Optimizing searches for bird collision fatalities within a wind-power plant area by using trained dogs

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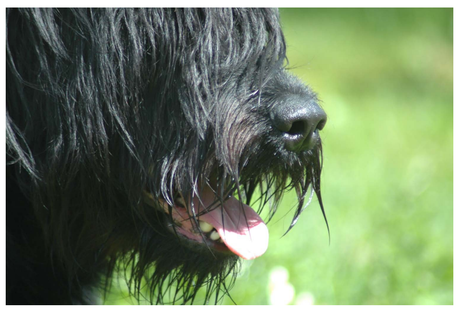
Introduction

One important bias when estimating bird collision fatalities is the number of dead birds or dead bird remains overlooked by the observer. In general the area within a wind-power plant is searched for dead birds (and bats) by one or more persons walking in a fixed pattern searching visually. At the Smøla Wind Power Plant (WPP) dogs were used to locate dead birds and bird remains.



A dog searches mainly by its olfactory sense, and covers therefore an area determined by movements of scents in the air. A dog needs only a few molecules to respond to a scent.

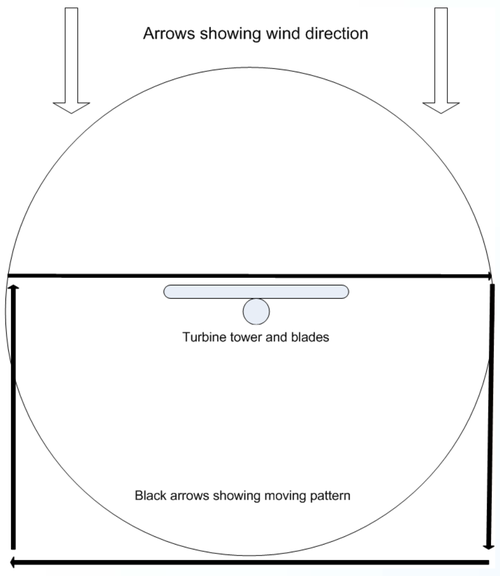
The objectives were to improve the search accuracy, and subsequently the basis for future estimates of the total bird fatalities within the wind-power plant area, and compare the search efficiency between the dogs and the dog handler.

Method

Two dogs were trained to find feathers and bird remains during summer 2006, and were used at weekly searches over a four year period. The dog searching method has been evaluated by comparing the efficiency of the dog and dog handler in finding dead (or injured) birds. The numbers of bird casualties found by each dog and by the dog handler were compared. The dog performance were also tested by their ability to locate artificially placed dead bird objects.

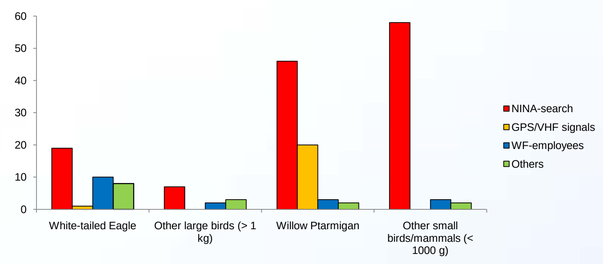
Luna – a riesenschnauzer – earlier trained to search for humans – was trained to have a search image for groups of feathers – before the first turbine search. Solan – a briard – earlier an authorized avalanche dog - was trained to find dead birds by reinforcing when he found dead birds and feathers in the first searches.

Search pattern at each turbine. Both the dog and the dog handler moved along the same route, in order to comparing the finding efficiency of both. At Smøla turbines the search area covers until 100 m from turbine base. The most efficient search will be when the searching dog is directed at right angle to the wind direction.



The dog was trained to have a search image of groups of feathers – and to indicate a dead bird or feathers by lying down at the object.

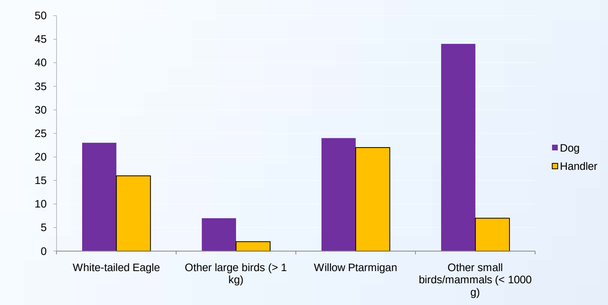
Dead birds and bats found in the Smøla WPPA, until 2010.
Large birds classified to White-tailed Eagle and other species, smaller species to Willow Ptarmigan and other species.
NINA = Norwegian Institute for Nature Research. WF-employees = persons working in the Smøla WPP. Others = the general public or visitors to the area.



Results

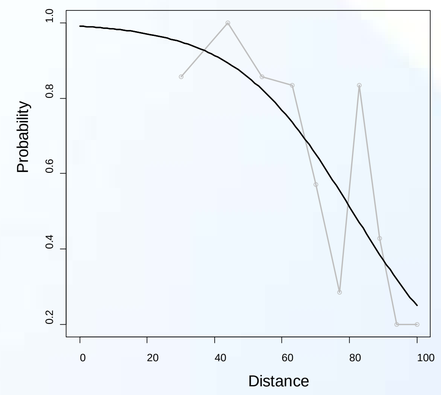
The dog's ability to locate the objects (i.e. dead bird remains) they initially were trained to, proved to be superior compared to human vision. During the searches on Smøla the dogs were significantly better to find dead birds and feathers than the dog handler (98 versus 47 objects; $\chi^2 = 17.9$; d.f. = 1; $p < 0.001$). The differences were large for most bird species except Willow Ptarmigan.

Finding efficiency in the searches in the Smøla WPPA until 31 December 2010, the dog and dog handler compared.
Large birds are classified to White-tailed Eagle and other species, smaller species to Willow Ptarmigan and other species.



The difference in efficiency between the dog and dog handler:

- was significantly greater in seasons with more vegetation (summer) than in winter
- was greater for Luna, the best trained dog (but not significant)
- was significantly greater for species with feathers poor in contrast compared with bird species with feathers rich in contrast.



Effect of distance from turbine on the probability of finding a carcass. The grey line depicts the actual data for the dog tests, and the black line the modelled effect.

Discussion & conclusion

These results are based on a direct comparison between a dog and the dog handler walking along the same route and the searching time at each turbine was in general below 10 minutes. The dog was more efficient in finding all bird species groups. If one person should cover the same area and find all small birds (as the dog did), the search had to last more than 1.5 hours at each turbine.

These differences are caused by the differences between the human vision and dog olfactory sense. Vision is based on electromagnetic radiation and the distance from the object to the observer is crucial. To cover the whole area until 100 m from a turbine (31 400 m²) persons have to walk in a detailed pattern. The olfactory sense are based on scent, i.e. molecules, moving through the air. If a dog is trained to respond to small amounts of a particular scent, and walking at right angles to the wind direction, the dog will detect scents from a distance of more than 100 m.

The dogs used at Smøla were trained to find feather groups. But most dogs may respond to decaying cadavers or breathing live birds, as both Luna and Solan did well. But Luna was better to find remaining feather groups. Therefore the training of the dog search image is important, and may be improved.

It is also possible to improve the field procedures. This study compared the efficiency and therefore the dog handler moved together with the dog. A better procedure may be to let the dog do all the searching in the terrain, the only task for the dog handler may be to direct the dog in different directions covering the whole area.

NINA Norwegian Institute for Nature Research

CEDREN Centre for Environmental Design of Renewable Energy

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