

USING DNA ANALYSES TO ASSESS TERRITORY STRUCTURE, MORTALITY AND PARTNER SHIFTS IN A POPULATION OF WHITE-TAILED EAGLE BREEDING INSIDE AND CLOSE TO THE SMØLA WIND-POWER PLANT

Espen Lie Dahl, Øystein Flagstad, Arne Follestad,
Ole Reitan, Kjetil Bevanger & Torgeir Nygård



Main objectives

- Identification of individuals of adult white-tailed eagles (WTE) at Smøla through DNA analysis
- Monitor adult WTEs in territories over time to reveal territory structure, mortality (turnovers) and partner shifts
- Trace origin of collision victims from the wind power-plant

Who are your parents?



Methods – data sampling

- ▶ All eagle nest sites at Smøla visited every year
- ▶ Blood sampled from chicks (2006-2010)
- ▶ Moulted adult feathers sampled from nests (2006-2010)
- ▶ Tissue samples from turbine-collision victims (2006-2010)

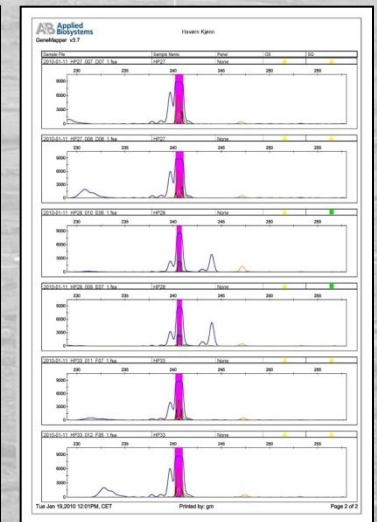
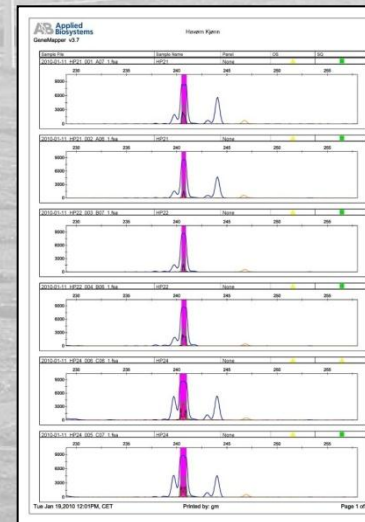
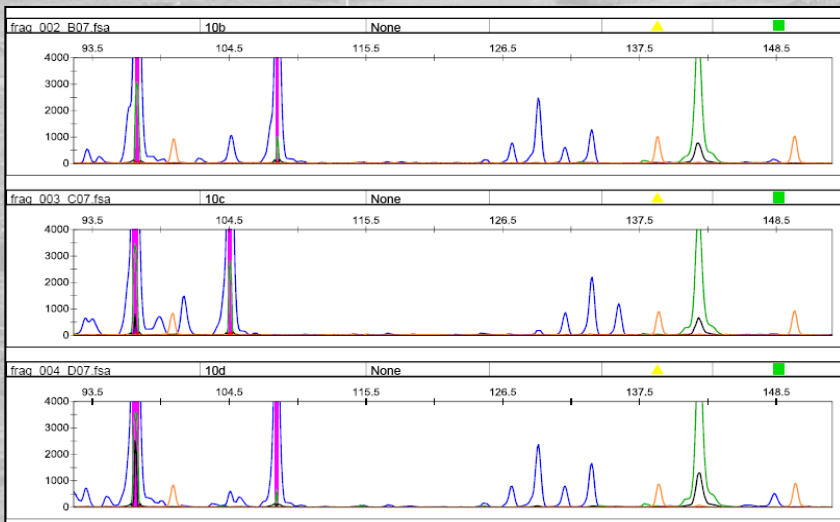


Methods – DNA sampling

Two feathers from each nest analysed each year

13 Microsatellites for individual recognition

Testing for sex

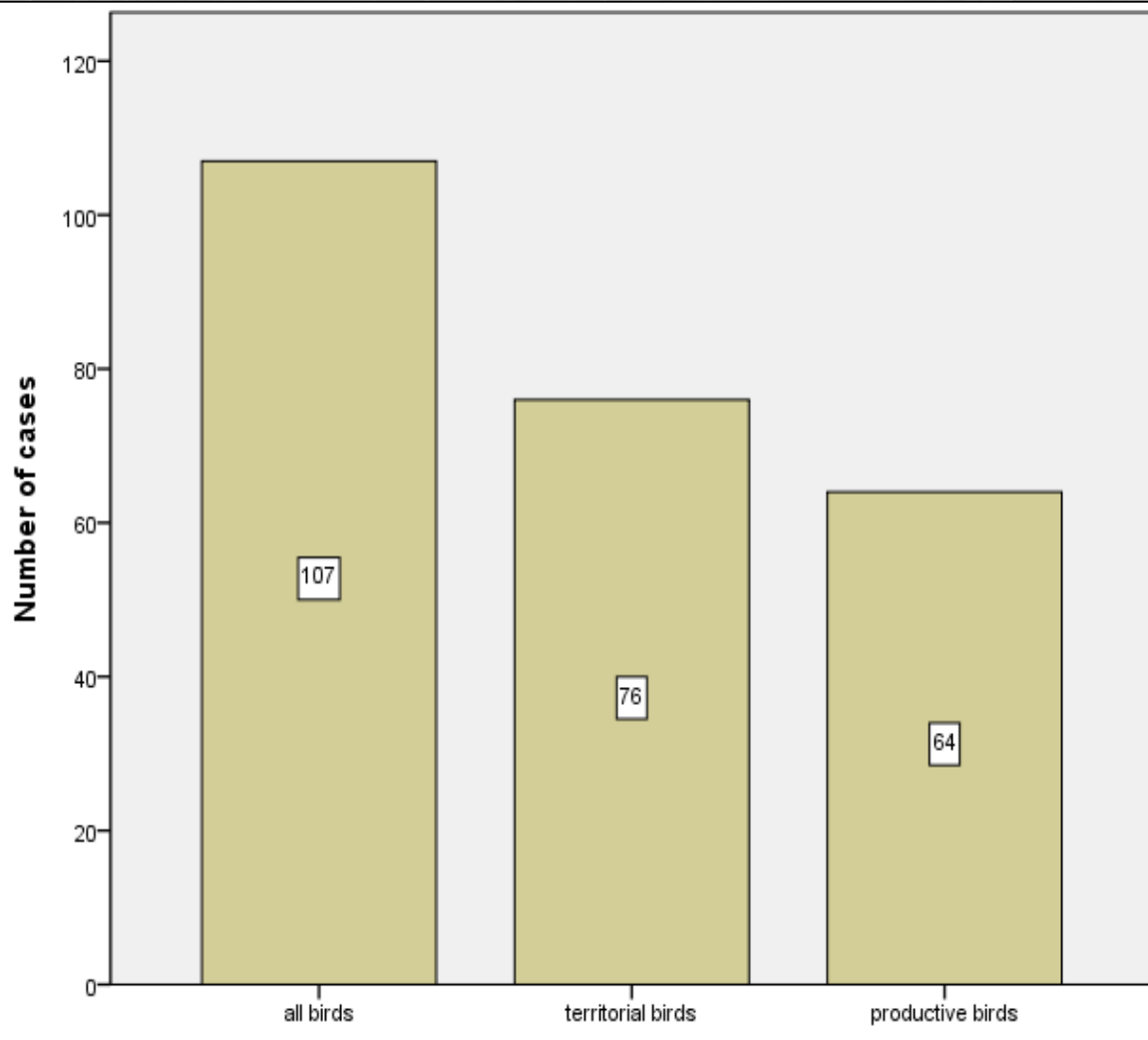


Results

- ▶ Feathers collected from a total of 80 nests
- ▶ 107 adult individuals identified (2006-2010)
 - 61 females
 - 46 males
- ▶ Close to 100% of the breeding population at Smøla was sampled



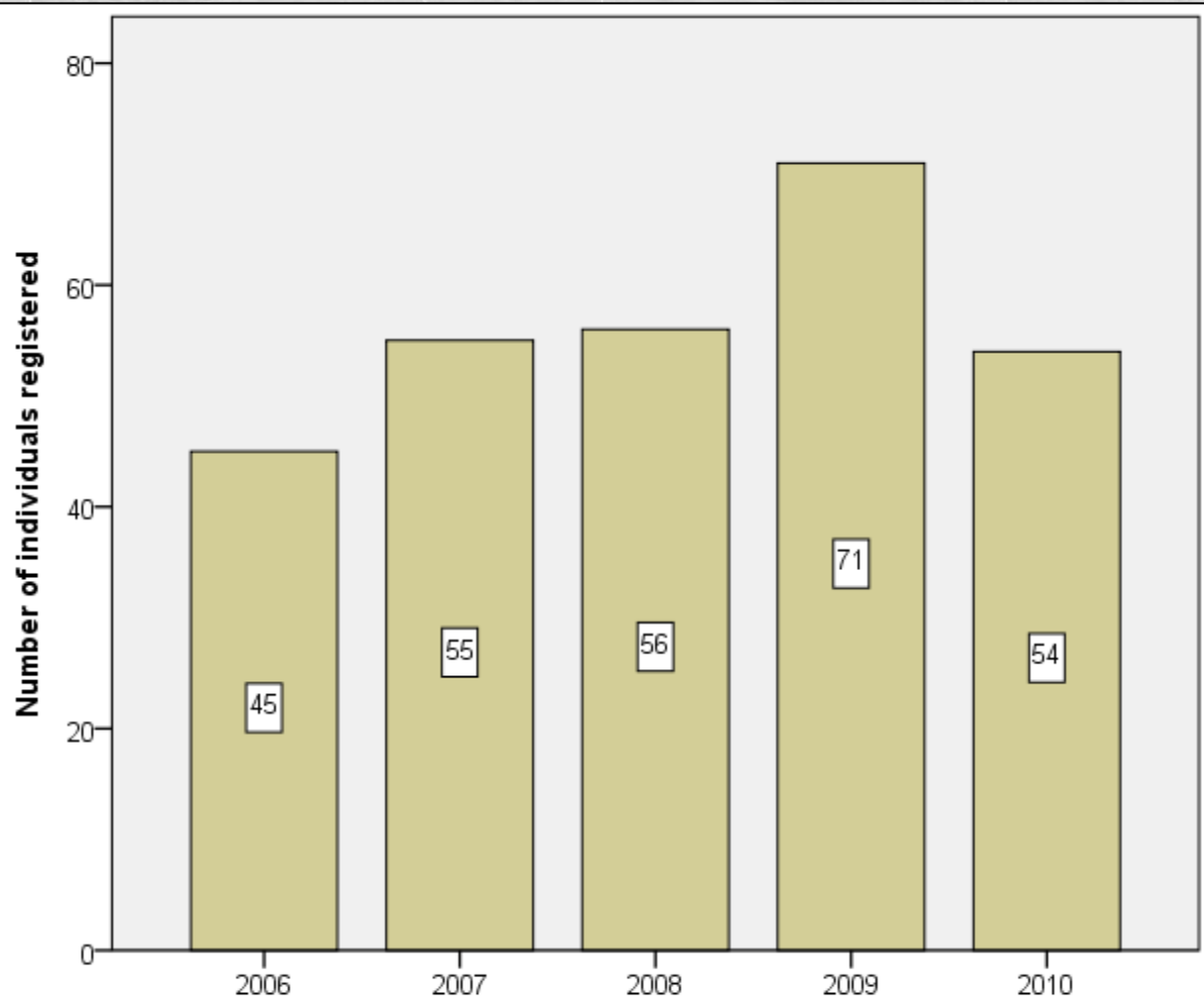
Results - territorial and reproductive birds



71% (76 ind.) of birds were defined as territorial (chicks or 2 or more years at same location)

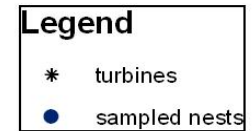
60% (64 ind.) of the birds produced chicks during the five year period

Results – number of birds identified each year



On average per year
11% of the birds were
non-territorial birds
(floaters)

Location of the sampled nest sites



Feathers sampled
over a five year
period from a total
of 80 nest sites

10

Kilometers

Results – territory structure and pop. size

- ▶ Previous population monitoring suggested 60-65 territorial pairs of eagles at Smøla
- ▶ DNA sampling reveals a previous overestimation of the population size
- ▶ DNA-based population estimate: 45-50 pairs
- ▶ Complex territory structure (pair of birds moving between sites between years) led to reduced estimate

Overestimating the population size - examples



- nests location
- territory #1
- territory #2
- territory #2
- territory #2
- territory #2
- territory #1
- territory #1

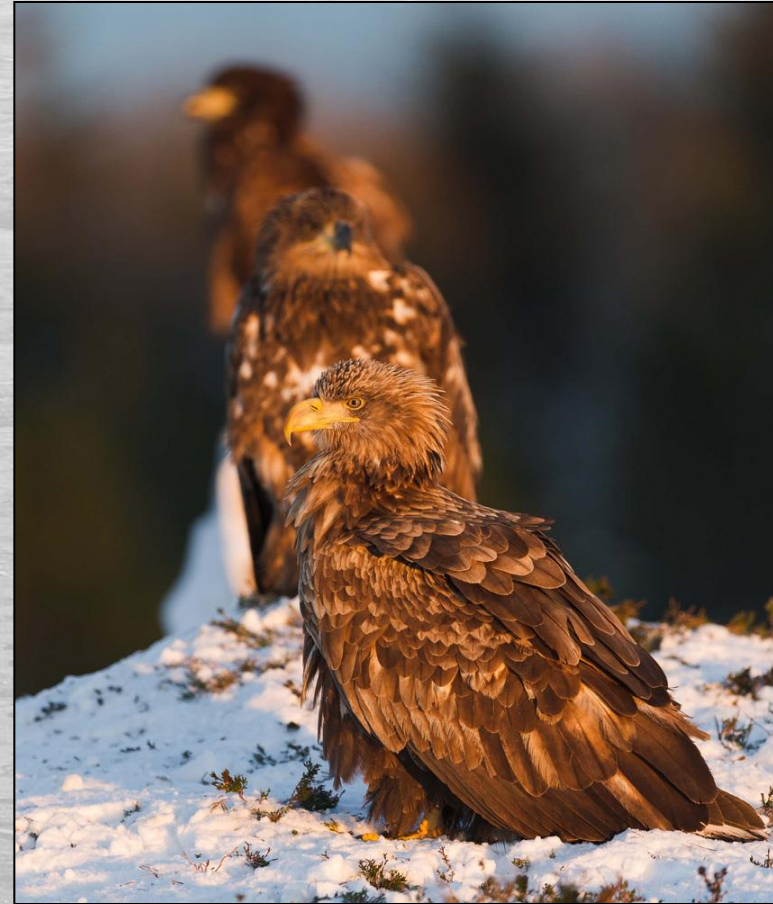
Counting the same pairs several times has led to an overestimation of the population of ca 25%

10 Kilometers

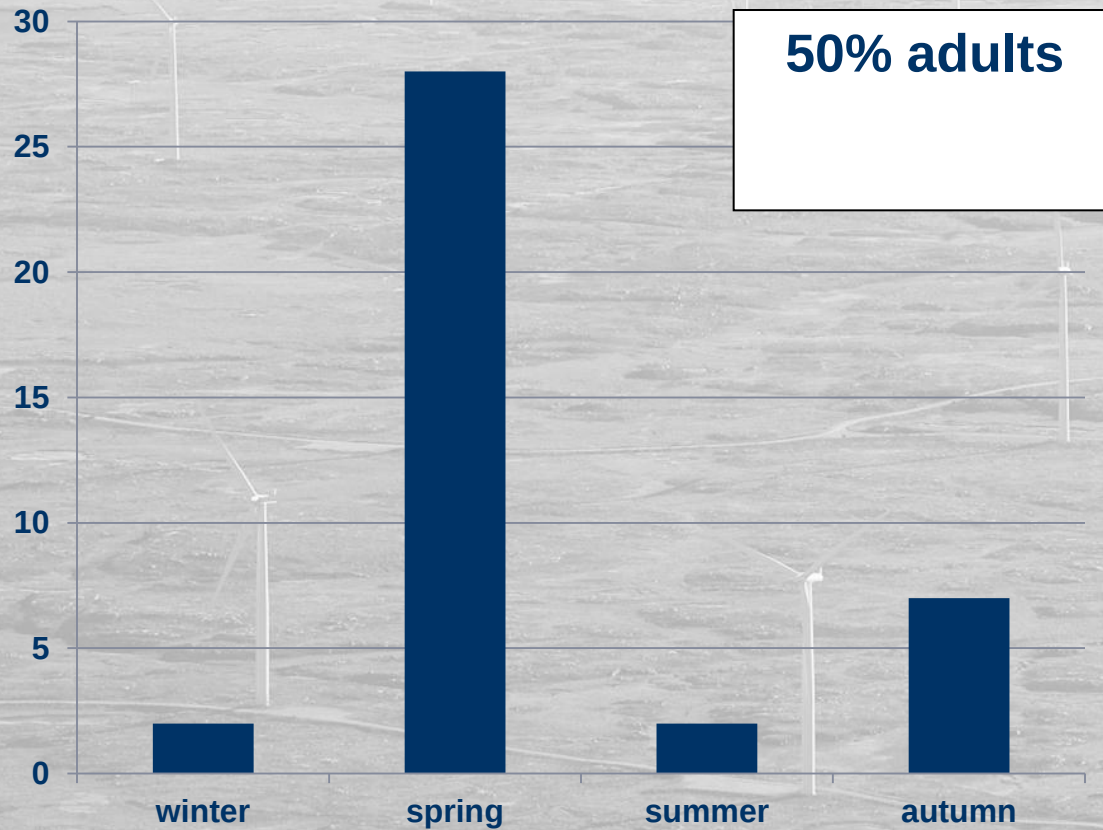
Results – turnovers and origin of collision victims

In total, 14 instances of partner shifts were recorded

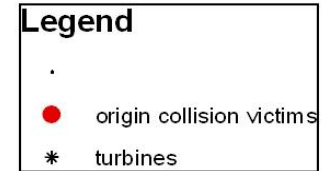
- 5 of these because of collision with turbines
- 9 others with unknown fate
- all matches against collision victims had origin closer than 5 km. from power-plant



Results – number of WTE collision victims per season



Origin of collision victims



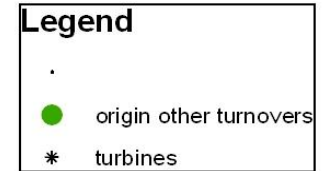
Origin of five
collision victims
traced

All collision victim
matches had origin
close to windfarm
(< 5 kilometers)

10

Kilometers

Origin of other turnovers

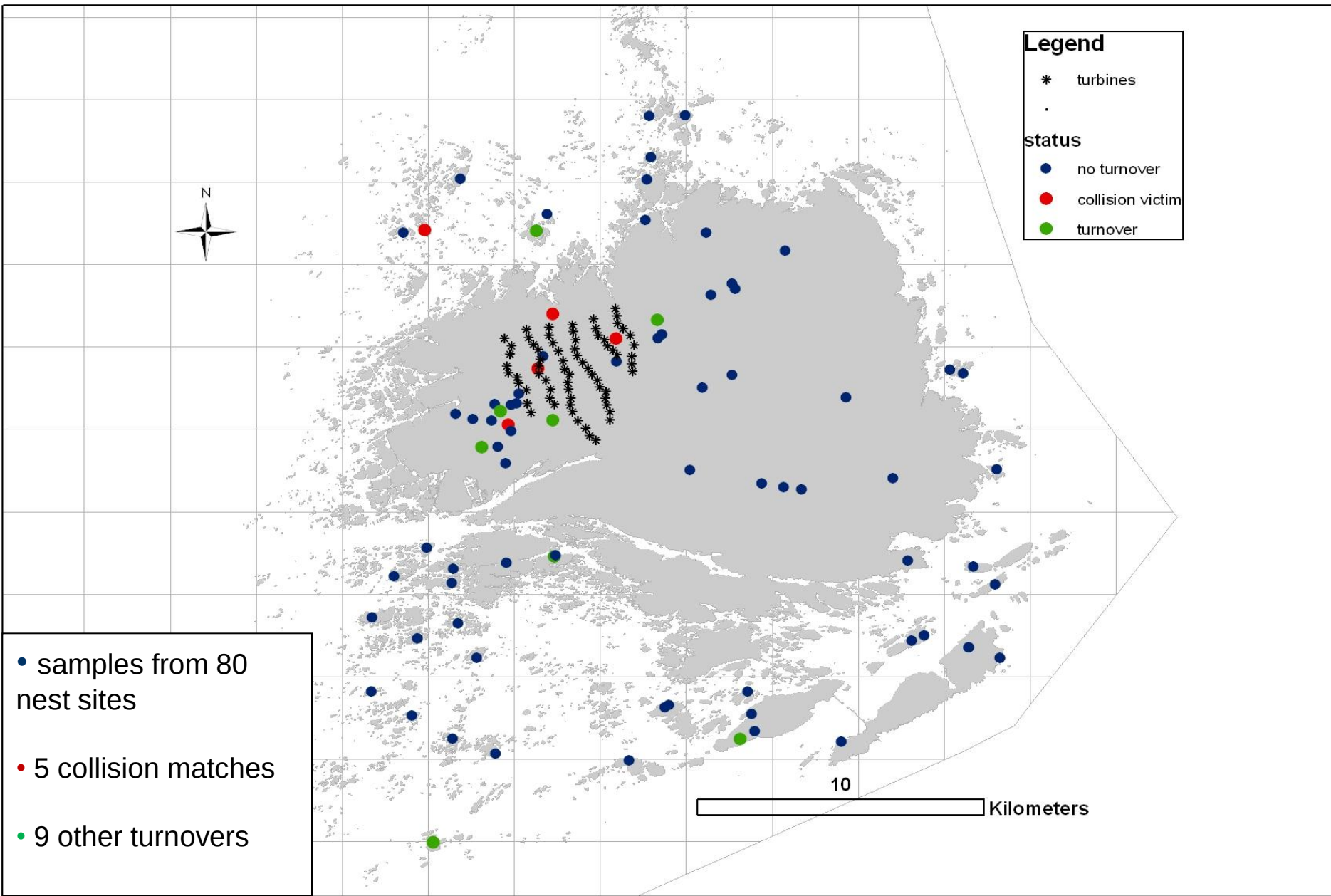


9 turnovers with
unknown fate

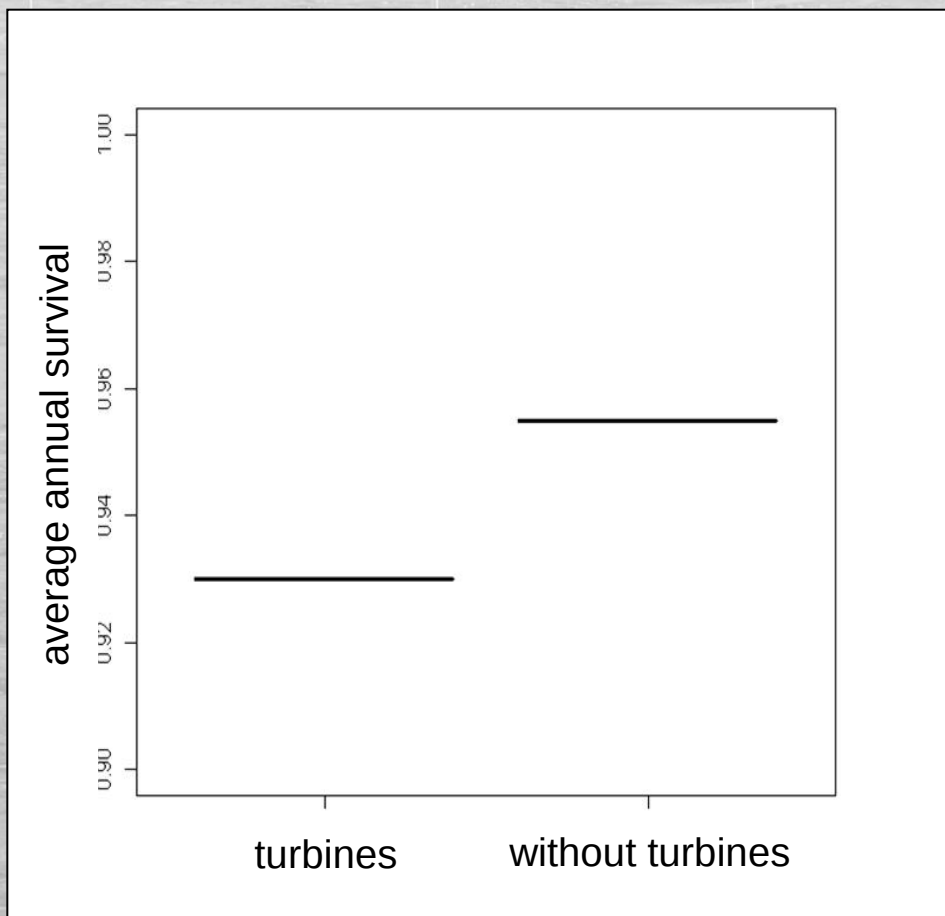
Several of these
close to windfarm

10

Kilometers



Results - Cause-specific survival



Kaplan-Meier survival analyses:

Overall survival rate: **0,93** (± 0.0179)

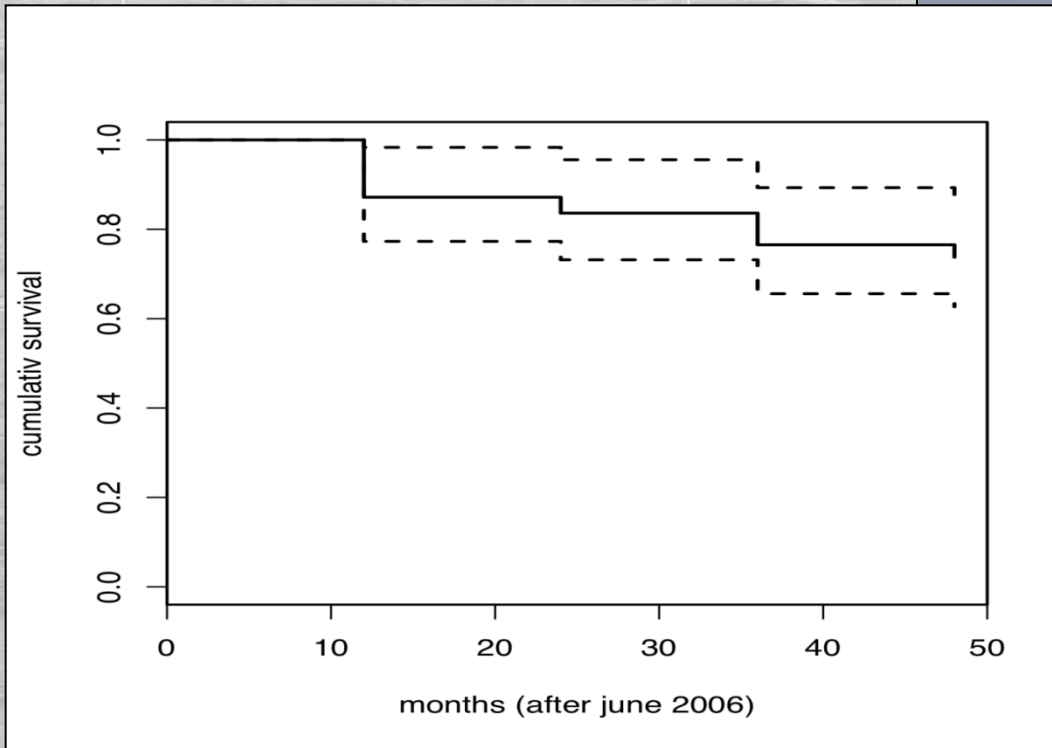
Survival without turbines: **0,955** (± 0.0145)

Smøla Windfarm lowered adult survival from 0,955 to 0,93

The power-plant contributes to 1/3 of the total adult mortality in the population

Results – cumulative survival (Kaplan-Meier)

Cumulative survival of all birds from
june 2006 – june 2010 (staggered
entry)



Discussion

- ▶ Are all collision victims found?
- ▶ 20 adult collision victims, only five matches (25%) – why?
- ▶ Expect increased proportion matches in coming years
 - 2010: 75% match success of adult collision victims



Thank you for your attention!

