

Bird fatalities within Smøla wind-power plant

Ole Reitan, Kjetil Bevanger, Roel May & Espen Lie Dahl, Norwegian Institute for Nature Research, Box 5685 Sluppen, NO-7485 Trondheim, Norway.

Introduction

Smøla is the largest Norwegian wind-power plant with 68 turbines. Due to recordings of several dead white-tailed eagles (WTE) within the power plant area in 2005 and 2006, and a general poor knowledge on bird impacts from wind power generation in Norway, NINA initiated a 4 year research project (BirdWind) (2007-2010) based on funding from the Research Council of Norway.



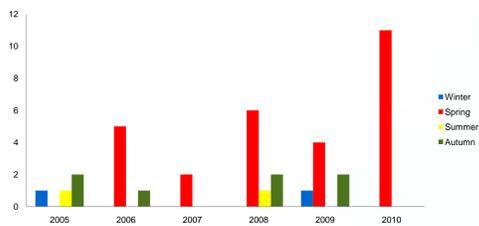
A main objective of the BirdWind Project has been to study species-, site- and seasonal-specific bird mortality; and to identify vulnerable species and site-specific factors that should be considered to improve the basis for future pre- and post construction EIAs in connection with wind power-plant constructions.

Since August 2006 two dogs, trained to search for dead birds, together with a dog handler, have conducted weekly searches for bird casualties at a selection of 25 turbines. The remaining 43 turbines have been searched once each month. Removal and search bias experiments have been carried out.

White-tailed eagle *Haliaeetus albicilla*

Since regular searches were initiated in 2006 a total of 35 dead eagles have been located within the power plant area. A total of 39 dead or injured WTEs have been recorded within the SWPP area (1 August 2005 - 31 December 2010). Of these 28 (72%) have been found during 2-2.5 months each spring between the beginning of March to the beginning of June, with the peak varying somewhat between years. In the autumn 7 (18%) dead/injured WTEs have been recorded.

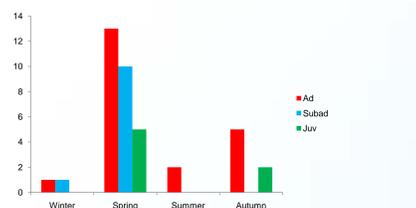
Number of WTEs found (dead or injured) at the turbines until 31 December 2010. The first was found in August 2005, however, regular searches were not initiated until 2006. Winter=December-February; Spring=March-May; Summer=June-August; Autumn=September-November



Since 1 August 2005 (operational start of the 48 turbines in stage 2) to 1 August 2010 on average **7.8 WTE have been recorded per year**, i.e. **0.11 dead WTE/turbine/year**.

Of the 39 WTEs, 21 (54%) were adults (in their 6th calendar year or older). They have mainly been recorded in the spring or autumn. A total of 11 (28%) subadult (2 cy summer – 5 cy) birds have been recorded, mainly in spring, and 7 (18%) juveniles (less than one year old) in the autumn and their first spring.

Age distribution of white-tailed eagle victims. Ad=6cy+ birds, in their 6th calendar year or older; Juv=Birds in their first year; Subad=2cy summer-5cy birds, in their 2nd summer (from summer) through 5th calendar years.



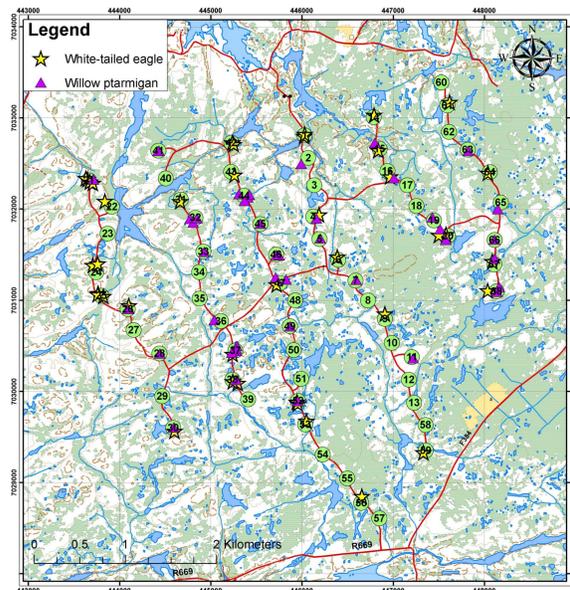
The WTE victims show a distinct pattern also in space; 11 (28%) have been found in connection to 5 turbines in the northwest part of the SWPP, between numbers 21 and 26. Some of the turbines have been searched weekly with no recorded victims.

Willow ptarmigan *Lagopus lagopus*

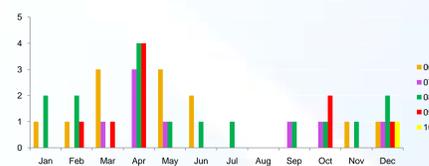
A total of 74 dead willow ptarmigan have been found within the wind power-plant area between 1 August 2006 and 31 December 2010. This includes birds found dead during the regular turbine-related searches (more than 50), radio-tagged birds found dead after they ceased to move, and birds found by occasion.

Of these 47 were found in the search area (r < 100 m) at the turbines. 45 ptarmigans were classified as turbine-induced dead birds. Between 10-15 specimen were found at the turbines each year.

Dead willow ptarmigan recorded near turbines; to the left an intact specimen (turbine no 26 – 5 May 2010) and a scavenged bird a few meters from the tower base (turbine no 32 – 21 March 2010). All unscavenged ptarmigan specimen recorded have died in few hours prior to the discovery.



The distribution of victims of WTE and WP in the SWPPA.



The annual and seasonal distribution of dead willow ptarmigan found during the searches. The years defined as 1 August – 31 July.

Other bird species

Few other large bird species (> 1 kg; except for WTE) have been found. The weight of these species are ranging from 1.6 (Great Black-backed Gull) to 9.5 kg (Whooper Swan, and all were more or less scavenged in situ.

Of smaller bird species (< 1000 g; except WP) another 54 specimens of at least 20 species have also been identified as collision victims, between 10 and 15 annually. Few species seem to be vulnerable as victims in SWPPA.

Dead birds (excluded WTE and WP) recorded as turbine victims in the SWPPA.



	<2005	2006	2007	2008	2009	2010	Total
LARGE BIRD SPECIES							
Greyling Goose <i>Anser anser</i>	1			2	1		4
Grey Heron <i>Ardea cinerea</i>	1	1		1		1	4
Whooper Swan <i>Cygnus cygnus</i>	1	1					2
Golden Eagle <i>Aquila chrysaetos</i>						1	1
Great Black-backed Gull <i>Larus marinus</i>				1			1
SMALL BIRD SPECIES							
Common Snipe <i>Gallinago gallinago</i>		1	3	4	3		11
Hooded Crow <i>Corvus corone</i>	1	1		2	5	1	10
Golden Plover <i>Pluvialis apricaria</i>				2	2	3	7
Oystercatcher <i>Haematopus ostralegus</i>						3	3
Mallard Anas <i>platyrhynchos</i>			2		1		3
Gull Indet. <i>Larus</i> spp.		2					2
Kittiwake <i>Rissa tridactyla</i>				1			1
Redshank <i>Tringa totanus</i>				1			1
Starling <i>Sturnus vulgaris</i>						1	1
Teal <i>Anas crecca</i>					1		1
Fieldfare <i>Turdus pilaris</i>		1					1
Little Auk <i>Alca alle</i>				1			1
Meadow Pipit <i>Anthus pratensis</i>				1			1
Merlin <i>Falco columbarius</i>				1			1
Fulmar <i>Fulmarus glacialis</i>		1					1
Shoveler <i>Anas cyropa</i>			1				1
Northern Wheatear <i>Oenanthe oenanthe</i>					1		1
Parrot Crossbill <i>Loxia pytyopsittacus</i>					1		1
Red-breasted Merganser <i>Mergus serrator</i>				1			1
Twite <i>Carduelis flavirostris</i>		1	1			1	3
Birds Indet.						1	1
Total	3	9	12	15	14	12	65

Discussion & conclusions

Because of weekly searches with dogs and few scavenger species able to remove eagles and other large bird cadavers from the search area, close to all dead eagles and other large birds may have been recorded. Thus, the possibility of wounded eagles and other large birds able to move out of the search area seems to be the main (only?) biasing factor. The removal rate experiments are as yet not concluded, however, for all species (except the eagle/large birds) the removal rate seems to be particularly high during the first 24-48 hours, and low afterwards. Thus the final estimates will be higher than the preliminary ones, especially for ptarmigan and other small birds.

One bat has been found during the searches, indicating that bats are rare victims in the SWPP.

Conclusions: The regular and frequent dead-bird search regime have located a majority of the bird casualties within the wind power-plant area, and given unique qualitative and quantitative information on species-specific bird mortality in space and time.