Large terrestrial mammals and wind power – is there a problem?

Summary of discussion at evening workshop at the CWW, Trondheim May 4, 2011

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Background

Studies addressing the effects of wind power development on wild terrestrial mammals such as deer and carnivores are few. Any impacts that can be documented on these taxa may have effects on conservation and wildlife management, and should therefore be considered in environmental assessment. At present, handling officers have little support how to deal with the issue in the wind power planning process. The aim of this workshop was to synthesize the best available knowledge in the field, based on a bibliographic compilation and on experiences and views of the participants, in order to identify how this matter should be addressed, if at all. The discussion was guided by, but not strictly following, these questions:

- On what species or species groups have effects been proven, or can be expected?
- What type of impact – habitat changes, noise or visual disturbance, human disturbance, poaching, other?
- Can effects on the population level be proven/expected?
- Effects during construction, operation, maintenance (and what about disassemblance)?
- Can positive effects be expected for some species (e.g. due to increased food availability or facilitated movements along roads)?
- Are there methodological constrains for assessing and monitoring expected impacts?
- Is there a need for mitigation and compensation measures?

Summary of bibliographic compilation

Wolf (Portuguese studies):
- Space use: wolves use wind power plants and use nearby resting sites but…
    - Confirmed: some degree of displacement during construction, but normally disappear along operation
    - Confirmed changes in territory use (homesites) and configuration
- Demography: wolves breed near (~500m) wind power plants but…
    - Confirmed: some decrease in reproduction success (may be due to other factors or methodological constrains)
    - Confirmed decrease in breeding site fidelity and suitability
    - Probable decrease in productivity (pup survival)
    - Probable increase in human-caused mortality
- Behavior:
    - Probable decrease in scent marking intensity
- Effects on population viability:
    - Probably may occur mainly in humanized areas or wolf populations with other threats (disease, genetic depression, poaching)

Wild and semi-domestic reindeer (Norwegian studies):
- In experiments, reindeer appear not to be disturbed by noise from wind mills or power lines (Flydal et al. 2002, 2004)
- Wind turbines and roads lead to some direct habitat loss, but has limited effects on behaviour (Colman et al. 2008)
- Power lines may have extensive effects through indirect loss of habitat (avoidance). But different studies show deviating results, and solid knowledge is generally lacking (Colman et al. 2008)
- Roads and power lines may act as barriers to movements, thereby dissecting populations (Flydal et al. 2002, Vistnes et al. 2004)

Other cervids:
- Elk, deer (*Odocoileus sp.*) and pronghorn are expected to be temporarily displaced during construction. Direct habitat loss is not considered important for these species (review by Arnett et al. 2007)

- Disturbance during construction and some direct habitat loss are observed for elk, but no population level effects (Oklahoma; Walter et al. 2006)
- No difference in number of droppings of roe deer in areas with and without wind turbines (Germany; Menzel & Pohlmeyer 1999)

Bear:
- Some indication of avoidance by black bear during construction (Vermont; Wallin 1998)
- Black bear may be disturbed by human activity such as roads and industrial development up to a distance of 1 km (review by Linnell et al. 2000)
- Grizzly bear avoid and experience increased mortality in areas with high forest road density (Mace et al. 1996)

Smaller mammals:
- No measurable effect on small mammal catches (Spain; De Lucas et al. 2005)
- No difference in droppings of red fox or European hare (Germany; Menzel & Pohlmeyer 1999)
- Indication of increased vigilance in ground squirrels due to rotor noise (California; Rabin et al. 2006)

Summary of participants contributions

- There are some evidences of a temporary disturbance and/or displacement of large mammals during the construction phase.

- During operation, mammals appear not to be disturbed by the turbines *per se*. Species like roe deer, wild boar, Iberian ibex, pronghorn can be seen foraging or resting in the middle of wind parks or even right under turbines. Also on European ground squirrel no effect has been observed. Although sometimes pre-construction observations are available for comparison, no targeted studies have been conducted to address the issue.

- Species linked to very open habitats, such as gazelles and oryx, may be disturbed by the visual impression of wind turbines.

- Carnivores such as red fox and jackals may benefit from moving along access roads in wind farms, foraging in road sides, and even finding road and turbine kills. In Romania, there is an example where golden jackal has established in an area after wind development.

- Mammals that vocalize (e.g. alarm or social calls) may in theory be disturbed by, or get their vocalization masked by, wind turbine noise. Available studies on road traffic noise can possibly be extrapolated to wind turbine noise.

- Vigilant prey species such as ground squirrels may theoretically interpret the turbine pole as a threat.

- For some carnivores (e.g. wolves, bears), the access roads associated to wind farms may act as a source of disturbance, leading to avoidance particularly during breeding and nursing periods, and therefore be a potential negative impact factor.

- Unintended (and often unforeseen) secondary use of roads built for construction and maintenance of the wind farms may have adverse effects on all wildlife, including mammals, for example:
    - additional (leisure) traffic with cars or terrain vehicles
    - increased access for other leisure activities on foot or by bike
    - increased access for hunting and poaching
    - littering
    - secondary developments (example: summer cottages in the Carpatians)

- In areas where hunting from car occurs, large mammals may avoid even roads with low traffic levels.

- Gating roads may limit the unintended use, but will not eliminate it, since gates may be broken or easily passed with terrain vehicles.

- The unintended use of access roads in wind farms should be considered an unavoidable consequence of wind power development and therefore included in the EIA and addressed in mitigation measures.

- The road network may cause habitat fragmentation (cumulative to the fragmentation caused by other land use). This effect however depends on the habitat requirements of the species. Example: Wild cat suffers greatly from forest fragmentation, and would experience a significant habitat loss if wind farms would be situated in the sparse remaining forest areas. But for other species, increased edge habitat along access roads may be beneficial.

- Effects on wildlife of development of oil and gas fields in boreal or arctic environments may be comparable to effects of wind farms (access roads, occasional human presence, constant noise from drilling stations). Therefore lessons can be learned from available studies of oil and gas development.

- Power lines in wind farms may not be a major concern. In some countries, power lines between turbines are often placed underground. But in the long run, an increased development of wind power will lead to an increased network of large power lines in the landscape, which may have various ecological effects.

- Effects on the population level are important, because that is what actually matters, but such effects are rarely studied and may need long term monitoring along several years of pos-construction.