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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

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Possible New File

Windfarm in Smøla Archipelago (Norway)

REPORT BY THE NGO

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WIND FARM ON THE SMØLA ARCHIPELAGO (NORWAY)

Update report by the NGOs
BirdLife International (Norwegian Ornithological Society – BirdLife in Norway, Royal Society for the Protection of Birds – BirdLife in the UK)

Background

At its 21st meeting, the Standing Committee decided not to open a file on this case, but asked Norway not to authorise the second phase of the wind farm project before assessing the results of the first one. In 2006 and 2007 BirdLife International drew the attention of the Standing Committee to the fact that, as they had warned, in 2001, the wind farm is having a significant impact on the local internationally important White-tailed Eagle (*Haliaeetus albicilla*) population, including killing numerous individuals.

Furthermore the Norwegian government had failed to heed the advice of the Standing Committee and following a very limited study of Stage 1 (20 turbines completed in 2002) had gone on to permit Stage 2 (reduced from 52 to 48 turbines) which was constructed in 2005; the wind farm covers 18 km². Assessment of collision mortality did not begin until February 2006.

In 2007, in line with the position of the Norwegian Government, the Standing Committee decided not to recommend an on-the-spot appraisal until 2009 to enable results to begin to become available from the new Norwegian Government-funded international research project on the impacts of wind turbines on birds and coastal birds population dynamics concerning both pre- and post-construction phases. This is due to complete in 2010-2011.

Summary of key impacts of Smøla wind farm

- Territory occupancy by White-tailed Eagles reduced by 25-30% within the wind farm area.
- Reduced breeding productivity – three chicks being reared 2005 and just a single White-tailed Eagle chick being reared within the wind farm in 2006 and 2007 and none at all in 2003, 2004 and 2008, compared to 19 territorial pairs producing an average of 0.46 young/yr pre-construction.
- Collision mortality. So far, at least 19 White-tailed Eagles have died at the Smøla wind farm as a result of collision with wind turbines, mainly during March to May with the heaviest losses being in 2008: seven birds in one year. Fourteen of the fatalities were potentially terroitorial birds (12 adults and 2 subadults).
- Whilst it is too early to know whether the observed effects of the Smøla wind farm have the potential for a long-term impact on the White-tailed Eagle population, it clearly indicates the likelihood of cumulative impacts arising from expansion of wind farms within areas of high breeding density.
- Other bird species of conservation concern have received extremely limited study, inadequate to determine whether they have been affected by the wind farm.

The Smøla Archipelago Important Bird Area (IBA)

The Smøla Archipelago Important Bird Area comprises nearly 6000 islands, islets and skerries around the main island of Smøla in southern Norway. It is one of the largest Norwegian marine wetlands and has some of the largest continuous mires.

White-tailed eagle

This species occurs in this IBA at the highest breeding density ever recorded globally, especially in the wind farm area. The population was estimated at 70 territorial pairs before construction of the Smøla wind farm, possibly as high as 80 pairs.

This could amount to more than 1% of the European population that is now, thanks to large increases since 1970, estimated at 5,000-6,600 pairs, encompassing 50-74% of the global population.

It is about 3% of the Norwegian population which itself amounts to at least a third of the European breeding pairs, being the largest national breeding population in Europe. The Norwegian population was still slowly increasing during 1990-2000 (BirdLife International 2004[1]). Due to the strong recovery of the European White-tailed Eagle population, in 2005 the species was downlisted from the list of globally threatened species (BirdLife International 2006)[2].

In winter, the resident White-tailed Eagles on Smøla are joined by birds from across the Scandinavian breeding range, including from Sweden and Finnish Lapland, to a total wintering population numbering more than 300 birds. They have communal night roosts in coniferous plantations or craggy areas both on the main island and in the skerries.

Additionally, in the Smøla Archipelago IBA there are important breeding and moulting populations of other bird species which could be potentially at risk from the wind farms:

- **Red-throated Diver** *Gavia stellata* (25-35 pairs) and **Black-throated Diver** *G. arctica* (c 10 pairs) are of special importance; both are Species of European Conservation Concern (SPECs) and have been in decline for many years.
- The main island is the stronghold of breeding waders in lowland, coastal Southern Norway with three main species - **Golden Plover** *Pluvialis apricaria*, **Whimbrel** *Numenius phaeopus*, and **Dunlin** *Calidris alpina* (SPEC); the latter is thought to be the *schinzii*-subspecies, and if so Smøla is one of the mainland European strongholds, may be as much as 10-20% of the mainland population.
- The Smøla Archipelago is also one of the main strongholds for breeding **Grey Heron** *Ardea cinerea* in Norway.
- There is a very high density breeding population of **Greylag Goose** *Anser anser*.
- **Willow Grouse** *Lagopus lagopus*, considered by some to be a local subspecies.

Wintering and migrating birds:

There is a broad variety of species and very high numbers of migrating birds moving along this part of the coast or wintering along the shores or in the shallow waters around Smøla. The Smøla Archipelago is located strategically on the migration route along the Norwegian coast, along the stretch where migration is most concentrated. It includes seabirds and other species coming from the high Arctic. From the east, a migration route, mostly of wetland birds, crosses mid-Scandinavia to the Atlantic coast, mainly approaching the Norwegian coast in the Smøla area then following the coast west and southwest.

Wintering species of special conservation status, and at potential risk from the wind farm are as follows:

- Divers and grebes, especially Great Northern Diver *G. immer* and Red-necked Grebe *Podiceps grisegena*, but also White-billed Diver *G. adamsii* and Red-throated Diver (SPEC) and Slavonian Grebe *P. auritus* (SPEC).
- There are significant numbers of Whooper Swans *Cygnus cygnus*,
- an influx mostly of young Goshawk *Accipiter gentilis*, Golden Eagle *Aquila chrysaetos* (SPEC) and Gyr Falcon *Falco rusticolus* (SPEC), and
- nationally high numbers of Grey Heron.

The importance for White-tailed Eagles of the wind farm area

White-tailed Eagle breeding numbers and productivity have been monitored on Smøla by the Norwegian Sea Eagle Project since 1974 (there are some additional data from 1972).

[1] BirdLife International (2004) *Birds in Europe: population estimates, trends and conservation status*. Cambridge, UK: BirdLife International. (BirdLife Conservation Series No. 12).
[2] BirdLife International (2006) Species factsheet: *Haliaeetus albicilla*. Downloaded from http://www.birdlife.org on 22/8/2006

Within the wind farm area, the Norwegian Sea Eagle Project identified at least 19 different territorial pairs of White-tailed Eagle before the development began. This is about 1% of the Norwegian population and is by far the highest breeding density of White-tailed Eagle ever known. The three 10 km^2 covering or surrounding the Smøla wind farm held at least 49 nesting pairs of White-tailed Eagle (at least 20 in the 10 km^2 which includes most of the wind farm, 14 pairs in the adjacent 10 km^2 to the south, where the rest of the wind farm is located, and 15 pairs in the square east of the latter). Outside this area, there are 10 km^2 with 9, 8, 6, 5 and 3 pairs each and two 10 km^2 with 2 and two with one pair. Some of the latter squares cover small land areas on neighbouring islands. In 2006, there was a minimum of 69 territorial pairs (may be as high as 80) on the Smøla Archipelago.

For comparison, a White-tailed Eagle survey (Hauff & Mizera 2006[3]) in Germany and Poland found maximum breeding densities per 10 km^2 of 9 pairs (one square in Poland), 8 pairs (one square in Poland) and 7 pairs (two squares in Germany). Only twelve 10 km^2 in Germany hold 4-6 pairs, the rest 3 pairs or fewer.

The Smøla wind farm area, prior to construction commencing, not only had the highest concentration of nesting territories but also had the highest productivity (fledglings per pair) in the whole archipelago (0.49 vs 0.44 fledglings/pair/yr).

Hence, there should be no doubt that the Smøla Archipelago is unique on a global scale as far as White-tailed Eagle breeding performance is concerned. The data amply confirm that co-location of the wind farm with the nesting sea eagles could hardly have hit the bull's eye more perfectly. No part of the wind farm area is without significance for the White-tailed Eagle.

The Smøla wind farm

The Environmental Impact Assessment (EIA), carried out prior to construction of the Smøla wind farm, indicated that this was an unsuitable location for a wind farm because of the collision risk to breeding White-tailed Eagles. Nonetheless, the Norwegian government granted a licence in 2001 to Statkraft, the National Power Company in Norway, for the construction of a wind farm comprising 68 turbines, on the island of Smøla. Stage 1 (20 2 MW turbines) was completed in September 2002. Stage 2 (reduced to 48 2.3 MW turbines) was completed in August 2005.

The impacts of the Smøla wind farm on birds

Pre-construction studies of the wind farm area were restricted to monitoring the White-tailed Eagle breeding population size and productivity, while other important species, like Red-throated Diver, Whooper Swan, Willow Grouse, Golden Plover and Dunlin (*schinzii*) were ignored. Post-construction studies likewise included only monitoring of breeding White-tailed Eagle, and were carried out only for one season during Stage 1.

Investigations by the Norwegian Institute for Nature Research (NINA) and BirdLife Norway (NOF) to determine the effects of construction and operation of Smøla wind farm on the local population size and breeding productivity of White-tailed Eagles commenced in 2003. Since 2004, satellite transmitters have been fitted to eagles to enable the fate of nestlings from the wind farm and nearby area to be followed. So far, 41 transmitters have been fitted to nestlings in and around the wind farm (NINA Report 248, 2007). During 2006-2008, feathers were collected from nests and nestlings for DNA analysis to compare with similar samples from collision fatalities to help identify the origins of the latter.

In autumn 2005, NINA and the RSPB started a collaborative study to undertake behavioural observations of eagles in relation to the wind turbines. This study commenced as a pilot study in autumn 2005, and continued during the 2006 breeding season. Two observers carried out vantage point watches from suitable observation points, following individual birds as they entered the wind farm and recording behaviour, notably flight behaviour in relation to the wind turbines and hence collision risk (unpublished NINA/RSPB).

[3] Hauff, P. and T. Mizera 2006: Verbreitung und Dichte des Seeadlers Haliaaetus albicilla in Deutchland und Polen: ein aktuelle Atlas-Karte. Vogelwarte 44, 2006:134-136.

Assessment of the effects of Smøla Wind farm Stage 1:

As mentioned above, post construction studies of the wind farm were carried out only during one year for Stage 1 before commencement of building Stage 2. During this year, one White-tailed Eagle pair disappeared and has not shown up elsewhere. There was no successful breeding inside the wind farm, and the reproduction in the wind farm area and in Smøla Archipelago as a whole was half the mean for the preceding 28 years. On the other hand, productivity of White-tailed Eagles may differ greatly from year to year, and it was impossible to draw a conclusion based on this single season.

It was not possible to make any proper assessment of the effects of Smøla wind farm Stage 1 following just one year's study, and hence no mitigation measures were taken for Stage 2, although it was permitted to go ahead in spite of the inconclusive findings from the one year of study. In fact, two different White-tailed Eagle nests, both actively used in 2001, were removed by road construction for Stage 2.

Table 1: Summary information on White-tailed Eagles in the Smøla wind farm area plus (2 km buffer). Stage 1 of the wind farmwas completed in September 2002 and Stage 2 in August 2005. Information from Follestad et al. 2007 and NINA unpublished.
Ad = 6th Calendar Year+
Subad = 4th-5th Calendar Year
Imm = 2nd-3rd Calendar year (immature)
J = 1st Calendar Year (juvenile)

Stage 1 of the windfarm was operating from Sept 2002, and construction of stage 2 started Sept 2003, with heavy human activity in the whole windfarm area in 2003 and 2004. The windfram was fully operating from Aug 2005.

Year	Breeding attempts in wind farm area and (2 km buffer)	Young produced in wind farm area plus (2km buffer)	Collisions found
2003	7 (10)	4 (7)	No data
2004	1 (5)	0 (7)	No data
2005	7(9)	3 (5)	4 (2 ad, 1 j, 1 subad)
2006	2(6)	1 (5)	6 (4 ad, 2 j)
2007	3(10)	1 (4)	2 (1 subad, 1 imm)
2008	2 (?)	0 (2)	7 (6 ad, 1 imm)
Total	22 (43+)	5 (9)	19 (12 ad, 3 j, 4 sub)

Effects on White-tailed Eagle breeding numbers and productivity:

In 2003 and 2004 there were no successful breeding attempts within the wind farm area, and 2008 again there were no successful breeding attempts although two pairs did lay eggs. Within the 2 km buffer zone, there was only one successful twin brood and on the western edge of the buffer zone there was an additional twin brood just outside the buffer, raised by a pair that has moved from their former nest sites within the 2 km buffer. .

This contrasts with the 19 territorial pairs of eagles within the study area prior to construction of the wind farm, producing an average of 0.46 young/yr.

The construction activity of the wind farm Stage 2 started in autumn 2002, and during 2003-2005 the mean breeding productivity dropped to half the mean for the period 1974-2001 (0.21 vs. 0.44 chicks/pair/yr for the Smøla total) both in the wind farm area and its surroundings and in the archipelago as a whole. It remained stable at this reduced level even in 2006, regardless of the situation elsewhere in Møre & Romsdal County. In 2007, the breeding productivity for all-Smøla improved to about 0.4 chicks/pair, but in 2008, dropped once more to 0.26-0.31 chick/pair.

Collision mortality due to the wind turbines:

No collision studies or formal searches were carried out for Stage 1 (20 turbines) for the period September 2002 - August 2005, so it is unknown whether there were any collisions during this period.

With the completion of Stage 2 of the wind farm in August 2005 the first dead White-tailed Eagle was found close to a wind turbine, by chance by a hiker. It was not until February 2006 that formal searches across the wind farm were established and these are only of 25 randomly selected turbines out of the total 68 and are carried out only at long intervals. Thus, the figure for the number of collision victims is the absolute minimum.

To date, a total of 19 fatal collisions with the rotor blades have been recorded. Five were reported in April and May 2006, four having been found in just one week, and another two between late April and early May 2007. During 2008, seven white tailed eagles have been found dead within the wind farm during the period March to May. This is the heaviest loss of birds in a single year so far. Only one collision fatality has so far been found in winter.

Fourteen of the birds were potential territory holders (12 adults, 2 subadults) of which several were actively breeding birds, determined by the presence of a "brood patch"). Three of them were first year birds, including, in 2006, three of the six nestlings fitted with satellite transmitters in summer 2005; two of which were among the three young that fledged within the wind farm in 2005.

In addition to the collision fatalities recorded on Smøla, a White-tailed Eagle collision fatality was also found incidentally on Hitra, the site of another wind farm close to Smøla, and during late summer 2008 the remains of an additional eagle was reported from the same wind farm.

In addition to White-tailed Eagles there have been some other collision fatalities found, as follows: Grey Heron (3), Greylag Goose (1), Whooper Swan (1), Shoveler (1), Willow Grouse (19), Common Snipe (8), Golden Plover, Greater Black-backed Gull/Herring gull juveniles (2), Little Auk (1), Bat (1).

Research into the effects of the Smøla wind farm:

NINA has published a report covering the studies undertaken 2003-2006 (Follestad *et al.* 2007). This includes the results of preliminary DNA studies on collision fatalities and feathers sampled from nests. The initial results indicate that the wind farm could affect white tailed eagles from a wider population than the local breeding birds on Smøla.

Response to the detrimental effects of the Smøla wind farm:

In May 2006, there was considerable international media coverage of these White-tailed Eagle deaths, and in October 2006 the Norwegian Broadcasting Corporation gave a TV presentation about the Smøla case and some of the other plans for wind power development along the Norwegian coast.

No mitigation measures have been taken so far in response to the collision losses of White-tailed Eagle. The response has instead been to instigate studies of the wind farm. A project granted funding by the Norwegian Research Council in late 2006 has commenced, to investigate the impacts of the wind farm and possible mitigation solutions to prevent future collisions.

The studies include the application of radar (operational from March 2008) to augment further visual observations of eagles, and test the use of colouration to increase the visibility of the blades and possibly alarm calls on or surrounding the wind turbines. Monitoring of breeding White-tailed Eagles, including satellite tracking and DNA studies are continuing, and studies have commenced on several other bird species that occur within the wind farm area and surroundings, including ongoing corpse searches. These studies may further our knowledge of wind farm impacts but do not address the immediate problem for White-tailed Eagles on Smøla.

There has been no discussion of the legality of a project such as the Smøla wind farm development in terms of the Norwegian Wildlife Act or other acts or treaties, including international conventions like the Bern Convention.

Conclusion

While the Government funded research project progresses in the absence of any mitigation measures, the wind farm in 2008 has had its worst impact to date on the white-tailed eagles with zero productivity and seven collision fatalities.

The area's uniqueness for the White-tailed Eagle has been increasingly emphasised the more the species has been studied on Smøla and elsewhere. Smøla wind farm has had several adverse effects on White-tailed Eagles:

- reduced territorial/breeding activity at some territories, including cessation of occupancy of at least five territories and reduced breeding productivity within and adjoining the wind farm;
- at least 19 fatalities due to collision with wind turbines, including actively breeding mature adult birds and recently fledged juveniles, thus a direct impact on the breeding population and productivity.

The loss of breeding adults, compounded by loss of juveniles, is potentially significant for a species that is long-lived, slow to mature and has relatively low reproductive output. The impacts recorded so far have been more marked and serious than expected by the government, and may lead to population-level effects beyond the local scale.

The unanswered questions are:

- Will new recruits occupy vacated territories and, if they do, will any young become further casualties, in other words will this formerly high breeding density location for White-tailed Eagle become a population sink?
- If displaced territory holders have not been able to relocate, what has happened to them - some may be among the collision fatalities?
- Where did the birds that have collided fatally with the Smøla wind turbines originate from? Were they all local birds or do they include birds from further afield? If the latter, the population implications are very different than if just local birds have been affected.
- Is the situation observed to date likely to continue or will the eagles adjust to the presence of the turbines? Currently, the reduced territory occupancy and collision fatalities persist.
- Is the situation observed at Smøla likely to be repeated at other wind farms, *i.e.* cumulative impacts of multiple wind farms?

Clearly, if the situation at Smøla continues and is repeated at other locations, there is the potential for a serious adverse impact on the hitherto healthy population of White-tailed Eagles in Norway and Europe. The only way to determine long-term impacts will be by means of long-term studies, but without at least mitigation measures, retaining the status quo would be in contradiction of Norwegian and international legislation and conventions.

No proper assessment was made of Stage 1, no mitigating measures were implemented during the building of Stage 2, and no special care was taken of existing nests. Furthermore, there has been no decision on a plan to modernise the hydropower plants in Norway and no signs of alternatives to controversial wind farms.

In fact the Norwegian Directorate for Energy has continued, during 2008, to increase the list of wind farms planned or operating in Norway from 130 to 161, almost every one located along the Norwegian coastline in the breeding areas of the White-tailed Eagle and a number of other vulnerable bird species in Norway. Since last year, two additional wind farms are operational bringing the total to 17, with one more (total 19) having got a licence and proposals for an additional 11 (total 42) somewhere in the process from public hearing to decision, some of them really large. An additional 17 (total 83) plans have been reported as progressing towards proposals to the Directorate for Energy.

There are now further wind farm proposals posing similar potential problems to the Smøla wind farm, notably that proposed for the nearby island of Frøya. A decision on the Frøya project is put on hold until the impact studies of the Smøla Wind Farm have come to a conclusion.

The licensed wind farms already exceed the Parliamentary goal of 3 TwH wind power on the Norwegian power grid by 2010. The sum of all plans recorded in Norway so far amount to more than ten times that goal.

Wind power is considered by many to be one of the most environmentally friendly forms of energy production on a large scale. However, careful consideration of their location is essential to avoid environmental conflicts. Continuation of the studies at Smøla is vital to increase our understanding of the risk factors associated with wind farms and to identify whether there are solutions for this wind farm.

Lessons learned:

- Long-term monitoring is essential, and the results need to be made widely available as they emerge to enable informed debate.
- The Bern Convention/EU guidance on wind farms and nature conservation is urgently needed outside the EU as well as within it.
- It is regrettable that the Standing Committee did not take a stronger line on this case when it came before them in 2001 (as a direct result at least 19 white-tailed eagles have died on Smøla).
- It is essential that the Smøla case is reviewed and the lessons learned applied to ensure that no further wind farms that have the potential to cause damaging impacts on White-tailed Eagle populations are consented by the Norwegian Government.

Recommendations

We call on the Standing Committee of the Bern Convention to ensure an on-the-spot appraisal of the case in 2009 leading to a recommendation to the Government of Norway covering:

- The legality of the continuation of the Smøla wind farm and the potential for its removal from this exceptionally sensitive site;
- provision of compensation for the damage already caused;
- at the very least comprehensive mitigation and long term monitoring to assess the effectiveness of such mitigation and to assess residual impacts;
- strategic planning measures to avoid such damaging wind farm developments from ever again being licensed in future.

Annex 1

SMØLA WIND FARM

SPEC - SPECIES (SPECIES OF EUROPEAN CONSERVATION CONCERN) RECORDED REGULARLY IN OR CLOSE TO THE WIND FARM AREA
(possibly at risk from long term wind farm effects)

Species	SPEC-status	Breeding	Migration	Wintering
Red-throated Diver *Gavia stellata*	3	>10 pairs	x.100	
Black-throated Diver *Gavia arctica*	3	c. 2-5 pairs	x.10	-
Tufted Duck *Aythya fuligula*	3	-	x.10	-
Velvet Scoter *Melanitta fusca*	3	-	x.100	?
White-tailed Sea Eagle *Haliaeetus albicilla*	2	20-(30) pairs	x.100	>300
Golden Eagle *Aquila chrysaetos*	3	-	x.10	x.10
Kestrel *Falco tinnunculus*	3	-	x.10	-
Gyr Falcon *Falco rusticolus*	3	-	x.10	5-10
Crane *Grus grus*	2	>1 pair	x.10	-
Lapwing *Vanellus vanellus*	2	x.10 pairs	x.100	-
Dunlin *Calidris alpina (schinzii)*	3	x.10 pairs	x.1000	-
Ruff *Philomachus pugnax*	2	x.10 females	x.1000	-
Jack Snipe *Lymnocryptes minimus*	3	-	x.100	-
Common Snipe *Gallinago gallinago*	3	x.10 pairs	x.100	-
Black-tailed Godwit *Limosa limosa*	1	-	x.100	-
Curlew *Numenius arquata*	2	x.10 pairs	x.100	-
Redshank *Tringa totanus*	2	x.10 pairs	x.100	x.10
Common Sandpiper *Actitis hypoleucos*	3	x. pairs	x.10	-
Common Gull *Larus canus*	2	x.100 pairs	x.1000	-
Eagle Owl *Bubo bubo*	3	-	-	singles
Snowy Owl *Nyctea scandiaca*	3	-	occ.	-
Short-eared Owl *Asio flammeus*	3	Occasionally	x.1	-
Grey-headed Woodpecker *Picus canus*	3	-	x.10	few
Skylark *Lullula alauda*	3	x.10 pairs	x.10	-
Wheatear *Oenanthe oenanthe*	3	x.10 pairs	x.100	-

x.10 pairs = several tens of pairs
x.100 pairs = several hundreds of pairs
x.10-x.1000 = counts of individuals, ranging from several tens to several thousand

The estimates are given for areas within and surrounding the wind farm, covering the zone in which the birds may be possibly at risk, defined to be the area surrounding Smøla Wind Farm and between the wind farm and the public roads surrounding the total area.

Norwegian Ornithological Society 2007