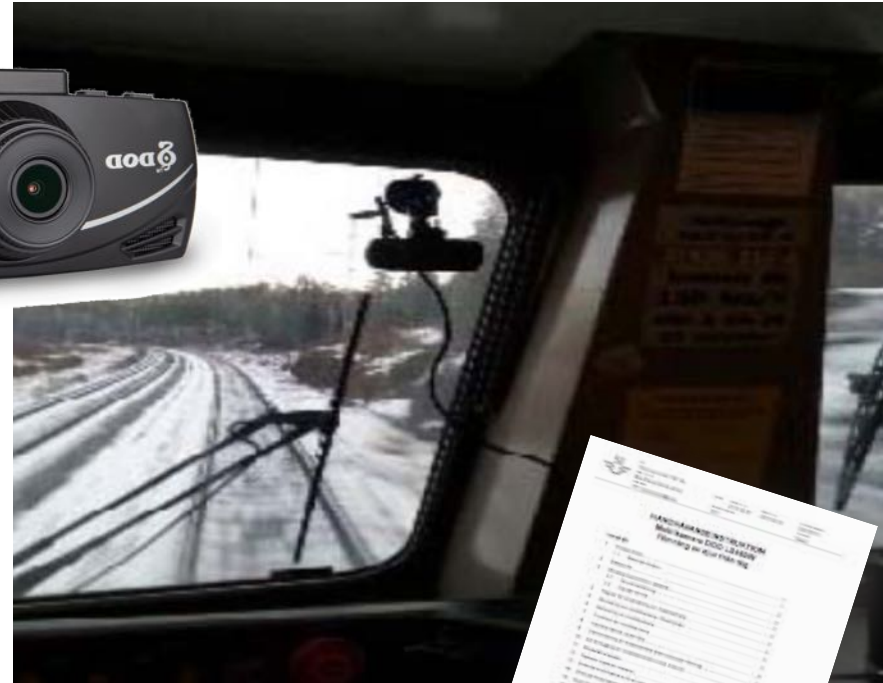
- Cognitive and behavioural factors
- Long intervals between trains
- Silent and fast trains
- Flight behaviour
- ??? ...





# Video documentation

- Train drivers volunteered
- Dash cams
- Rules for handling
- Rules for use of recordings
- Film clips upload on project website
- Start: April 2015 ...





# Video documentation

Experiences:

- Requires dedicated drivers ...
- GPS does not operate in train engines
- Video quality not always optimal
- Cameras rather sensitive (USB contacts)
- Night sensitivity is good (similar to human eye)
- No infringement on train driver working routines
- Operator:  
use dash cams as standard ?







## Video example

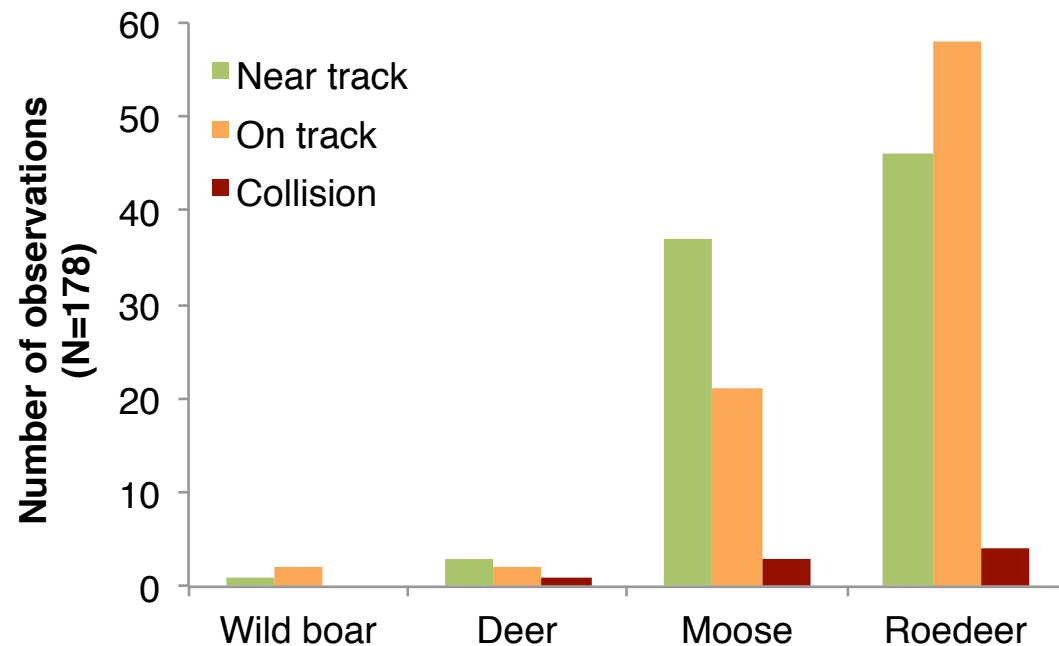
SAFER RAIL 4 WILDLIFE  
**EXAMPLES OF DEER-  
TRAIN ENCOUNTERS**

[WWW.VILTOCHTRAFIK.SE](http://WWW.VILTOCHTRAFIK.SE)



## ... first results

- 178 train encounters with ungulates have been recorded on video since April 2015
- 26 records of birds of prey
- few occasional records of carnivores (fox, badger, bear)





## ... first results

- most animals in rail corridor (90%) do NOT collide with
- kill rate in moose and roe deer is about 5%
- being next to or on rail track increases collision risk
- some animals (15%) do not respond to approaching trains (adaptation or detection ?)
- warning signals make no difference ?
- Limited sample size ...



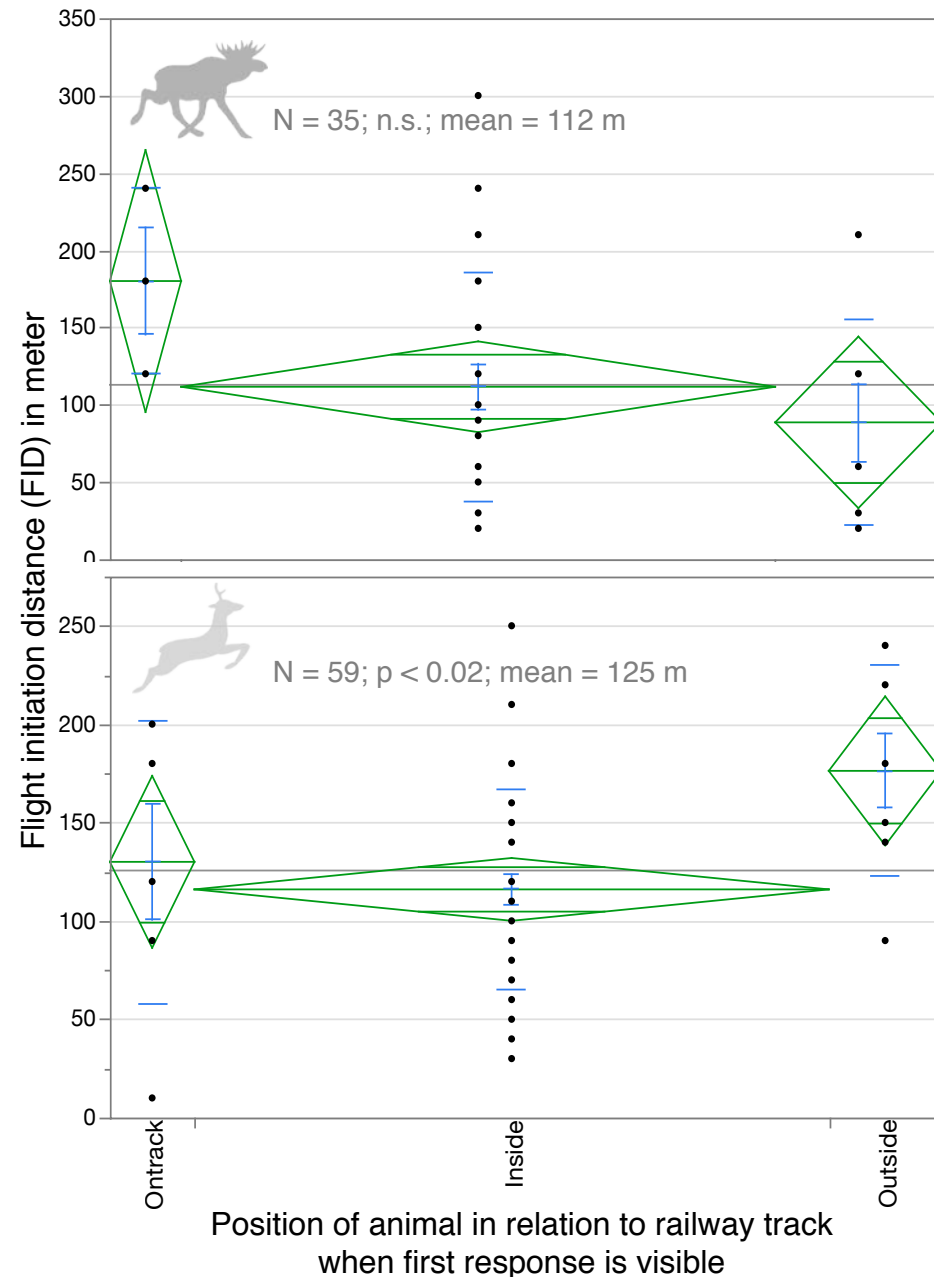




# ... first results

## Flight initiation distance (FID)

- mean FID < 150 m
- no significant difference in FID between the two species
- roe deer initiate flight earlier when outside the railway track,
- moose may be less vigilant when not on the track itself (n.s.)
- number of observations still too small





# Conclusions

- Dash cams very useful tool for monitoring:
  - continuous recording (loop)
  - saved sequences (alarm)
  - time and place (GPS)
  - video quality: acceptable



## Continuation

- More train drivers / trains
- improved GPS logging
- Thermal cameras (expensive)
- extending to roads (complement to road kill observatories ...)





Join the IENE-working group on Rail & Wildlife !

[www.viltchtrafik.se/viltsakerjarnvag](http://www.viltchtrafik.se/viltsakerjarnvag)

