



International Migratory Bird Day (IMBD), held annually on the second Saturday in May, is an invitation to celebrate and support migratory bird conservation.

IMBD Information
web - <http://birds.fws.gov/imbd>
phone - 703/358-2318

IMBD Materials
web - <http://www.BirdDay.org>
phone - 1-866/334-3330

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A Fine Line for Birds

A Guide to Bird Collisions at Power Lines

How are power lines used to carry energy?

Electricity is created for and delivered to the consumer in a 3-part process:

1. A power plant generates energy, then...
2. Transmission lines from tall transmission towers carry high voltage energy (115-500 kV) over long distances to a substation, then....
3. Distribution lines from substations to smaller pole-mounted transformers carry lower voltage energy (less than 69 kV) to businesses and houses.

Both transmission and distribution lines carry enough energy to harm or kill both people and birds.

Why aren't birds electrocuted when they sit on power lines?

Actually, some birds are. Small birds don't usually get electrocuted because they fail to complete a circuit either by touching a grounded wire or structure, or another energized wire, so electricity stays in the line. Larger birds, however- such as the California Condor, which has a wingspan of up to 9.5 feet - are more likely to touch a power line and a ground wire, another energized wire, or a pole at the same time,

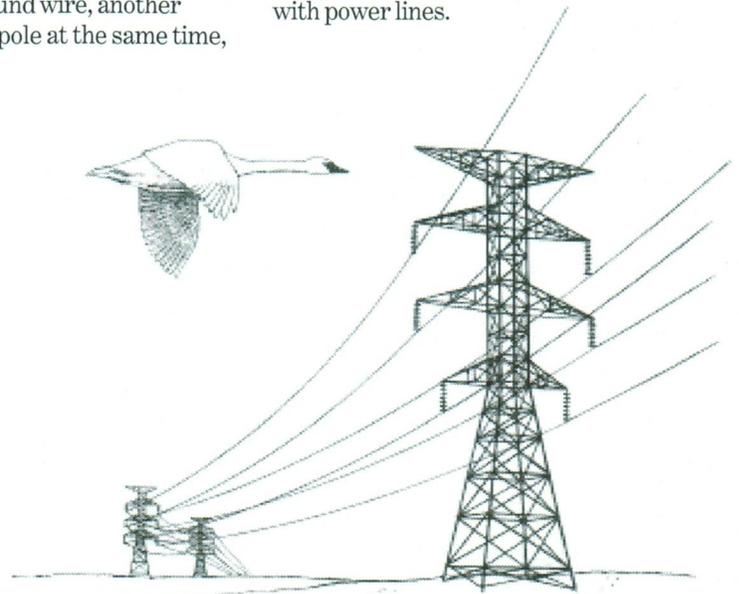
giving electricity a path to the ground. In both situations, the birds are electrocuted and killed, a fuse is blown, power fails, and everyone is impacted.

Why do birds crash into power lines?

It is generally believed that birds collide with power lines because the lines are invisible to them, or because they do not see the line before it is too late to avoid it. Birds' limited ability to judge distance makes power lines especially difficult to see, even as they are flying closer to them. Large birds are especially vulnerable because they are not always quick enough to change their direction before it is too late. Poor weather conditions, such as fog, rain or snow, as well as darkness may make the lines even more difficult to see.

What happens when birds collide with power lines?

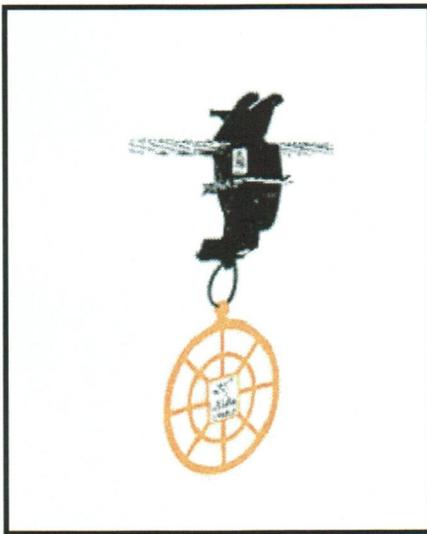
Birds can either be killed outright by the impact, or be injured by contact with electrical lines, resulting in crippling which is likely fatal. Electrocutions can also start wildfires and cause power outages. An estimated 5-15 percent of all power outages can be attributed to bird collisions with power lines.



What can be done to help prevent power line collisions?

There are several ways to help make lines more visible to birds. Marking wires and conductors with white wire spirals and black crossed bands in one study reduced mortality by up to 75 percent. Other potentially helpful devices include bird flappers and diverters, such as the Firefly and the BirdMark, which swivel in the wind, glow in the dark, and use fluorescent colors designed specifically for bird vision. More research needs to be conducted on these so-called “deterrent devices” to see if they truly work.

The practice of burying lines underground, though it eliminates collision risks, creates other risks to wildlife habitat and human safety and is often not feasible from technical and cost perspectives. Yet, at times when collision risks to sensitive species are great, placing the line underground through critical habitat may be the best option.



Example technology: BirdMark bird diverter (P & R Technologies)

Power companies have been voluntarily taking steps to help, such as insulating wires to cover exposed connections and increasing the distance between wires so that no contact with ground or another energized wire can be made by the birds. One example is Tampa Electric, whose Avian Protection Plan promises to retrofit equipment to minimize the risk to birds.

Another leader in the electric utility industry is the Avian Power Line Interaction Committee (APLIC), formed in 1989 to deal with collisions and electrocutions nationwide. It was originally composed of ten utilities nationwide, the Edison Electric Institute (EEI), the U.S. Fish and Wildlife Service (USFWS) and the Audubon Society. Today it includes 29 utilities, EEI, USFWS, and other utilities, united in efforts to protect avian resources while enhancing energy delivery.

Websites with more information:

<http://www.aplic.org/>
(information about coalition dedicated to protecting birds while enhancing reliable energy delivery; not much scientific information, but has good links to literature)

<http://www.culverco.com/sseng/wires/>
(very short article about bird safety on wires; website devoted to explaining science and safety of electricity and natural gas)

<http://www.pacificpower.net/Article/Article43391.html>
(published by a power company in western US; good example of voluntary changes by power company to help birds)

Electrocution of Birds and Collision With Power Lines: Solutions to a Global Problem

ScienceDaily (Dec. 4, 2010) — Electrocution on power lines is a major threat to many bird species across the world, in particular endangered species such birds of prey, which show the greatest incidence of electrocution. The study is published in the *American Journal of Wildlife Management* by the University of Barcelona's Conservation Biology Group, which is directed by Joan Real of the Department of Animal Biology. It focuses on preventing bird electrocution through the identification and correction of high-risk pylons.

Bird death by electrocution is a global problem that has been aggravated by increases in the energy demand of certain regions and is particularly prevalent in natural areas where the introduction of power lines is a cause of significant disruption to local species. In Catalonia, electrocution is the primary cause of death of the Bonelli's Eagle (*Aquila fasciata*), and across the rest of the Iberian Peninsula it affects particularly large numbers of the endangered Iberian Imperial Eagle (*Aquila adalberti*) and many other ecologically valuable species. In the United States, the problem has a particular impact on the highly symbolic Bald Eagle (*Haliaeetus leucocephalus*). In Africa, common victims include the Cape Vulture (*Gyps coprotheres*) and the Egyptian Vulture (*Neophron percnopterus*).

Electrocution: Threats and solutions

Electrocution occurs when a bird comes into contact with two wires or when it perches on a conductive pylon (for example, a metal structure) and comes into simultaneous contact with a wire. In Catalonia, there are more than 1000 different models of electricity pylons, which pose different levels of threat to birds. The article published in the *Journal of Wildlife Management* confirms the validity of the predictive model designed by the UB research group to determine the risk of electrocution according to pylon design and location, as well as verifying the effectiveness of corrective measures implemented at electrocution blackspots.

Joan Real explains that, "The threat posed by a pylon depends on the electrotechnical design and the natural features around it. If we apply the predictive model we can correct power lines more



Death by electrocution is the primary cause of death of the Bonelli's Eagle (Aquila fasciata). (Credit: Image courtesy of Universidad de Barcelona)

effectively without having to apply measures to entire spans of the transmission network." The model makes it possible to select and act on the most dangerous pylons and correct them effectively. According to Joan Real, applying correction measures "to only 6% of the most dangerous pylons could reduce bird mortality by up to 70%."

Effectiveness of corrective measures

The article reviews more than ten years of pioneering work by the UB team on the detection and correction of potentially dangerous pylons and the evaluation of anti-electrocution measures over an area of 210,000 hectares in the Barcelona pre-littoral mountains. In the design of the predictive tool, the team modelled the risk of bird electrocution posed by 3,869 electricity pylons. Next, the team worked with power companies to apply corrective measures to the most dangerous pylons identified by the model (those with wires or connectors above the cross-arms and located in natural habitats or areas selected by bird species for specific activities). The study confirms that these anti-electrocution measures are effective and reduce the number of birds electrocuted in their natural habitats.

As Joan Real explains, "The predictive model is effective in identifying the pylons that present the greatest risk of electrocution. The results also show the effectiveness of corrective measures in preventing bird death through electrocution." Through its research, the Conservation Biology Group has developed a strategic analytical tool that will be of use to any public or private body involved in environment management in areas where transmission infrastructures have had adverse effects on bird life -- a specific environmental problem recognized by the Convention on Migratory Species (Bonn Convention, 2002) and in many EU conservation directives, as well as receiving specific mention in the recent decree on power transmission lines announced by the Spanish government.

Collision: A hidden threat

Electrocution is not the only threat that power lines pose to bird species. Collision also has an impact on the survival of birds, in particular endangered species and those with wider home ranges, which include various species of eagles. The findings of an article produced by the UB's Conservation Biology Group, published in the journal *Bird Conservation International*, suggest that the problem is more serious than previously thought.

"Collision with power lines is a lesser-known problem than electrocution and is harder to detect because it can occur at any point along the transmission line," explains Joan Real. In the case of power lines, the bird collides with one of the wires, generally the earth wire, which is less visible. In the study, the UB team presents a predictive model for determining which lines and spans create the greatest risk of collision, describing the most effective strategies for reducing the number of accidents caused by transmission lines. The results of the article, based on a radio-tracking study of Bonelli's eagle populations in the Barcelona and Tarragona area, suggest that collision risk is influenced by a number of factors, including the topography of surrounding terrain and the proximity of lines and pylons to nests and other areas used frequently by local species.

Since 1980, the Conservation Biology Group has carried out applied research for the conservation of endangered species aimed at identifying effective preventive measures which can be applied by conservation managers and other stakeholders. The group is supported by the Miquel Torres Foundation in Vilafranca Penedès, and funding for its most recent studies has been provided by Barcelona Regional Council and the companies FECSA-ENDESA, Estabanell i Paysa S.A., Electra Caldense S.A. and Red Eléctrica de España, S.A.