



Department of Defense
Partners in Flight

Our Mission

Providing expertise on the management and conservation of birds and their habitats to sustain and enhance the military mission



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Reducing Avian Electrocutation

to Benefit Conservation, Safety, and Mission

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Electrocution Overview

Overhead wires and equipment in North America electrocute millions of birds each year. Although birds can safely perch on a single conductor wire, if they touch a second conductor or a grounded contact concurrently they risk electrocution. Electrocution is most common on distribution (<60kV) lines, which serve commercial and residential facilities, because distribution safety clearances are narrower than those of transmission lines (>60kV) moving power across large distances. Electrocution

disproportionately kills larger birds such as eagles, osprey, hawks and owls, and many corvid species, but can be a common cause of mortality for many other avian species. Avian electrocution is relevant to conservation at the population and even species level. This fact sheet introduces strategies for identifying and mitigating avian electrocution hazards, and references policy and practical tools that can provide additional guidance for system design, construction and maintenance practices that will reduce Department of Defense's (DoD) exposure to environmental risk.

DoD Context

DoD facilities have high avian electrocution exposure compared to other federal agencies because of their setting and electrical systems. Facilities commonly include large tracts of wild lands with a minor human footprint for

security reasons and for testing and training purposes. Managed, in part, for the benefit of natural resources, these diverse habitats attract breeding, migrating, and wintering birds.



Simultaneous contact with any two different-colored lines will result in a shock or electrocution (green denotes ground potential).

The design, construction, and maintenance practices of DoD electrical systems reflect the history of each facility and bear the fingerprint of many contractors. Older designs and equipment often pose a greater avian electrical hazard than new construction, and many DoD facilities date back to the first half of the 20th Century. System privatization represents an opportunity to require the continuation of established best practices or potentially implement new ones.

Avian electrocution is a conservation challenge that also threatens mission readiness. An estimated 5 to 10% of power outages are attributed to birds and other wildlife; many wildfires and incidences of large scale (>\$1M) equipment damage have been linked to avian and wildlife electrocution. Therefore, avian electrocution causes interruptions and delays, poses safety hazards, and diverts resources from essential missions. However, tools are available to effectively prevent and mitigate electrocutions.

Laws, Policies and Guidelines

The Bald and Golden Eagle Protection Act protects eagles, and the Migratory Bird Treaty Act protects 1,093 native bird species. A much smaller number of species are federally protected under the Endangered Species Act. DoD policy broadly supporting migratory bird conservation includes Executive Order 13186 and the February 6, 2018 memorandum from the Deputy Assistant Secretary of Defense for

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Environment, Safety and Occupational Health. The 2014 DoD and U.S. Fish and Wildlife Service (USFWS) Memorandum of Understanding (and its' 2022 extension) set goals and strategies for avian conservation on military facilities.

Unified Facility Criteria (UFC) 3-550-01 Exterior Electrical Power Distribution and UFC 3-550-07 Operation and Maintenance: Exterior Power Distribution Systems reference relevant Institute of Electrical and Electronics Engineers standards (<https://standards.ieee.org/>) with actionable guidance for preventing avian electrocution. Facility- specific Integrated Natural Resources Management Plans, Installation Design Guides, and system privatization documents may offer further guidance or commitments for avian friendly line designs or ongoing mitigation. If these documents do not currently address avian electrocution, future revisions are an opportunity to incorporate best practices or management commitments.

Awareness and Risk Assessment

Only a small percentage of avian electrocutions are reported and tracked. Some do not cause a service interruption, whereas others are recorded as an outage with an undetermined cause. Scavengers quickly remove most carcasses from the base of the pole where mortality occurs, and carcasses typically persist only for hours or days.

Opportunistic discoveries represent only a small percentage of avian electrocutions, and typically only a subset of electrocutions encountered are reported to facility personnel who can fully investigate, file an external report, coordinate mitigation, and track the issue over time. Any pole that causes an electrocution represents an ongoing hazard until mitigated or replaced.

Electrocution risk varies among poles based on exposure and hazard. Exposure is the extent to which susceptible birds use a particular pole; factors influencing exposure include surrounding habitat and proximity to a nest, roost, or foraging area. Hazard reflects the number and arrangement of potentially lethal contacts on a pole; factors influencing hazard include pole grounding, the number of conductors, and number, type, and arrangement of pole-mounted equipment such as

switches, transformers, or surge arresters, as well as the wires connecting them. An avian risk assessment (ARA) relies on both biological factors and electrical system characteristics to identify mitigation strategies for high-risk poles.

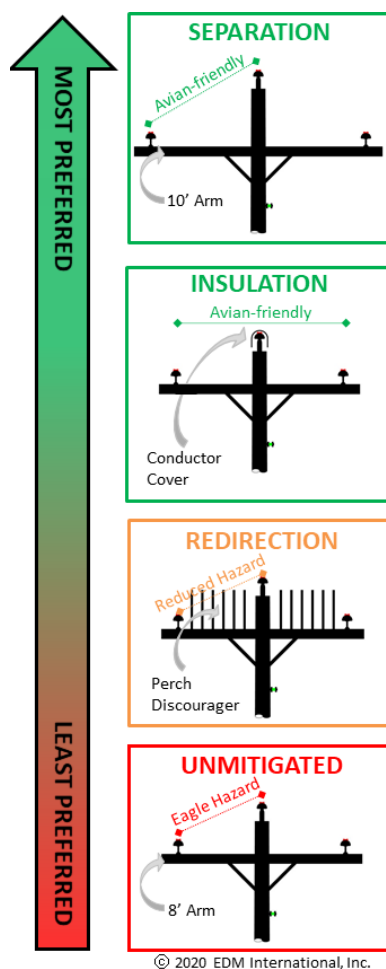
Best Practices

In 2005, the industry-sponsored Avian Power Line Interaction Committee (APLIC) and USFWS published *Avian Protection Plan (APP) Guidelines*, describing a management framework for reducing avian mortality. Most DoD facilities would benefit from an APP and ARA

developed by a contractor with avian-power line experience. Together the APP and ARA are a blueprint for mitigating the most hazardous poles.

APLIC's Suggested Practices for Avian Protection on Power Lines sets best practices for electrocution prevention. "Avian friendly" poles are protective of eagles and provide 60 inches (horiz.) and 40 inches (vert.) clearance around energized and grounded components near a perch. Spacing is achieved through:

- *Separation* is primarily a design strategy to provide extra space between wires and components; it is effective and durable, but impractical for most existing poles and new equipment poles.
- *Insulation* uses specialized covers to mitigate existing high-risk poles or new construction with pole-mounted equipment; it is effective properly implemented but will require maintenance.
- *Redirection* uses perch discouragers to shift bird use toward less hazardous locations on a pole. Determined birds defeat perch discouragers and they have fallen out of favor except when separation and insulation are impractical.



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Strategies to eliminate or reduce avian electrocution

- These strategies can and should be implemented:
- a) preventively during system design, construction, and rebuilds;
 - b) proactively on existing high-risk poles; and
 - c) reactively, after an electrocution.