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AN ANALYSIS OF BIRD ELECTROCUTIONS IN MONTANA

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ABSTRACT.—Fifty incidents of reported electrocutions were analyzed that occurred in Montana between October 1980 and December 1985 and involved 61 birds. The Golden Eagle (*Aquila chrysaetos*) was the most common bird reported and was involved in 54% of all cases. Statistical analysis suggested that birds were not disproportionately electrocuted when comparing pole, vegetation and terrain types. However, a pole along a hilly grassland had twice the potential to kill multiple numbers of birds than a pole along a flat agricultural terrain. Mitigative measures when incorporated proved to be successful.

Since 1970, bird electrocutions have drawn the attention from industry and government agencies alike (Boeker, E. L., and P. R. Nickerson, *Wildl. Soc. Bull.* 3:79–81, 1975) and subsequent awareness has increased through the efforts of the Edison Electric Institute (Olendorff, R. R. et al., *Raptor Res. Rep. No.* 4., St. Paul, Minnesota. 111 pp. 1981). Here, I report 50 incidents of electrocution in Montana occurring between October 1980 and December 1985 involving 59 raptors and two herons. This paper is based on mortality reports that were voluntarily completed on dead birds found underneath or near a distribution or transmission line by electric utility personnel or reported to the utility by the public.

Raptors are primarily electrocuted by low voltage lines (Miller, D. et al. 1975, *in* Olendorff et al. 1981). Electrocutions can occur when wings contact two conductors (phase to phase) or conductor to ground wire (phase to ground). Typically, conductors are spaced 0.6–1.2 m apart. Low voltage lines include distribution lines with a voltage range of 2.3–25 kV and transmission lines with voltages up to 69 kV (Olendorff et al. 1981).

METHODS

I reviewed and summarized mortality reports that contained data on: date of discovery, approximate date of mortality, location, species, age, sex, suspected cause of mortality, pole type, vegetation (forest, grassland, etc.) and terrain (hilly, flat, etc.). Reports were condensed annually and filed with the U.S. Fish and Wildlife Service, Office of Permits, Denver Regional Office, Denver, Colorado and Special Agent-In-Charge of Law Enforcement, Great Falls, Montana. Recovered carcasses were either buried on site or delivered to a state or federal agent.

Chi-Square statistic (Snedecor, G. W., and W. G. Cochran, Statistical Methods. The Iowa State Univ. Press, Ames, IA. 593 pp. 1967). was used to test for significant variations among pole configurations, vegetation types, or terrain differences. The hypothesis was birds are not disproportionately electrocuted when comparing pole, vegetation, and terrain types.

RESULTS AND DISCUSSION

Birds were found and reported throughout the year with eight species of birds electrocuted during the study period (Table 1). Date of mortality, sex and age of the birds involved often could not be determined with confidence, and are not included for discussion. Table 2 gives site data at time of discovery and shows that 61% of electrocutions occurred on poles with either double crossarms (i.e., configurations with two or more crossarms) or a transformer present. Thus, poles that deviate from a single crossarm may have greater electrocution potential or may disporportionately attract raptors or other birds. However, such potential or attraction does not appear to be significant ($\chi^2 = 1.6$, $P = 0.25$).

The Golden Eagle (*Aquila chrysaetos*) was electrocuted more frequently than any other species (Table 1) and was involved in 54% of all cases reported. Most eagles select landing sites in response to prevailing winds and visibility (Nelson, M. W., *Aware Mag.* 51:9–12, 1975). Poles with double crossarms and transformers are frequently used to strengthen

Table 1. Reported bird electrocutions in Montana for 1980–85.[a]

SPECIES	NUMBER
Golden Eagle (*Aquila chrysaetos*)	32
Great Horned Owl (*Bubo virginianus*)	12
Red-tailed Hawk (*Buteo jamaicensis*)	2
Swainson's Hawk (*Buteo swainsoni*)	2
Goshawk (*Accipiter gentilis*)	1
Cooper's Hawk (*Accipiter cooperii*)	1
Raven (*Corvus corax*)	1
Great Blue Heron (*Ardea herodias*)	2
Unidentified owl	7
Unidentified hawk	1

[a] No data were reported for 1981.

Table 2. Summary of bird electrocution site data in Montana for 1980–85.

Site Data	Year[a] 1980 Cases	1980 Birds	1982 Cases	1982 Birds	1983 Cases	1983 Birds	1984 Cases	1984 Birds	1985 Cases	1985 Birds	Total Cases/ Birds
Pole Type											
Single Crossarm	1	1	7	7	2	2	2	3	3	4	15/17
Double Crossarm	3	5	0	0	11	12	2	2	2	3	18/22
Transformer Present[b]	0	0	3	4	2	3	3	3	4	5	12/15
Other	0	0	0	0	1	1	2	4	2	2	5/7
Vegetation Type											
Grassland	4	6	7	7	14	15	7	10	6	8	38/46
Agriculture	0	0	3	4	1	1	1	1	4	5	9/11
Other	0	0	0	0	1	2	1	1	1	1	3/4
Terrain Type											
Flat	0	0	7	8	6	7	6	7	8	9	27/31
Hilly	4	6	3	3	10	11	3	5	3	5	23/30
Total	4	6	10	11	16	18	9	12	11	14	50/61

[a] No data were reported for 1981.
[b] Includes pole types that also had single and double crossarms.

corners and at deadends of distribution lines where prevailing winds and visibility can be favorable for landing or visual food searching. In addition Golden Eagles have a wing span which makes them more susceptible to electrocution.

Site data also suggestd that higher bird mortality occurred in grassland habitats than in the less diverse agricultural lands. Nonetheless, the number of electrocutions observed vs. expected was not significant ($\chi^2 = 1.8$, $P = 0.20$). Finally, total number of birds killed in either flat or hilly terrain was about the same and did not differ from what would be expected ($\chi^2 = 2.1$, $P = 0.16$). However, a pole along a hilly grassland had twice the potential to kill multiple numbers of birds than a pole along a flat agricultural terrain.

When the electric utility was made aware that specific poles were electrocuting raptors, mitigative measures were initiated consisting of altering pole configuration to reduce the potential for raptor electrocution using one or more of the techniques suggested by Miller et al. (1975). For instance, in reviewing mortality data I found that one 25 kV line about 1.8 km long was associated with 14 raptor electrocutions (6 in 1980 and 8 in 1983). The line was upgraded to 69 kV in 1984, and at that time conductor spacing was increased to eliminate electrocutions and elevated raptor perches installed at four locations. To date the most common technique has been to attach an elevated perch to poles. In all cases where mitigative measures have been incorporated there were no reports of further electrocutions.

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