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## GOOD EXAMPLES OF ELECTRICAL NETWORK SECURITY FOR LESSER KESTREL (*FALCO NAUMANNI*) IN SPA SAKAR (BG002021)

Stilyana Yaneva<sup>1,2\*</sup>, Gradimir Gradev<sup>1,2</sup>, Simeon Marin<sup>1</sup>

1 Green Balkans- Stara Zagora NGO, Bulgaria

2 Agricultural University - Plovdiv, Bulgaria

\*Corresponding author: [stilqna.qneva91@gmail.com](mailto:stilqna.qneva91@gmail.com)

### Abstract

The overhead electrical power lines, which are part of the electricity distribution network, could be considerable threat to different bird species. The main incidents are related to electrocution and bird`s collision with power lines. The biggest danger comes from electrocution – in these cases birds die as a result of contact with the power line. The electrical current generates electric arc through the bird and the power line and leading to the birds` instant death.

The Green Balkans, as a breeder in SPA Sakar BG 002021 Bulgaria, and under the projects “Lesser Kestrel Recovery” LIFE11 NAT/BG/360 and “LIFE for Lesser Kestrel” LIFE19 NAT/BG/001017 succeeded to recover Lesser Kestrel (*Falco naumanni*, Fleischer 1818) and among the aims of the project was to take measures to mitigate the threat of electrocution. Among the operational over ground power grid lines in Bulgaria, according to the electrical voltage, the most dangerous and life threatening to birds is the mid voltage power supply grid (20 kV) that is also the main cause for death from electrocution.

The Green Balkans` team conducted field research of the dangerous types of pylons, on-site isolation of electricity pylons has been identified within a range of 4.5 km of the Lesser Kestrel colony. According to the way of safeguarding the elements of the electrical grid several different devices were used: “Rigid bird protective cover”, perch guards and bird discouragers. Safeguarding by installation of perches has also been done. The isolation of dangerous pylons in the electrical network ensured safe conditions not only for the Lesser Kestrels, but also for other birds that use the power line elements as landing sites, rest spots, or even for nesting.

**Keywords:** Electrical network, *Falco naumanni*, Lesser Kestrel, SPA Sakar

### INTRODUCTION

The unsafe overhead electrical power grid, part of the electricity distribution network in the country, poses a considerable threat to different bird species. The main outcomes of incidents where birds fall victim to the power grid are electrocution and collision with power lines. Poor meteorological conditions – low visibility, snowing, fog, etc. – increase the chance for collision since the power lines are hardly detected by birds. These negative factors affect not only the local population of birds, but also migrating individuals. The biggest danger

comes from electrocution – in these cases the birds die as a result of contact with the power line. The passing of electrical current through the bird and the power line by the generated electric arc leading to their instant demise. Usually, with electrocution the lethal end is instant. Not rare are the cases when burnt or torn off limbs of birds are found after electrocution. Considering collisions with power lines – in this type of threats the cause of death is a direct collision of birds with power lines. In such cases, the bird may survive after the collision, but will suffer fractures of limbs or body which could be lethal at a later stage (Gradev, 2019).

The risk is particularly higher with migrating species because even if they live in an area with safe grid during the migration or wintering may become victims of dangerous power grids in other countries or even continents (Green Balkans – Stara Zagora, 2017). There are numerous studies and publications on this topic not only from Europe - Spain, Germany, Hungary, Slovakia, Norway, Russia, but also from Asia - Kazakhstan and Mongolia, as well as from America, Africa, etc. In addition to discussing the negative impacts on birds, many authors have also provided the good examples for securing the risk elements and reducing the threats to birds. Similar studies were also done in Bulgaria (Demerdzhiev et al., 2009, Gerdzhikov & Demerdzhiev, 2009). Cases of Lesser Kestrel mortality caused by contact with power grids were reported by a number of authors from Portugal (Inigo & Barov 2010), Spain (Langston & Pullan, 2004), Kazakhstan (Lasch et al. 2010). After has being recovered Lesser Kestrel (*Falco naumanni*, Fleischer 1818) as breeder in SPA Sakar BG 002021 Bulgaria, one of the aims at mitigating the threat of electrocution, especially at the sites where the Lesser Kestrel colonies were located (Marin et al., 2020).



**Fig. 1.** Unsafe electrical pole with Lesser Kestrels.

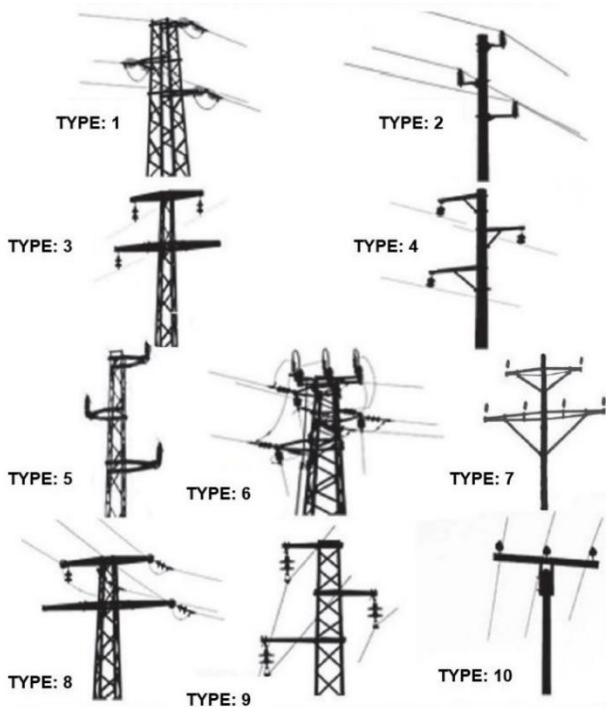
The aim of the study was to conduct the field research on the dangerous types of pylons and to take actions to safeguard the electrical grid through installation of “Rigid bird protective cover”, perch guards, bird discouragers, and perches.

## MATERIALS AND METHODS

The most dangerous types of pylons were identified according to the number and species of dead birds found along the grid lines. Among the operational overhead power grid lines in Bulgaria, according to electrical voltage, the most dangerous and life threatening for the birds are the elements of the mid voltage power supply grid (20 kV) that are the main causes of the death from electrocution. There are several types of electric poles in Bulgaria, according to the configuration of the attached power lines.

Considering the proven threat that the 20 kV electrical grid poses for birds, there have been considerable efforts towards safeguarding this type of power grid. The field researchers identified that the biggest threat was posed by several types of electric poles of the 20 kV power supply grid. In cases when birds were victims of electrocution, the biggest share of accidents has been caused by poles of types 1, 5, and 6, shown in Fig. 2.

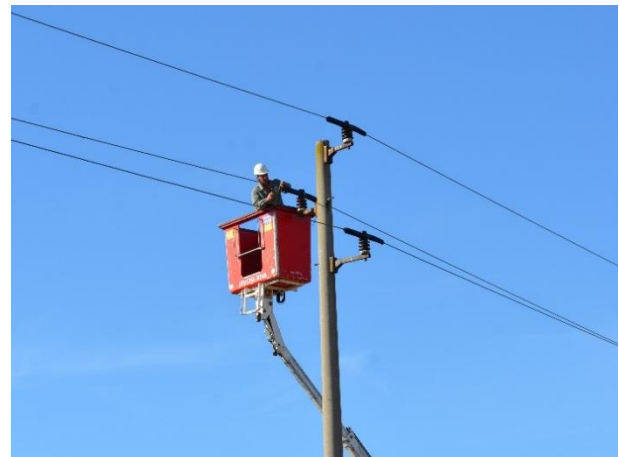
The field research on the dangerous types of pylons has identified on-site isolation of the electricity pylons within a range of 4.5 km of the Lesser Kestrel colony as well as other potentially suitable sites. The reason to select such a range is the fact that the average maximum foraging range is away from the colony of Lesser Kestrels.



**Fig. 2.** Different types of electrical poles used in Bulgaria.

## RESULTS AND DISCUSSION

In safeguarding the elements of the electrical grid several different devices were used: “Rigid bird protective cover”, bird discouragers and safeguarding by installation of perches. Insulators of the type “Rigid bird protective cover” safeguard the power lines at the point where these are connected to electric poles. The insulators cover the power line and the isolator that connects it to the pole. In this way the contact between birds, power lines and the pole are prevented thus avoiding electrocution. These insulations are widely used on type 2 poles or others with similar structure, power line configuration, and ways of attachment to the poles (Fig. 3). Except for the protective plates, in these cases the “spider-web” type insulation has been used. It also prevents birds’ access to the dangerous parts of the power line poles. This type is suitable for safeguarding of type 1 electric pole.



**Fig. 3.** Insulators of the type “Rigid bird protective cover” on type 2 pole.

Safeguarding of electric posts in this way provides suitable perches to birds on the poles, but far enough from the power lines, so to avoid the possibility of contact between the birds and the conductive parts, or the possibility of electric arc. It is suitable for type 6 power line poles and it is the only way, for the time being, to safeguard these poles in the country. Safeguarding these pylons is of the utmost importance in open areas without trees where there are no other natural landing and resting sites. In cases of overhead power lines passing through such areas these provide the only perches and sometimes even nest sites that can be used by the birds (Fig. 4).



**Fig. 4.** Safeguarding by installing perches and bird discouragers.

The NGO “Green Balkans” together with the electricity distribution company has isolated 109 pylons of the electrical network on the territory of SPA Sakar. Five of them were isolated with bird discouragers and two with perches. The other 102 were isolated with insulators of the type “Rigid bird protective cover”. The isolation of the dangerous pylons of the electrical network ensured safe conditions not only for the Lesser Kestrels, but also for other species such as the Imperial Eagle, Storks, and other birds using power line elements for landing sites, rest spots, or even for nesting.

### CONCLUSIONS

In safeguarding the elements of the electrical grid several different devices were used: “Rigid bird protective cover”, perch guards and bird discouragers. Safeguarding by installation of perches was also done. “Green Balkans” team, together with the electricity distribution company, has isolated 109 pylons of the electrical network on the territory of SPA Sakar. Five of them were isolated with perch guards and bird discouragers and two with perches. The other 102 were isolated with insulators of the type “Rigid bird protective cover”. The isolation of the dangerous pylons of the electrical network ensured safe conditions not only for the Lesser Kestrels, but also for other species such as the Imperial Eagle, Storks, and other birds using power line elements for landing sites, rest spots, or even for nesting.

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