

POWER POLE CASUALTIES AMONG RAPTORS AND RAVENS IN NORTHWESTERN CHIHUAHUA, MEXICO

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On 11 and 12 February 2000, we searched for dead raptors and ravens beneath 1612 consecutive power poles near the village of San Pedro (30° 51'N, 108° 23' W) in northwestern Chihuahua, Mexico. Two of us (Cartron and Manzano-Fisher) resurveyed 214 consecutive poles along two power lines on 23 and 24 March 2000. The area we surveyed represents one of the few well-preserved grasslands left in Mexico (Miller et al. 1994). It supports the largest complex of Black-tailed Prairie-dog (*Cynomys ludovicianus*) towns remaining in North America (Ceballos et al. 1993), along with relatively high numbers of wintering and nesting raptors (Manzano-Fisher et al. 1999). Power lines are also present in the area, some of them built at the edge of, or within, the boundaries of prairie-dog colonies.

We conducted our searches on foot, except where the road was immediately adjacent to a power line. In such a case, we drove the distance between poles and stopped to inspect the ground beneath each pole. Because the vegetation along power lines was typically very short, searches by car also allowed us to inspect the ground visually between poles. In March, the two power lines we surveyed again were those with the largest number of raptor remains found in February.

All of the power poles surveyed were built in the three-phase configuration known to be most dangerous to raptors (Olendorff et al. 1981, APLIC 1996). Most of them were single concrete poles with a steel cross arm. The total number of power poles inspected in February and March represented a cumulative distance of 163 and 24 km of power lines, respectively. Surrounding vegetation types typically ranged from pure grassland and grassland associated with *Ephedra*, *Yucca*, or *Opuntia* to shrubland of mesquite (*Prosopis* sp.). Some of the areas surveyed were also characterized by pastures, agricultural fields, or bare ground.

In February, we discovered the remains of at least 27 raptors and 15 ravens at the base of 39 power poles. We found an additional Golden Eagle (*Aquila chrysaetos*) beneath a power line between two poles. In most cases the remains of dead birds were limited to a large number of feathers or some body parts. However, all dead bodies of Golden Eagles were whole, as were those of a few Ferruginous Hawks (*Buteo regalis*) and Red-tailed Hawks (*Buteo jamaicensis*). No bullet wounds were visible in any of these carcasses. The most frequent raptors were the Ferruginous Hawk ($n = 9$), Golden Eagle ($n = 9$), and Red-tailed Hawk ($n = 6$). Three Prairie Falcons (*Falco mexicanus*) and one American Kestrel (*Falco sparverius*) were also found. Six of the Golden Eagles were adults. At least one dead Ferruginous Hawk was an adult. In addition to these remains, we also found beneath six poles single feathers, one of the Ferruginous Hawk, one of the Red-tailed Hawk, four unidentified, that suggested other possible casualties.

In March, we found at least one dead raven, two Golden Eagles (one adult and one immature), one adult Ferruginous Hawk, one Red-tailed Hawk, and one Turkey Vulture that had not been present in February. The Turkey Vulture (*Cathartes aura*

NOTES

and Ferruginous Hawk carcasses were found beneath the same power pole. One of the dead Golden Eagles was found between two poles rather than at the base of one. All Golden Eagle carcasses found in February were still present. Of two whole Ferruginous Hawk carcasses found in February, only one remained; we searched for the other but found only scattered feathers. All Golden Eagles and Ferruginous Hawks discovered in February and March were found beneath poles or lines near or within prairie-dog towns.

Electrocution by power lines can be an important cause of mortality among raptors and ravens (Ferrer and Hiraldo 1990, Olendorff et al. 1981, Real et al. 1996, APLIC 1996, Bayle 1999). Electrocution is typically the result of power-pole configuration rather than voltage (Williams and Colson 1989). In the western U.S., it occurs primarily in areas with few natural perches, such as shrublands and grasslands (Boeker and Nickerson 1975, Benson 1982, APLIC 1996). In our study area, the risk of electrocution among raptors is likely compounded by the scarcity of trees, low levels of human disturbance near power lines, and high population densities of Black-tailed Prairie-dogs that attract foraging Golden Eagles and Ferruginous Hawks.

Our data do not allow us to estimate the incidence of electrocutions. In addition to the limited scope of our survey, the total number of deaths by electrocution beneath the 214 poles revisited in March was likely underestimated because of scavenging by Coyotes (*Canis latrans*). However, our study strongly suggests that power poles may be an important cause of mortality among at least Ferruginous Hawks, Golden Eagles, and ravens in the prairie-dog town complex of northwestern Chihuahua. Although most Golden Eagles killed by electrocution are typically immature or subadult (Boeker and Nickerson 1975, Benson 1981), in our survey area they may be chiefly adults. Importantly, our survey also documents the presence of smaller raptors such as the Prairie Falcon among power-pole casualties. From the results of our surveys, we believe that electrocution of raptors and ravens represents a serious local conservation problem that needs to be addressed.

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