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Avian Protection Plan

Holy Cross Energy

Prepared for:

Holy Cross Energy

3799 Highway 82| PO Box 2150 | Glenwood Springs, CO 81602 | 970-945-5491
www.holycross.com

Prepared by:

EDM International, Inc.

4001 Automation Way | Fort Collins, Colorado 80525 | 970-204-4001 | Fax: 970-204-4007
environmentalservices@edmlink.com | www.edmlink.com

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DOCUMENT CHANGE LOG

DATE	PAGES	DESCRIPTION OF CHANGE	AUTHOR

EXECUTIVE SUMMARY

Birds—most of them federally protected—perch, hunt, nest, and fly in the vicinity of overhead electrical infrastructure. These activities have the potential to lead to avian electrocutions and collisions, which may negatively impact safety and reliability. Avian management can reduce harmful avian power line interactions for the benefit of avian conservation, system operators, and power users.

Holy Cross Energy (HCE) works proactively to protect avian species on its electrical system. In 2003, HCE first developed an Avian Protection Plan (APP) to minimize potential electrocution and collision hazards for birds on its existing power grid and improve compliance with the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), and Endangered Species Act (ESA).

This 2019 APP follows recommendations from the Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS) Guidelines (APLIC and USFWS 2005), and other issue-specific avian protection guidelines (APLIC 2006, 2012). As part of HCE's ongoing commitment to protect bird species, this 2019 APP provides a primary resource for activities relating to avian protection. The document is relevant to HCE management, engineers, and field personnel, and reflects contemporary best industry practice and the current status of federal and state regulatory and permitting systems.

The purpose of the 2019 APP is to minimize bird mortalities and injuries through proactive and reactive approaches, improve compliance with federal and state avian-protection laws, and improve system reliability. The HCE APP describes key avian-protection issues and recommended mitigation strategies, including a list of manufacturers of relevant products. The APP summarizes the federal and state regulatory framework protecting birds and associated permits; incident response procedures designed to improve regulatory compliance are also provided. Species susceptible to power line interactions are identified and briefly described, along with applicable federal and state protections. The APP provides a training syllabus and a list of relevant resources to help HCE maximize the effectiveness of its avian program.

In 2003, EDM International, Inc. (EDM) conducted an Avian Risk Assessment (ARA) for avian collision and electrocution in the HCE service territory. Each record integrated a retrofit priority ranking and pole-specific retrofitting recommendations. Since 2003, HCE has retrofitted poles, marked lines, and implemented avian-friendly new construction. High risk poles that have not yet been addressed should be retrofitted according to the current best industry practices described in this APP; pole specific recommendations from 2003 will require minor modification, as preferred mitigation practices for certain situations have changed. Addressing the identified avian hazards will not only improve avian safety, it will also improve system reliability since avian electrocutions may result in outages.

The 2019 APP is more complete and user friendly than the 2003 APP, and ensures that field and management personnel have access to the background knowledge and resources required to make the HCE system more avian friendly and reliable.

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ACRONYMS AND ABBREVIATIONS

ACAS	Avian Collision Avoidance System
AIMRS	Avian Injury/Mortality Reporting System
AFD	Avian Flight Diverter
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
ARA	Avian Risk Assessment
BFD	Bird Flight Diverter
BGEPA	Bald and Golden Eagle Protection Act
CFR	Code of Federal Regulations
CPW	Colorado Parks and Wildlife
CRS	Colorado Revised Statute
DC	direct current
DOI	Department of the Interior
DWM	District Wildlife Manager
EDM	EDM International, Inc.
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
EWT	Endangered Wildlife Trust
FAA	Federal Aviation Administration
FR	Federal Register
GIS	geographic information system
GPS	Global Positioning System
HCE	Holy Cross Energy
HDPE	high density polyethylene
HW	high wind
IEEE	Institute of Electrical and Electronic Engineers
IMR	Injury Mortality Reporting
kV	kilovolt
LED	light-emitting diode
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
OHS	overhead shield/static
OPGW	optical ground wire

ACRONYMS AND ABBREVIATIONS, CONTINUED

PVC	polyvinyl chloride
ROW	right-of-way
SFD	Swan Flight Diverter
SPUT	Special Purpose Utility Permit
SVD	Spiral Vibration Damper
T/E	threatened or endangered
U.S.	United States
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UV	ultraviolet

SECTION I:
ISSUES

1 INTRODUCTION

Avian interactions with utility infrastructure include, but are not limited to, issues and concerns such as electrocution, collision, nesting, and pollution. Avian-power line interactions may be beneficial to birds under certain circumstances, but can cause injury, mortality, or diminished breeding productivity under others. Avian interactions that are not managed appropriately sometimes diminish reliability or threaten operational safety.

In the United States, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), and the Endangered Species Act (ESA) provide federal protection to specific bird species; all three acts are administered and enforced by the U.S. Fish and Wildlife Service (USFWS). The USFWS may authorize certain activities that otherwise would be prohibited through the federal permit system.

In 1989, nine major electric utilities formed the Avian Power Line Interaction Committee (APLIC) to further study avian interactions with power lines (Lewis 1997). APLIC has since grown to include over 50 member utilities in the U.S. and Canada, including investor-owned utilities, rural electric cooperatives, municipal utilities, power producers, and federal agencies. APLIC has produced guidance documents for minimizing avian electrocutions on power lines (APLIC 1996, 2006) and reducing avian collision risks associated with overhead infrastructure (APLIC 1994, 2012).

In 2005, APLIC and the USFWS developed *Avian Protection Plan (APP) Guidelines* (Guidelines), a framework for reducing avian impacts from electric utilities or industry. An APP is a company-specific avian management program to reduce avian injuries and mortalities resulting from harmful infrastructure interactions (APLIC and USFWS 2005); an APP also reduces legal liability by improving regulatory compliance, and is likely to harden the system and improve reliability.

Holy Cross Energy (HCE) serves more than 57,000 meters in Eagle, Garfield, Pitkin, Gunnison, and Mesa counties (Figure 1-1) and works proactively to protect avian species on its electrical system. HCE first developed an APP in 2003 and this updated plan is designed to provide HCE with the critical tools to enhance avian conservation on its overhead system, thereby improving system reliability and regulatory compliance. Furthermore, HCE initiated the 2019 APP to ensure all elements of the APP were consistent with current best practices and accurately reflected the existing legal and permitting framework.

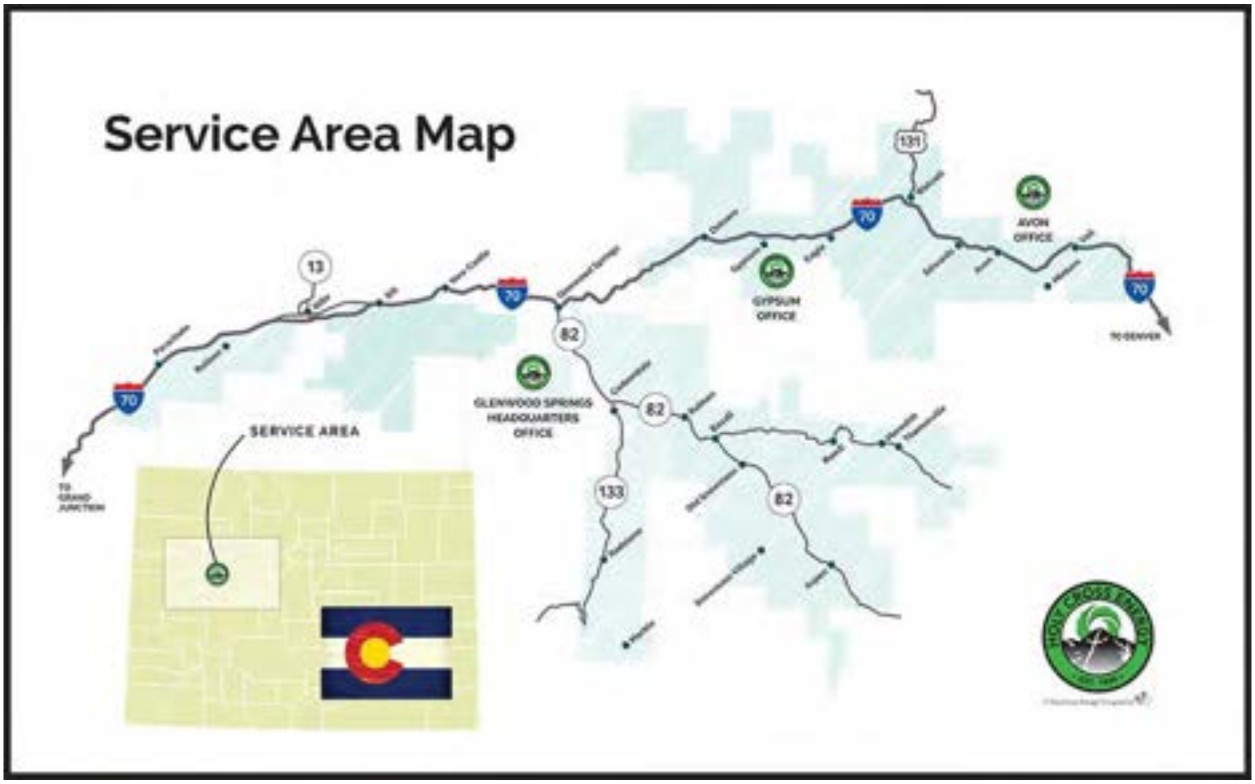

Figure 1-1. HCE service area.

1.1 Avian Protection Plan Framework

Adherence to the Guidelines (APLIC and USFWS 2005) is voluntary and allows proponents flexibility in tailoring an APP to accommodate their specific needs, while working toward shared avian protection and conservation goals. Although each APP is unique, most contain certain core components. APLIC and USFWS (2005) described 12 elements comprising the basic APP framework. This APP addresses all 12 elements recommended in the Guidelines:

1. Corporate Policy
2. Training
3. Permit Compliance
4. Construction Design Standards
5. Nest Management
6. Avian Reporting System
7. Risk Assessment Methodology
8. Mortality Reduction Measures
9. Avian Enhancement Options
10. Quality Control
11. Public Awareness
12. Key Resources

This APP is structured for a variety of audiences (e.g., environmental, engineering, field crews, agencies) and is organized as follows.

Section I: ISSUES describes avian-power line issues from multiple perspectives:

- Chapter 1 *Introduction* is a broad overview of the primary issues and presents the APP goals, components, and organization.
- Chapter 2 *Avian-Power Line Interactions* summarizes the state of knowledge for predominant avian-protection issues including electrocution, collision, nesting, fecal contamination, and other industry-related issues.
- Chapter 3 *Regulatory Context* introduces the federal and state regulations protecting birds, and the agencies that implement and enforce these regulations.
- Chapter 4 *Avian Permitting* provides information on federal and state permits specific to avian management actions, and the circumstances under which they might be relevant to company operations.

Section II: AVIAN RISK REDUCTION provides a variety of mitigation strategies for reducing avian risk for a range of infrastructure types:

- Chapter 5 *Distribution Electrocution Measures* contains practical guidance for addressing avian electrocution risks on distribution structures.
- Chapter 6 *Transmission Electrocution Measures* contains practical guidance for addressing avian electrocution risks on lower-voltage transmission structures.
- Chapter 7 *Substation Electrocution Measures* contains practical guidance for addressing avian electrocution risks in substations.
- Chapter 8 *Collision Measures* contains practical guidance for reducing avian collisions with overhead lines.
- Chapter 9 *Nesting Measures* contains practical guidance for nest management on company infrastructure.
- Chapter 10 *Feces Measures* contains practical guidance for addressing outages, faults, and operational issues caused by avian fecal streamers and pollution.

Section III: AVIAN MANAGEMENT AND RISK ASSESSMENT describes the utility's approach and commitment to avian protection, internal policies, and risk-assessment methods:

- Chapter 11 *Approach to Avian Issues* describes the utility's system, the birds most likely to occur, federally and state-listed bird species, company policies, personnel training, and the APP-development process.
- Chapter 12 *Incident Response and Reporting Protocols* provides guidelines for safely and appropriately responding to avian incidents and problem nests.

- Chapter 13 *Proactive Avian Management* contains the utility's proactive approaches to reducing avian risk such as avian-friendly construction standards, retrofit implementation, facility construction and siting methods, and seasonal nest avoidance.
- Chapter 14 *Avian Risk Assessment Approach* describes the methods employed to evaluate avian risk on a utility's system.
- Chapter 15 *Literature Cited* presents a list of bibliographic sources.

Supplementary materials are integrated into the document as appendices. Table 1-1 references the chapters or appendices where the 12 APP elements are discussed in this document. Inclusion of these elements ensures this document is aligned with the APLIC and USFWS (2005) guidelines. Key terms, definitions, and scientific names are provided in Appendix A *Terms Definitions, and Scientific Names*.

Table 1-1. Index to 12 APP elements, as defined by APLIC and USFWS (2005).

APP ELEMENT	LOCATION
Corporate Policies	Chapters 11, 12
Training	Chapter 11 Appendices I, J
Permit Compliance	Chapters 3, 4 Appendix B
Construction Design Standards	Chapters 5, 6, 7, 8, 9, 10, 13
Nest Management	Chapters 9, 12, 15 Appendix F
Avian Reporting System	Chapter 12 Appendix K
Risk Assessment Methodology	Chapters 14
Mortality Reduction Measures	Chapters 5, 6, 7, 8, 9, 10, 13
Avian Enhancement Options	Chapters 11
Quality Control	Chapters 11, 12, 13
Public Awareness	Chapter 11
Key Resources	Chapters 3, 4, 11, 12, 13 Appendices E, G, I, J, L

APLIC=Avian Power Line Interaction Committee, USFWS=U.S. Fish and Wildlife Service

1.2 Avian Risk Reduction Process

A successful avian program requires both proactive and reactive components. These actions must be regularly evaluated to ensure success. A continuous commitment to improvement will enhance an APP's long-term effectiveness. Figure 1-2 shows how proactive measures, reactive responses, and regular program evaluations and improvements may refocus avian protection efforts for maximum effectiveness. As lessons are learned during APP implementation, the APP evolves to improve future strategies.

A proactive measure is implemented to avoid or minimize anticipated risk. A key proactive step to minimize avian risk includes using avian-friendly standards for new construction. Another preventive strategy is an Avian Risk Assessment (ARA) and followed by avian-friendly retrofits for hazardous structures. Other proactive measures include training, which prepares personnel to properly address avian issues, and public outreach, which builds support for an avian protection program. Finally, acquiring and maintaining permits ensures management actions are conducted according to the applicable regulatory requirements.

Reactive protocols address issues that may arise despite proactive efforts. Principal reactive techniques include actions pertaining to nest management and response to injured or dead birds, specific to regulatory framework, company permits, and agency directives. In addition, companies often implement reactive retrofits on mortality structures to prevent future issues. Detailed recordkeeping ensures accurate reporting and documents incident specifics.

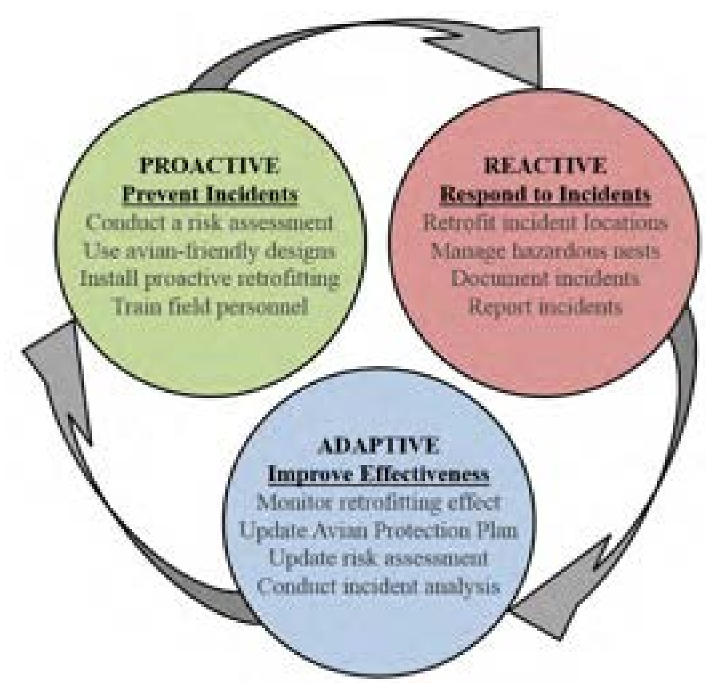

Figure 1-2. Conceptual model of an evolving avian risk-reduction program.

A program evaluation is conducted to improve the proactive and reactive components of avian risk reduction. For example, retrofit monitoring might reveal a product is being applied incorrectly, an avian protection product is incompatible with the system, or mortalities are disproportionately associated with a particular configuration or geographic area. These issues might result in updated procedures or materials lists, revised retrofit priorities, or reallocated budgets.

Program improvements must be proactively communicated to personnel through ongoing training and should be incorporated in the APP to ensure the document remains accurate and up to date. Both employees and contractors require avian training appropriate to their activities and responsibilities. In this document the term “personnel” includes both employees and contractors.

Although APPs should reflect current best industry practices, the field of avian protection is evolving rapidly. Therefore, APPs are conceived as “living documents” (APLIC 2006) and should be updated to incorporate new information, innovations in avian protection, regulatory changes, and revisions to company protocols. This APP is designed to be a dynamic, ever-evolving reference that will provide effective guidance to HCE avian-management programs for many years.

To facilitate future APP updates, this APP has been prepared in a format that will allow ongoing modifications to incorporate new information. A Change Log is provided in this document to track future APP updates. This approach provides a mechanism for demonstrating that HCE has diligently updated the document to reflect changing best practices and regulatory shifts.

1.3 Avian Protection Plan Coordinator

For programmatic questions regarding the HCE APP, please contact the APP Coordinator:

Mr. Cody O’Neil
Vice President-Glenwood District Operations
Holy Cross Energy
Office: 970-947-5466
Cell: 970-274-2715
Email: coneil@holycross.com

2 AVIAN-POWER LINE INTERACTIONS

Rural electrification of the U.S. began in the late 1800s and expanded rapidly. As wires began to span rural areas, avian collisions and electrocutions began to occur. Collisions with rural telegraph wires were first documented in 1876 (Coues 1876). Since that time, avian electrocution and power line collisions have become recognized as persistent challenges confronting the utility industry (APLIC 2006, 2012; Lehman et al. 2007; Institute of Electrical and Electronic Engineers 2010a). Nests on power lines can pose a threat to avian safety, human safety, and reliable electrical service (APLIC 2006, 2012). Bird feces also can result in infrastructure contamination, causing line faults or outages in areas heavily used by certain species (van Rooyen et al. 2002). Bird contacts can also cause fires on Rights-of-Way (Lehman and Barrett 2002, Guil et al. 2018, Dwyer et al. 2019a), substantially increasing the potential liability of electric utility operations. The following discussion outlines risks to birds from power line and infrastructure operation.

HCE owns and operates 1,100 miles of overhead distribution lines (plus 1,800 miles of underground), 100 miles of 115kV transmission lines, and 5 substations. The HCE service territory is host to a variety of birds and other wildlife frequently associated with power system interactions and outages. Therefore, it is important for HCE to evaluate the potential risk to avian species through its service territory and implement appropriate engineering controls to minimize the risk of avian interactions.

2.1 Electrocution

Overhead distribution power lines typically support one, two, or three energized phase conductors, usually labeled A, B, and C. Such lines are termed single-phase, two-phase, and three-phase power lines, respectively. Distribution power lines typically have a grounded neutral conductor to provide a return path for the electricity. Electrocution causes mortality, whereas electric shock is non-lethal, but may cause persistent injuries (Dwyer 2006); this report focuses on electrocution but acknowledges shock as an important and closely related issue. Electrocution can occur when a bird simultaneously contacts two different energized phase wires (i.e., A-B, B-C, or A-C), or one energized phase wire and one grounded contact. Avian electrocutions may cause line faults and outages that negatively impact system reliability and power quality.

North American electric utilities began to focus on raptor (i.e., bird of prey) electrocutions in the winter of 1970-1971 when numerous eagle deaths resulting from poisoning, electrocution, or shooting along power lines were recorded in Wyoming and Colorado (Olendorff et al. 1981). In 1972, the U.S. Rural Electrification Administration published Bulletin 61-10 to reduce raptor electrocutions, and several electric companies began testing less-hazardous power line designs (Olendorff et al. 1981). The new pole configurations formed the foundation for avian electrocution guidelines: *Suggested Practices for Raptor Protection on Power Lines* (Miller et al. 1975). *Suggested Practices* was revised and updated in

1981 (Olendorff et al. 1981), 1996 (APLIC 1996), and 2006 (APLIC 2006), recognizing a broader focus (e.g., nest management) and expanding to include non-raptor bird species.

Reducing power line electrocutions is a worldwide raptor conservation priority (Lehman et al. 2007, Rollan et al. 2010, Tintó et al. 2010, Eccleston and Harness 2018). In the U.S., regulatory scrutiny of avian electrocutions has increased in recent years, and the USFWS has brought federal charges against electric utilities resulting in multi-million-dollar settlements. These lawsuits are designed to encourage utilities to proactively reduce raptor mortalities (Capiello 2013). In addition to their conservation and legal liability benefits, avian-friendly lines are often more reliable because they have fewer wildlife-caused outages.

2.1.1 Distribution Power Lines

Power lines located in areas with low vegetation, flat terrain, and few natural perch sites are particularly attractive to raptors, since the poles provide structures that can be used for hunting, roosting, and nesting (Boeker 1972, Benson 1981). Understanding relationships between power pole locations and the habitat of species at risk of electrocution can be useful in identifying critical areas for retrofitting (Dwyer et al. 2016). Eagles and buteos (i.e., soaring hawks) are particularly attracted to structures where prey is abundant and few other perch sites are available (Olendorff et al. 1981, Mojica et al. 2018). Poles provide raptors a wide range of vision and greater attack speed when hunting. Additionally, poles can provide a place for raptors to broadcast territorial boundaries and offer protection from the elements (e.g., sun, shade) (Colson and Associates 1995). Smith (1985) reported diurnal perches for eagles and hawks typically were located on the outer and upper portions of utility structures, and nocturnal roost sites were located on the inner and lower structure sections. Poles also present a nesting structure; 12 North American raptor species have been documented nesting on utility structures (Blue 1996), and Osprey are well known for their proclivity for power poles (Nelson and Nelson 1976, Blue 1996).

Some North American raptor species perch on power line structures more readily than others. For example, Red-tailed Hawks actively seek power line corridors (Ansell and Smith 1980), while forest-dwelling accipiters, such as the Cooper’s Hawk and Sharp-shinned Hawk, prefer the seclusion and shelter of trees and rarely perch on power poles (Olendorff et al. 1981).

In general, Golden Eagles (Figure 2-1) are electrocuted more frequently than Bald Eagles, and Golden Eagle juveniles are more frequently electrocuted than adults (Benson 1981; Mojica et al. 2018). The hawk and owl species most commonly electrocuted in North America are the Red-tailed Hawk and Great Horned Owl, respectively (Harness 1997).

Figure 2-1. Golden Eagle.

Numerous factors contribute to electrocution potential including bird size, sex, and age; line clearances; precipitation; wind direction; and season (Mojica et al. 2018). Within species, female raptors tend to be electrocuted more often than males, probably because females are larger, and young birds tend to be electrocuted more often than adults, probably because young birds are less-practiced fliers (Harmata et al. 2001, Rubinolini et al. 2001, Dwyer and Mannan 2007). Electrocutions also tend to occur near nests (Dwyer and Mannan 2007).

Figure 2-2. Example of Golden Eagle wing span relative to clearances between phase wires on a typical three-phase distribution structure.

Bird size is an important determinant of electrocution risk (APLIC 2006, Dwyer et al. 2015), as it applies to electrical clearances on a structure. The avian electrocution risk is determined by the likelihood of a bird making simultaneous phase-to-phase (energized to energized components) or phase-to-ground (energized to non-energized and grounded component) contacts with the structure. Figure 2-2 provides an example of eagle wing size relative to clearances on electric distribution structures.

Table 2-1 provides a range of measurements for representative species susceptible to power line electrocution in North America. A large female Bald Eagle may have a 96-inch wingspan, but the outer portion of the wing is comprised of only feathers. Whereas the fleshy wrists are conductive, dry feathers are relatively good insulators (Nelson 1979) (Figure 2-3). Thus, the recommended 60 inches of horizontal separation for eagles is designed to preclude a flesh-to-flesh contact with energized wires when an eagle is taking off or landing. A bird's vertical dimension (distance from head to feet) also is important, since perched birds may be electrocuted when simultaneously contacting energized and grounded components (Olendorff et al. 1981, APLIC 2006).

Table 2-1. Dimensions for representative bird species susceptible to electrocution in North America.

SPECIES	WINGSPAN (INCHES)	WRIST-TO-WRIST (INCHES)	LENGTH (HEAD-TO-TAIL) (INCHES)	HEIGHT (HEAD-TO-FOOT) (INCHES)	WEIGHT (POUNDS)
Great Blue Heron	66-84	—[a]	38-52	20-39	5-8
Turkey Vulture	63-72	24-28	24-32	14-21	3.5-5.6
California Condor	98-118	—[a]	43-55	—[a]	14.4
Osprey	54-72	28	20-26	—[a]	2.2-4.2
Bald Eagle	66-96	31–36	27-37	18-28	4.4-14
Golden Eagle	72-90	31–42	27-38	18-26	6.6-14
Swainson's Hawk	44-54	16-23	17-22	13-16	1.3-2.7
Red-tailed Hawk	42-58	14-23	17-25	13.5-22	1.5-3.5
Ferruginous Hawk	52-60	22	20-27	19	2.0-4.5
Rough-legged Hawk	48-56	—[a]	18-23	—[a]	1.6-3.1
Great Horned Owl	36-60	17–25	18-25	12-16	3-1-5.5
American Crow	33-40	—[a]	16-21	—[a]	1.0
Common Raven	46-56	—[a]	21.5-27	16	2.5-3.7
Black-billed Magpie	22-25	—[a]	17.7-23.6	—[a]	0.5

Adapted from Avian Power Line Interaction Committee 2006, The Birds of North America Online 2017, Clark and Wheeler 2001, Cornell Lab of Ornithology 2011, Rocky Mountain Raptor Program 2011, Sibley 2014, Terres 1991, Wheeler 2003, Wheeler and Clark 2003. See also Dwyer et al. (2015) for additional species and measurements.
[a]Information not available

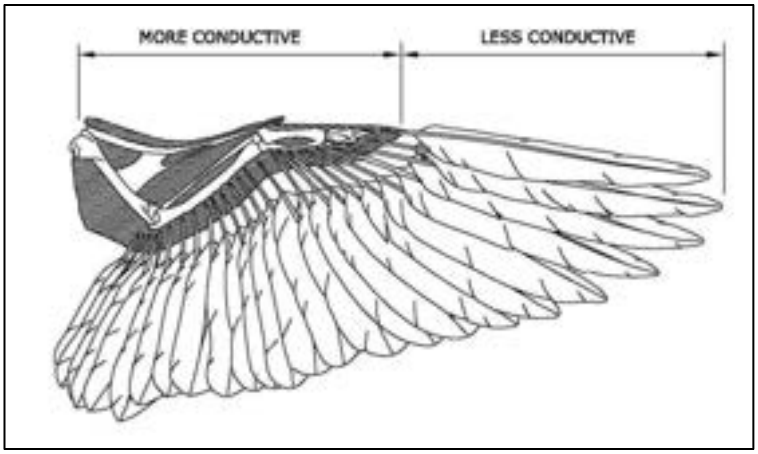

Figure 2-3. The outer portion of the wing is composed of flight feathers that provide a relatively high level of insulation when dry (after Proctor and Lynch 1993).

Not all distribution poles are equally hazardous to large birds, and models have been developed to predict problematic configurations (Schomburg 2003, Dwyer et al. 2014). Harness and Wilson (2001) found that rural three-phase transformer banks accounted for less than 3% of all poles in the western U.S. but were responsible for 22% of detected raptor electrocutions. Poles with little separation between energized and grounded components (i.e., phase-to-phase or phase-to-ground) are particularly hazardous, especially when equipment (e.g., power transformers) is mounted on the pole (Figure 2-4) (Kemper et al. 2013).

Figure 2-4. Complex transformer pole with many jumper wires, and little separation between energized (red) and grounded (green) contacts.

Jumper wires connect primary circuits to one another, and stinger wires connect primary conductors to ancillary equipment. The total number of jumpers and stingers on any pole is a useful index of the pole’s complexity. In separate studies and disparate environments, Dwyer et al. (2014) and Harness et al. (2013) found that the number of jumper and stinger wires was the best predictor of whether a pole was at elevated risk of avian electrocution. Many power pole designs are avian friendly, however, and pose little or no risk to birds (Figure 2-5).

Figure 2-5. Hawk-friendly pole has adequate separation between energized (red) and grounded (green) components.

Other environmental and behavioral factors also influence electrocution risk. Inclement weather is a major factor in eagle electrocutions (Benson 1981). Raptors with wet feathers are more vulnerable to electrocution above 5 kilovolts (kV) (Nelson 1979, Olendorff et al. 1981), and may have greater difficulty navigating around energized conductors when flying to and from poles.

Wind direction relative to utility crossarm orientation affects the probability of electrocution (Boeker 1972, Nelson and Nelson 1976, Nelson 1977, Benson 1981). Crossarms mounted perpendicular to the wind allow raptors to soar away from the structure and wires. Raptors taking off from crossarms mounted parallel to prevailing winds can more easily be blown into energized conductors or jumper wires. Wind presumably affects the flight of inexperienced fledgling birds more than experienced birds, which are better able to compensate and remain in control.

Raptor electrocutions often fluctuate seasonally. Seasonal precipitation or storm events may increase the electrocution risk. In the winter, power line structures provide sit-and-wait hunting perches, allowing raptors to seek prey without expending energy hunting in flight (Benson 1981). During the spring, raptors utilize pole structures as nesting sites, or by using poles as locations to transfer prey between adults and young (Dwyer and Mannan 2007), increasing their exposure to electrocution. Seasonal fluctuations of prey abundance also may influence the number of raptors electrocuted in a particular area (Benson 1981, Olendorff et al. 1981).

Behavior can affect the electrocution risk with power lines. Nesting, courtship, and territorial defense can make raptors more susceptible to electrocution. Breeding birds carrying nesting materials or prey items back to the nest also may be vulnerable to electrocution (APLIC 2006), since these items may bridge the gap between energized components on the structure (Figure 2-6). Species that use poles in social displays can be electrocuted when perching together (Dwyer and Bednarz 2011).

Figure 2-6. Red-tailed Hawk and snake with burn mark, indicating electrocution.

2.1.2 Transmission Power Lines

Avian electrocution risk is lower for transmission structures than for distribution poles (APLIC 2006). Utility design standards must adhere to Section 235 of the National Electrical Safety Code (NESC), which sets the standard for minimum horizontal and vertical clearances for wires on the same supporting structure. The NESC minimum clearances are designed for human safety, but at higher transmission voltages they also protect birds by providing increased phase-to-phase or phase-to-ground separation.

Although many transmission configurations provide avian-friendly spacing, not all do. Avian electrocution is most likely to occur on lower-voltage (e.g., 69kV) transmission lines supported by steel or grounded concrete poles. The impact of grounded structures on avian risk has studied internationally (Harness et al. 2013, Martín et al. 2015, Demeter et al. 2018, Dwyer et al. 2019b), and is increasingly relevant in North America as steel and concrete poles become more common. Ground wires, grounded guy wires, and grounded hardware also can comprise electrocution hazards on lower-voltage wood transmission structures (Figure 2-7).

Figure 2-7. Steel transmission structure with little separation between energized (red) and grounded (green) contacts.

2.1.3 Substations

The Electric Power Research Institute (EPRI) has determined that wildlife electrocutions within substations can result in costly outages affecting many customers (EPRI 2016a). Substation outages also can damage equipment and may require costly environmental cleanup (e.g., spilled oil from a ruptured transformer). Cost and lost revenue from a single outage can exceed $200,000 (Heck and Sutherland 2013) and can be even higher if the substation is destroyed by fire. Some utilities have noticed an increase in substation outages in recent decades. In southern Canada, up to 25% of substation outages are associated with bird and other wildlife electrocutions (Heck and Sutherland 2013).

Substations have numerous energized contacts with the potential to electrocute birds and precipitate an outage. According to the EPRI study *Distribution Wildlife and Pest Control* (EPRI 2001), most animal problems occur on the distribution ("low") side of substations, which have smaller clearances than the transmission ("high") side. The most problematic substation facilities are breakers, reclosers, bus conductors, and power transformers (EPRI 2001).

Birds are frequently implicated in substation outages in the U.S. (Distribution Systems Testing Application and Research 2005). Birds and other wildlife enter substations for several reasons: to forage, avoid predators, seek shelter, build nests, or establish/broadcast territories. Birds may be attracted by substation landscaping that includes fruit- and nut-bearing trees (EPRI 2001, 2016). Birds also may be attracted to substations because equipment gives off heat, and crevices and cavities are potential nest sites (Figure 2-8).

Figure 2-8. Nesting birds may attract larger predators to a substation, increasing the electrocution risk.

Not only can nesting birds be at risk of electrocution, they can attract larger animals such as squirrels, raccoons, and weasels that enter substations and become electrocuted while trying to take eggs or young out of their nests (Heck and Sutherland 2013). Some predators, such as snakes, may be large enough to bridge the gap between high-side contacts (EPRI 2001). Large and/or active birds are most vulnerable to electrocution. Nesting and foraging within a substation significantly increase the electrocution risk to both adult birds and young (Figure 2-9). Avian electrocutions are believed to be most common in the spring when birds are nesting, and in the fall when bird populations are concentrated for migration (EPRI 2001).

Figure 2-9. Nests in substation transformer cooling fins (EPRI).

Avian electrocution risk at substations is closely associated with surrounding habitats (EPRI 2001). Substations are most attractive to birds in landscapes lacking other suitable nesting areas. Substations near landfills may have problems with avian outages due to the high level of activity among species attracted to landfills such as crows and ravens (Heck and Sutherland 2013), and gulls. Avian electrocutions tend to recur at the same outage-prone substations until the underlying issues are addressed (EPRI 2001, Heck and Sutherland 2013).

2.2 Collisions

Little research was conducted on avian collisions with overhead power lines until the late 1970s, when studies demonstrated avian-power line collisions are not uncommon in some locations. Well-documented collisions for federally endangered Whooping Cranes increased public awareness of the issue. In 1989, representatives of the electric utility industry formed APLIC to address Whooping Crane-power line collisions (APLIC 2012). Several years later, APLIC published *Mitigating Bird Collisions with Power Lines*: *The State of the Art in 1994* (APLIC 1994). The manual was updated in 2012 under the title *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2012).

Birds may face collision threats from many sources including power lines, communication towers, guy wires, fences, wind turbines, cars, aircraft, and trains. While not all power lines pose a major collision risk, specific line spans with multiple overlapping risk factors can be problematic. Avian-power line collision risk varies as a function of bird species and populations, nearby habitat, and line design, (Bevanger and Brøseth 2001, Mojica et al. 2009, Rollan et al. 2010, APLIC 2012). Specific factors affecting collision risk include bird size, maneuverability, and flight behavior; avian habitat utilization near power lines; and utility structure type and location (APLIC 2012, Bernardino et al. 2018).

Bird size, maneuverability, and flight behavior are particularly important in evaluating a species' susceptibility to power line collisions (Jenkins et al. 2011, APLIC 2012, Bernardino et al. 2018). Large, heavy-bodied birds (e.g., herons, cranes, swans, geese, pelicans) are particularly vulnerable to power line collisions. These species' large wingspans and poor maneuverability place them at elevated risk of collision (Figure 2-10). Although relatively small and maneuverable, many species of ducks (Figure 2-11) also are vulnerable to collision because of their high flight speed, low altitude, and flocking behavior. Flocking birds such as waterfowl, cranes, and pelicans can be at increased collision risk because their view may be obscured by other members of the flock (Figure 2-12). Finally, the less-controlled flight of juvenile or immature birds is more likely to result in collision than the flight of an adult (APLIC 2012).

Figure 2-10. American White Pelican near a lattice tower transmission line.

Figure 2-11. American Wigeon near a monopole transmission line.

Figure 2-12. Sandhill Cranes approaching a transmission power line.

Historically, raptors have been considered to be at relatively low risk for power line collisions; however, reports of raptor mortality from power line collisions (Figure 2-13) suggest this occurrence may be more common than previously recognized (Olendorff and Lehman 1986, Harness et al. 2003, Mojica et al. 2009). Although some of the collisions reported in these studies were directly observed (e.g., Murphy et al. 2009), power line collision was inferred as the cause of death in other accounts based on carcass location and the nature of the injuries (Heck 2007) (Figure 2-13). In another study, raptor collision risk was identified as negligible, even within a migration corridor used by thousands of raptors (Luzenski et al. 2016).

Figure 2-13. Bald Eagle carcass under distribution overhead power lines.

Avian collision generally emerges as persistent issue in localized areas with overhead wires, high-quality habitat, and concentrated use by species with poor maneuverability (Heck 2007). The proximity of power lines to landing and take-off locations can be critical (Stehn and Wassenich 2008). Collisions with power lines frequently occur during regular flights within a day-use area, particularly in ecologically sensitive areas such as wetlands, lakes, or rivers, where birds congregate seasonally (e.g., breeding, migrating, wintering) to nest, forage, stage, or roost (APLIC 2006). A power line bisecting these areas (e.g., a line located between a feeding area and a roosting site) can be especially problematic, particularly when only a short distance separates the use areas and birds make the short flights at a critical height. Birds crossing power lines at low altitudes several times a day are especially susceptible to collision. Collision risk is exacerbated by low-light conditions, fog, or inclement weather because the lines become more difficult to see and avoid (Figure 2-14 and Figure 2-15).

Figure 2-14. Trumpeter Swans approaching power lines during low-light conditions.

Figure 2-15. Transmission line partially obscured by fog.

Recently, collision risks during migration have become a focus of study (Luzenski et al. 2016, Murphy et al. 2016a, b), with collisions being found in large numbers and unexpected locations (Rogers et al. 2014). Although the migratory flight altitudes of most bird species are higher than power lines (both distribution and transmission voltages), migrating birds can be at risk of line collision during stopovers, particularly in areas where large flocks congregate.

Figure 2-16. OHS wires are less visible than conductors.

Overhead shield or static (OHS) wires often are located above conductors on transmission lines. These wires are grounded and are used to prevent lightning from striking the conductors. The OHS wire is a smaller-diameter wire than transmission conductors, making the OHS wire more difficult to see (Figure 2-16). In published field observations of avian-power line collisions (Crowder 2000, Pandey et al. 2007, Murphy et al. 2016b, Martin and Shaw 2010, APLIC 2012), birds often appear to see the larger conductors, adjust their flight altitude upward to avoid them, and subsequently collide with the smaller-diameter and less-visible OHS wire.

Following a 2-year study, Faanes (1987) reported 85% of 46 (Year 1) and 93% of 102 (Year 2) observed transmission line collisions involved the OHS wires. Murphy et al. (2009) reported 65% of 71 observed avian collisions involved the OHS wires. Pandey et al. (2008) used the *Bird Strike Indicator* to remotely monitor avian collisions on a complex line with 10 wires (Figure 2-17) and reported 68% of 154 avian collisions involved the OHS wires. Dwyer (2018) found that 94% of 48 observed Sandhill Crane collisions involved overhead shield wires at night. Similar to OHS wires on transmission lines, overhead neutral wires on distribution lines typically are smaller than the primary conductors and may increase collision risks.

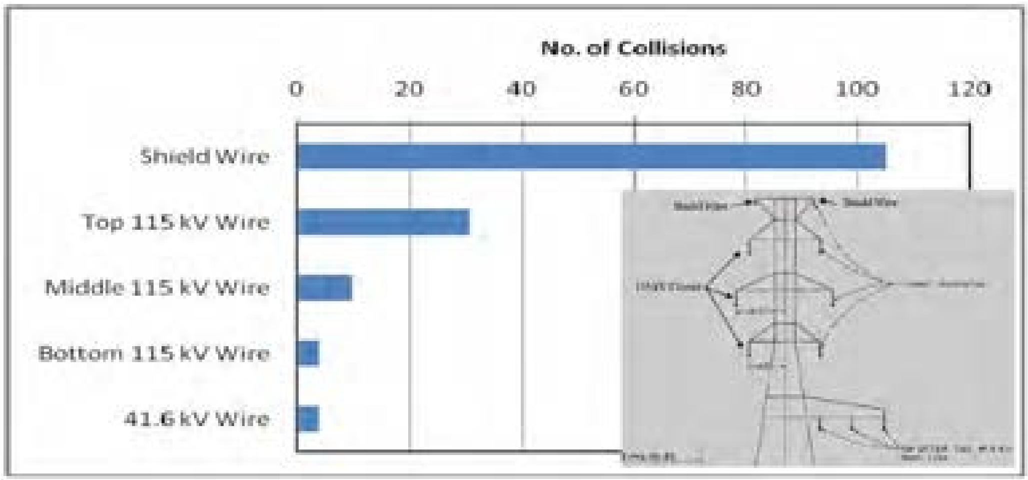

Figure 2-17. Distribution of collisions recorded by Pandey et al. (2008) using the *Bird Strike Indicator* (reprinted with permission).

The arrangement of conductors also affects collision risk. Figure 2-18 shows the difference between a horizontal and vertical configuration. A bird crossing the vertical configuration (right) would encounter a wire at four different flight altitudes (wire planes), whereas the same bird crossing the horizontal configuration (left) would encounter a wire at just two flight altitudes. Therefore, vertical configurations pose a greater avian collision risk than horizontal configurations, other factors being equal.

Topography and vegetation screening can influence avian collision risk with overhead lines (Bevanger and Brøseth 2001). Topographic features (e.g., rock outcroppings) and trees along a right-of-way (ROW) can form natural barriers (Figure 2-19) (APLIC 2012). Alternatively, topography can concentrate birds in potentially hazardous flight corridors (Figure 2-20) (Lucas et al. 2008).

Figure 2-18. Horizontal transmission configuration (left structure) and vertical transmission configuration (right structure).

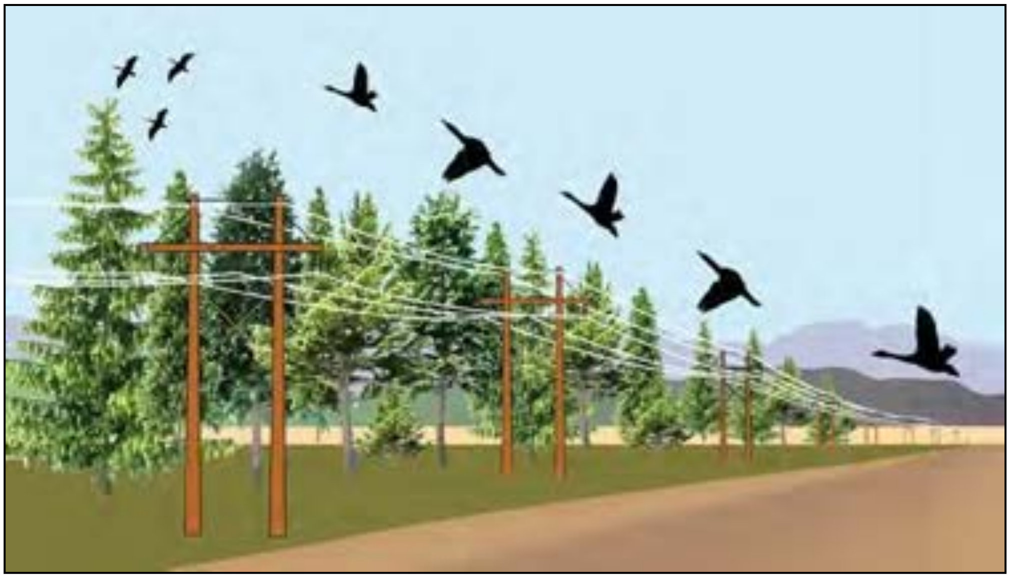

Figure 2-19. Vegetation can ensure flying birds have sufficient clearance above a power line, minimizing collision risk.

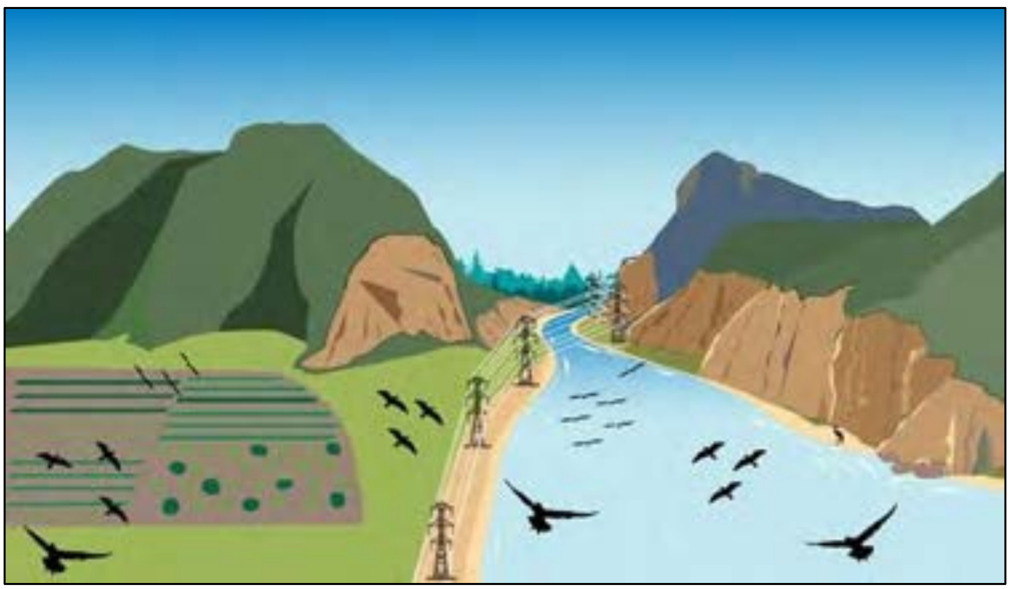

Figure 2-20. Topography can concentrate birds in potentially hazardous flight corridors.

2.3 Nesting

A nest is any readily identifiable structure built, maintained, or occupied for incubating eggs and rearing young. Birds build nests or use substrates on cliff faces; on the ground; in trees and cavities; and on manmade structures such as power poles, substations, aboveground tanks, and buildings. Some bird species frequently use power line structures for nesting, especially in open areas with limited elevated nesting substrates. Both active and inactive nests may be protected by federal and state laws, depending on the species.

2.3.1 Stick Nests

Stick nests can increase an operational risk to electrical systems (Figure 2-21, Figure 2-22, Figure 2-23, and Figure 2-24). Nesting materials, debris, foreign objects, bird excrement, and prey remains can cause power outages, flashovers, pole fires, equipment contamination, bird electrocutions, and loss of eggs or young. Nest removal alone often does not solve the problem, however, because many bird species will rebuild at a preferred site, especially if they previously fledged young at that location (Henny and Kaiser 1996).

Figure 2-21. Osprey nest affecting the viability of a wood distribution structure.

Figure 2-22. Swainson's Hawk nest on crossarm between perch discouragers.

Figure 2-23. Common Raven nest on a transformer bank.

Figure 2-24. Bald Eagle nest on a steel lattice transmission structure.

2.3.2 Cavity Nests

Woodpecker cavity nests and roosting holes are the most likely to cause structural problems for wood poles (Figure 2-25) (Harness and Walters 2005). Large woodpecker holes can lead to catastrophic pole failure. Along with reliability issues and economic losses, cavity nests also create safety risks for climbing linemen. A nest cavity also can harbor bees, wasps, snakes, squirrels, or other birds, creating an additional maintenance risk for line personnel. Woodpeckers constitute a challenge to inspection and maintenance crews because they can quickly inflict extensive pole damage (Figure 2-26).

Cavity nests cause indirect damage to poles by introducing moisture, which accelerates wood decay and reduces pole integrity. Large cavities may require pole restoration or replacement. To date, no woodpecker deterrent has been proven effective, practical, and economical for electric utilities (EPRI 2014).

Figure 2-25. Severe damage resulting from Pileated Woodpecker nesting or roosting cavity (Ron Pope).

Figure 2-26. Pileated Woodpecker excavating a nesting or roosting cavity.

2.3.3 Ground Nests

Some ground-nesting bird species may nest within transmission line ROWs and substations (Figure 2-27). These nests may be difficult to detect. Because most active (i.e., containing eggs or young) ground nests are protected, they have the potential to affect project construction or maintenance activities (e.g., vegetation management) in the immediate vicinity (EPRI 2017).

Figure 2-27. Killdeer nest within a substation.

2.4 Feces

Bird feces can cause maintenance issues and system outages through two mechanisms: streamers and pollution. During a fault investigation, it is essential to distinguish between a streamer and a pollution outage because the retrofitting solution is specific to the mode of failure.

2.4.1 Streamers

A streamer is long stream of excrement released by large birds (Figure 2-28) (Burnham 1995, van Rooyen et al. 2002, Zhou et al. 2009). An outage may occur when a streamer bridges the gap between energized and grounded components, or the streamer fills the air gap such that it facilitates arcing (van Rooyen et al. 2003). Streamers can be launched by either perched or flying birds; physiologically, only large birds can cause streamer outages.

Figure 2-28. An Osprey producing a streamer from the edge of a nest (Shawn Carey).

The species and number of birds, and their voiding behavior, determine whether streamers are a concern. Streamer faults often propagate vertically towards the tower. Although signs of such an outage are difficult to detect, small burn marks may be apparent on the structure or energized hardware. Signs of a phase-to-phase streamer outage may be limited to scorch marks on the conductors. Streamer outages typically exhibit a late evening or an early morning peak (Van Rooyen et al. 2003), associated with the voiding habits of large birds.

2.4.2 Pollution

Bird pollution occurs when feces build up on the insulators from repeated deposits (Figure 2-29). The feces undermine the insulator's material properties and may cause a phase-to-ground flashover across the surface of the insulator string, especially during wet conditions. Insulators covered with bird feces (EPRI 2006) also can result in a fault tracking across the insulator string; this occurs when excrement builds up on the insulators and rain moistens (but does not remove) the feces, thereby increasing conductivity. Burn marks can be visible across insulator sheds and on the conductor hardware. Pollution outages can be caused by birds of any size and are most commonly associated with flocking birds repeatedly perching above an insulator.

Figure 2-29. Accumulated avian excrement (bird pollution) on an insulator (Arizona Public Service).

3 REGULATORY CONTEXT

Electric utilities are subject to a variety of environmental regulations issued and/or managed by multiple state and federal agencies. A brief summary of each component of the legal framework is provided below.

3.1 Federal Regulations

The three primary federal avian protection laws in the U.S. are as follows:

1. Migratory Bird Treaty Act (MBTA)
2. Bald and Golden Eagle Protection Act (BGEPA)
3. Endangered Species Act (ESA)

Protections and permitting requirements depend on the species of bird. Table 3-1 shows the protections afforded different categories of bird species.

Table 3-1. Applicability by bird category.

PROTECTION	EAGLES	FEDERALLY LISTED T/E	STATE-LISTED T/E[a]	MOST SPECIES[b]	UPLAND GAME SPECIES	NON-NATIVE SPECIES
MBTA	✓	✓		✓		
BGEPA	✓					
ESA		✓				
Colorado regulations	✓	✓	✓	✓	✓	

MBTA=Migratory Bird Treaty Act, BGEPA=Bald and Golden Eagle Protection Act, ESA=Endangered Species Act, T/E=threatened or endangered.
[a]Some state-listed species also may be covered by the MBTA, BGEPA, and/or ESA.
[b]Encompasses species not regulated under BGEPA or ESA.

The USFWS Region 6 (Figure 3-1) Office of Law Enforcement is responsible for legal compliance and investigations within Colorado. Utility personnel must be aware of avian protection laws in order to comply with them. This section discusses federal avian protection laws in detail.

Figure 3-1. USFWS Region 6 Includes Colorado.

3.1.1 Migratory Bird Treaty Act (MBTA)

The MBTA (16 United States Code 703-712) protects most birds in the U.S. The MBTA does not apply to non-native species (e.g., House Sparrow, European Starling, Rock Pigeon, Eurasian Collared-Dove) and upland game species (e.g., Wild Turkey, various grouse and quail species). See 50 Code of Federal Regulations (CFR) Parts 10 and 21 for a full list of birds protected under the MBTA: http://www.gpo.gov/fdsys/pkg/FR-2013-11-01/pdf/2013-26061.pdf (USFWS 2013). Refer to Federal Register (FR) 12710, Volume 70, No. 49 for a complete list of non-native, human-introduced bird species not covered under the MBTA.

The MBTA affords protection to migratory birds and their parts, nests, and eggs. The MBTA states that, unless permitted by regulation, it is unlawful to “pursue, hunt, take, capture, kill, possess, sell, barter, purchase, ship, export, or import any migratory birds alive or dead, or any part, nests, eggs, or products thereof.”

The MBTA is a strict liability statute, meaning liability without fault. No intent to violate the law, or knowledge of the law must be proven. Penalties for each violation may include fines up to $15,000 per individual or organization, up to 6 months imprisonment, or both. Each dead or injured bird and each destroyed egg or active nest may count as a separate violation. The MBTA statute provides for criminal prosecution, but not for civil suits.

3.1.2 Bald and Golden Eagle Protection Act (BGEPA)

Bald Eagles and Golden Eagles, their eggs, and their nests receive protection under the MBTA and the BGEPA (16 United States Code 668-668d, 54 Stat. 250 and Amendments). The BGEPA states: “no person shall take, possess, sell, purchase, barter, offer for sale, transport, export, or import any Bald or Golden Eagle alive or dead, or any part, nests or eggs, thereof without a valid permit to do so.”

The BGEPA definition of the term “take” is to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The USFWS published the final rule in 72 FR 31132 on 5 June 2007 defining the term “disturb” to mean “to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (USFWS 2007a).

The USFWS published the final rule (74 FR 46836) on 11 September 2009 authorizing the issuance of permits to take Bald Eagles and Golden Eagles on a limited basis (USFWS 2009). Accordingly, 50 CFR 22.26 governs the issuance of permits to take Bald Eagles and Golden Eagles where the take is associated with, but not the purpose of, an activity, and the take cannot practicably be avoided. Five permit application criteria apply to this federal evaluation process, which encompass whether: (1) take is likely to occur, (2) the take is compatible with the preservation of the Bald Eagle and Golden Eagle, (3) applicable avoidance and minimization measures have been proposed, (4) the permit would preclude higher-priority decisions, and (5) additional factors apply. Most take authorized under this section would be in the form of disturbance.

The USFWS regulations set forth in 50 CFR 22.27 govern the issuance of permits for removing eagle nests where: (1) it is necessary to alleviate a safety emergency to people or eagles, (2) it is necessary to ensure public health and safety, (3) the nest prevents the use of a human-engineered structure, or (4) the activity or mitigation for the activity will provide a net benefit to eagles. All eagle nests (active and inactive) are protected, as detailed in Appendix B *Descriptions of Additional Federal Avian Permits*. Permit applications for either individual (i.e., one-time) or programmatic (i.e., recurring) eagle take are discussed in Chapter 4 *Avian Permitting*.

Conviction under the BGEPA requires the government to establish that the conduct was carried out knowingly, or with wanton disregard for the consequences of the action. Maximum civil penalties for single First Offense – Class A Misdemeanor violation of the BGEPA include fines up to $200,000 per individual or organization, up to 1 year of imprisonment, or both. The maximum criminal penalties for a Second Offense – Class E Felony violation of the BGEPA include fines up to $500,000 per individual or organization, up to 2 years imprisonment, or both. Vehicles and equipment also may be forfeited for violations. Under the BGEPA, each dead or injured bird or destroyed egg or nest may count as a separate violation, and penalties could be cumulative. The BGEPA statute provides for criminal prosecution, but not for civil suits.

3.1.3 Endangered Species Act (ESA)

The ESA (16 United States Code 1531-1544) protects fish, wildlife, and plants that are federally listed as threatened or endangered (T/E). Familiarity with federally species is important, particularly for planning purposes. A list of federally listed species is provided in Chapter 11.

The ESA makes it illegal to import, export, take, transport, sell, purchase, or receive in interstate or foreign commerce any living or dead species listed as T/E. “Take” under the ESA (50 CFR 17.3) is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct with a listed species. “Harm” is further defined by the USFWS to include significant habitat modification or degradation resulting in death or injury to a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined by the USFWS to include any intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns including, but not limited to, breeding, feeding, or sheltering.

The ESA is a strict liability statute, meaning liability without fault. No intent to violate the law, or knowledge of the law must be proven. Maximum penalties for misdemeanor violations include fines up to $200,000 per individual or organization, up to 1 year of imprisonment, or both, per violation. Under the ESA, each dead or injured bird, destroyed egg or nest, or incidence of significant habitat degradation, may count as a separate violation. Vehicles and equipment also can be confiscated.

The prohibition of take under the ESA may be enforced the USFWS or by citizen suit. Private activities may be enjoined by either USFWS enforcement or by citizen suit.

3.2 Enforcement Relative to “Take”

The MBTA does not have an "incidental take" provision; therefore, unplanned, accidental, or incidental fatalities of MBTA-protected species may be considered a take and could result in prosecution. In December 2017, the U.S. Department of the Interior (DOI) released Solicitor’s Opinion M-37050 (M-Opinion) asserting that the MBTA does not prohibit incidental take, and that the DOI would not prosecute avian mortalities that resulted from otherwise legal activities, such as power transmission and distribution, wind generation, or oil and gas extraction (DOI 2017, Appendix C *DOI Solicitor’s Opinion M-37050*). In response to the M-Opinion, the USFWS released new incidental take guidance for migratory birds that is applicable to power companies, other infrastructure owners/operators, and citizens (USFWS 2018a, Appendix D *USFWS Guidance Memorandum-Guidance on M-Opinion*). The defining characteristic of "incidental" take of a bird, egg, or active (containing eggs or young) nest is the *purpose* of the activity causing take.

It is important to note that the M-Opinion and policy do not change the underlying law, nor are they permanent. A future M-Opinion could reverse the 2017 M-Opinion, just as the 2017 M-Opinion reversed a 2016 M-Opinion that incidental take was, indeed, prohibited under the MBTA. Furthermore, federal District and Circuit Courts have interpreted the MBTA differently, leading to a patchwork of legal precedent. In Colorado, the 10th Circuit Court of Appeals established precedent in Apollo Energies' 2010 appeal that the MBTA does, in fact, prohibit incidental take. MBTA language around incidental take prohibition is ambiguous, and legal interpretation will vary until the law is revised and clarified by Congress or ruled on by the Supreme Court.

The status of the BGEPA and the ESA are unaffected by the 2017 M-Opinion. The BGEPA has processes for issuing "incidental" (non-purposeful) eagle take permits. An Incidental Take Permit is designed for specific eagles or nests that may be disturbed by a known and planned event. A Programmatic Eagle Take Permit is designed to cover multiple takes at some undetermined time in the future that occur as a foreseeable consequence of normal operations. Eagle Nest Take permits also are available.

Under the ESA, sections 7 and 10 have provisions to allow for the take of an individual bird incidental to an otherwise lawful and permitted activity. Take encompasses direct and indirect mortality, harm, and harassment. "Harm" is defined as an act that kills or injures wildlife. Such an act may include significant habitat modification or degradation that kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harassment" is defined as an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns such as breeding, feeding, or sheltering (50 CFR 17.4).

According to the federal *Avian Protection Plan Guidelines* (APLIC and USFWS 2005), a company implementing an APP will greatly reduce avian fatality risks, as well as the risk of enforcement under the MBTA, BGEPA, or ESA. The guidelines state, "While the Service generally does not authorize take under these Acts, the USFWS realizes that some birds may be killed even if all reasonable measures to avoid the take are implemented. USFWS Office of Law Enforcement carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries who seek to minimize their impacts on migratory birds. Unless the take is authorized, it is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the Office of Law Enforcement focuses its resources on those individuals, companies, or agencies that take migratory birds disregard for their actions and the law, especially when conservation measures have been developed but are not properly implemented." Because the 2017 M-Opinion does not apply to the BGEPA, it is presumed that the USFWS will continue to use prosecutorial discretion with respect to eagle mortality associated with utility infrastructure.

3.3 Colorado Regulations and Guidelines

States maintain statutes and regulations protecting certain wildlife species, although these regulations vary widely among states. Colorado Parks and Wildlife Department (CPW) is the state agency responsible for avian management and enforcement. CPW does not allow the possession or salvage of native species (alive or dead) or their nests without a permit authorizing the activity or coordination with the department.

In addition to protecting federally protected species within its borders, Colorado also identifies and protects state-listed T/E species. See Section 11.5 *Sensitive Species* for state-listed T/E bird species potentially found in the service territory. Colorado also maintains a list of Species of Special Concern—this designation reflects the state's conservation priorities but does not have regulatory significance for protections or permitting.

Certain upland game species like Northern Bobwhite and Greater Sage-Grouse are not protected under the MBTA but are regulated by state wildlife laws. Non-native species such as the House Sparrow, European Starling, Rock Pigeon (formerly Rock Dove or Common Pigeon), Eurasian Collared-Dove, and Monk Parakeet are not protected under either federal or Colorado law.

3.4 Local Regulations

Local and tribal governments can further regulate certain activities potentially impacting wildlife species covered by state and federal statutes. Generally, these activities include land-development regulations or ordinances applicable to power line siting and construction. Local regulations and tribal law are beyond the scope of this document.

4 AVIAN PERMITTING

Birds and their nests may be encountered during daily utility activities. This chapter provides an overview of the permits that may be required for carcass salvage, nest relocation, nest removal, or transportation of dead or injured birds. The permits discussed in this chapter are governed by the federal, state, and local regulatory framework summarized in Chapter 3 *Regulatory Context*. Activities involving possession of bird carcasses, potential disturbance of birds, or removal of nests must be carried out in accordance with federal and state law. All employees and contractors are responsible for familiarity and compliance with the APP, as well as awareness of the activities that may impact birds.

HCE does not currently hold any avian-related federal permits. Prior to any avian management activity or avian response, the APP Coordinator is responsible for contacting the USFWS and CPW to obtain necessary permits or guidance (see Appendix E *Agency and Avian Rehabilitator Contact List*) or determining that emergency demands an immediate response. Federal and state permit requirements are addressed separately in succeeding sections. Any contact with a federal or state wildlife officer should be handled as a regulatory inspection, and employees must follow internal procedures during such interactions. Avian policies are described in Chapter 12 *Incident Response Protocols*.

4.1 Federal Permits Relating to Avian Interactions

The USFWS is responsible for all permits issued under the authority of the MBTA, BGEPA, or ESA. The USFWS Migratory Birds office is responsible for issuing permits, whereas the USFWS Environmental Services office is generally responsible for risk assessment and mitigation. This section and Table 4-1 provide an overview of federal permits available through the USFWS to address the potential avian interactions a utility might encounter. Federal law gives the USFWS broad discretion in determining the correct permitting mechanism for an action requiring formal authorization. The APP Coordinator is responsible contacting the USFWS to obtain the necessary permits and/or guidance prior to taking any such action.

If a utility must regularly move nests or remove and dispose of carcasses, the utility should consider obtaining a Special Purpose Utility Permit (SPUT) under the MBTA. The activities authorized by a SPUT are summarized in Section 4.1.1 (USFWS 2014) and are described—along with permit requirements—in the following section. The SPUT is a programmatic permit authorizing ongoing and repeated actions. Individual permits for specific one-time actions are also available on a case-by-case basis. These permits are summarized and excerpted in Appendix B. USFWS permit applications and requirements are periodically updated; current versions may be accessed at: https://www.fws.gov/service/3-200-81-special-purpose-utility

Table 4-1. Actions most closely associated with each federal permit (authorized actions vary significantly depending on specific permit stipulations).

ACTIONS ALLOWED FOR EACH PERMIT*	FEDERAL								
	Special Purpose Utility	Special Purpose Salvage	Depredation	Recovery-Native Species	Eagle Nest Take	Golden Eagle Nest Take During Resource Development	Eagle Incidental Take	Special Purpose Miscellaneous	No Federal Permit Required
Permit Number	MBTA 3-200-81	MBTA 3-200-10a	MBTA 3-200-13	ESA 3-200-55	BGEPA 3-200-72	BGEPA 3-200-18	BGEPA 3-200-71	MBTA 3-200-10f	--
Recover a carcass									
MBTA[1]	✓	✓							
Non-MBTA[2]									✓
T/E									
Eagle									
Remove a nest (inactive)									
MBTA[1]									✓
Non-MBTA[2]									✓
T/E				✓					
Eagle[3]					✓	✓	✓		
Remove a nest (active)									
MBTA[1]	✓		✓						
Non-MBTA[2]									✓
T/E				✓					
Eagle[3]					✓		✓		
Relocate a nest (inactive)									
MBTA[1]	✓							✓	
Non-MBTA[2]									✓
T/E				✓					
Eagle[3]					✓		✓		
Relocate a nest (active)									
MBTA[1]	✓[4]		✓						
Non-MBTA[2]									✓
T/E				✓					
Eagle[3]					✓		✓		

ACTIONS ALLOWED FOR EACH PERMIT*	FEDERAL								
	SPECIAL PURPOSE UTILITY	SPECIAL PURPOSE SALVAGE	DEPREDATION	RECOVERY-NATIVE SPECIES	EAGLE NEST TAKE	GOLDEN EAGLE NEST TAKE DURING RESOURCE DEVELOPMENT	EAGLE INCIDENTAL TAKE	SPECIAL PURPOSE MISCELLANEOUS	NO FEDERAL PERMIT REQUIRED
Permit Number	MBTA 3-200-81	MBTA 3-200-10a	MBTA 3-200-13	ESA 3-200-55	BGEPA 3-200-72	BGEPA 3-200-18	BGEPA 3-200-71	MBTA 3-200-10f	--
Transport severely injured birds									
MBTA1									✓5
Non-MBTA2									✓5
T/E									✓5
Eagle									✓5

BGEPA=Bald and Golden Eagle Protection Act, ESA=Endangered Species Act, MBTA=Migratory Bird Treaty Act, T/E=federally threatened or endangered.

*The U.S. Fish and Wildlife Service (USFWS) has a high degree of flexibility in permitting. The first step in obtaining a federal permit is consultation with the agency. USFWS personnel will determine the most appropriate permitting mechanism for a proposed action.

1Species protected by the MBTA.

2Non-MBTA upland game species include (but are not limited to) grouse, pheasant, quail, turkey, and partridge. Non-MBTA non-native species include (but are not limited to) House Sparrow, European Starling, Rock Pigeon, Eurasian Collared-Dove, and Monk Parakeet.

3Contact the USFWS Migratory Bird Permit Office to determine whether an eagle nest is active.

4An active nest would be relocated on a case-by-case basis; coordination with regional USFWS office is recommended.

5Sick or injured migratory birds may be transferred to a licensed veterinarian or rehabilitator under the "Good Samaritan clause" of the MBTA (USFWS 2004). A USFWS Office of Law Enforcement Agent must be contacted before any federally listed T/E species or eagle is touched or moved. For instructions on safely transporting a sick or injured bird, see Chapter 12 of this Avian Protection Plan or contact the USFWS, Colorado Parks and Wildlife, or a licensed veterinarian or rehabilitator.

Experiences vary, but federal permitting can be a demanding process that frequently takes weeks or months to complete. Successful federal permit applications often are developed in cooperation with USFWS personnel. Typically, the first step toward a successful permit application is initiating a dialogue with the USFWS Migratory Birds office. These individuals can help the applicant develop materials that will ultimately be approved. Utilities are advised to plan ahead, to the extent possible, to ensure permits will be in place when needed. Although emergency permits are sometimes available, a last-minute approach to permitting is not recommended.

4.1.1 Special Purpose Utility Permit (MBTA)

A SPUT authorizes utilities to collect, transport, and temporarily possess migratory birds found dead on utility property, structures, and rights-of-way for mortality monitoring purposes. This permit may also authorize relocation or destruction of active nests in emergency circumstances. Utilities include communication towers, electric, wind power, solar, and other power generation, and transmission entities.

A SPUT authorizes utilities to carry out specific carcass and nest-related actions. It was designed to address the need to salvage and retain specimens to confirm identification, as well as address recurring nest-related challenges experienced by utilities. Authorized actions vary from permit to permit. Because Bald and Golden Eagles receive additional protection under the BGEPA, an MBTA SPUT does not authorize activities affecting eagles.

For the purpose of the SPUT, a utility is a business that owns and operates communication structures, or a facility that generates or transmits electricity, gas, oil, or water to the public. The application process requires provision of information on avian mitigation standards, protocols, and activities.

A SPUT may authorize an electric utility to remove an active nest posing a safety risk (e.g., may cause a fire or power outage) to the public or operator. The SPUT does not authorize the removal/relocation of nests of T/E species or eagles; this requires other federal permits. Emergency relocation of an active nest may be considered on a case-by-case basis. Management of active nests should be an action of last resort. Typically, problem nests not belonging to an eagle, T/E species, or species protected by the MBTA should be removed and destroyed outside of the active nesting season in accordance with the USFWS *Nest Destruction Memorandum* (Appendix F). Relocation of protected species' nests can be an effective management approach, but requires federal permits whether nests are active or inactive.

Except in the case of risk to public or operator safety, a SPUT does not typically authorize the take of or harm to migratory birds, eagles, or active nests (i.e., with eggs or young), nor does it absolve the utility from liability for such take. Orphaned young and eggs must be turned over to a federally licensed wildlife rehabilitator or authorized agency personnel.

Personnel must carry a copy of the permit when engaging in permitted activities. Also, a federal SPUT is not valid unless the permittee is in compliance with other applicable federal, state, tribal, and local requirements. For example, if a state requires a permit to collect dead migratory birds, the utility must have that state permit for the federal permit to be valid. Information on all birds found dead or injured on utility property must be reported and recorded contemporaneously in electronic format. Records requirements include:

- Species (if known)
- Date discovered

- Condition of the specimen
- Geographic coordinates or specific location information
- Suspected cause of mortality
- Disposition of the carcass or injured bird

Records are provided to the USFWS annually. SPUT reporting requirements include data associated with each formal carcass search, incidental finding, and carcass (or part) collected. As a condition of the SPUT, the USFWS is authorized to enter the permittee's premises at any reasonable hour to inspect wildlife, records, and property, and to determine compliance with the terms of the permit.

Annual reporting must be completed electronically using the Avian Injury/Mortality Reporting System (AIMRS) database form from the Regional Migratory Bird Permit Office. The electronic database form can be downloaded at https://www.fws.gov/media/3-202-17-annual-report-avian-injury-mortality. This report must be completed and submitted annually to the USFWS by 31 January of the year immediately following the action(s). Records must be maintained for 5 years after expiration of the permit.

A SPUT is effective for 3 years and may be renewed. The USFWS will provide a renewal letter or form and annual report form at least 60 days before expiration of the permit. If the renewal request is not submitted to the USFWS at least 30 days before expiration of the permit, the permit may expire before application approval and a new application submittal will be required. The renewal request must include any updates to monitoring protocol, information on any adjustments or measures taken by the permittee to avoid or minimize mortalities as a result of the monitoring, and any preliminary results of those modifications.

4.2 Colorado Permits

Most activities shown in Table 4-1 do not require a permit from the State of Colorado but do require coordination with CPW. Management activities affecting active and inactive nests require permission from the local District Wildlife Manager (DWM), under Colorado Revised Statute (CRS) 33-6-128. Non-native birds and their nests are not protected in any way; however, possession of Monk Parakeets is prohibited, and the DWM should be notified if the species is encountered. Sick or injured birds may be legally transported to CPW, a rehabilitator, a veterinarian, an animal control agency, or a local law enforcement agency if instructed to do so by that individual or agency.

4.2.1 Scientific Collection License

In Colorado, picking up or moving the carcass of any native bird is considered salvaging or possessing wildlife. A Scientific Collection License can authorize those activities at the state level. The Scientific Collection License does not authorize nest-related actions, which must be approved by the DWM.

The Scientific Collection License applicatoin is completed online at https://www.cpwshop.com/purchase-special-license.page.

The permit expires at the end of the calendar year, and the annual year-end reporting instructions are provided with the license, when issued.

SECTION II:
AVIAN RISK REDUCTION

5 DISTRIBUTION ELECTROCUTION MEASURES

Distribution power line structures with limited clearance between energized and grounded components pose an electrocution risk to perching and nesting birds. APLIC (2006) recommends a minimum of 60 horizontal or diagonal inches and 40 vertical inches of spacing between contacts with different electrical potentials to minimize avian electrocutions on distribution (≤60kV) structures. Figure 5-1 illustrates APLIC-recommended clearances designed to protect eagles on distribution structures. APLIC also recommends 12 inches of clearance below a perch to account for an eagle's tail, and suggests that covers extend 36 inches downline from a perch to protect eagles landing on, and launching from, a power pole. Structures providing sufficient clearance for eagles are considered "avian friendly" because they also are protective of smaller species. In areas with no eagles, 40 inches of horizontal and vertical clearance is considered protective of Osprey, hawks, and other raptors (APLIC 2006).

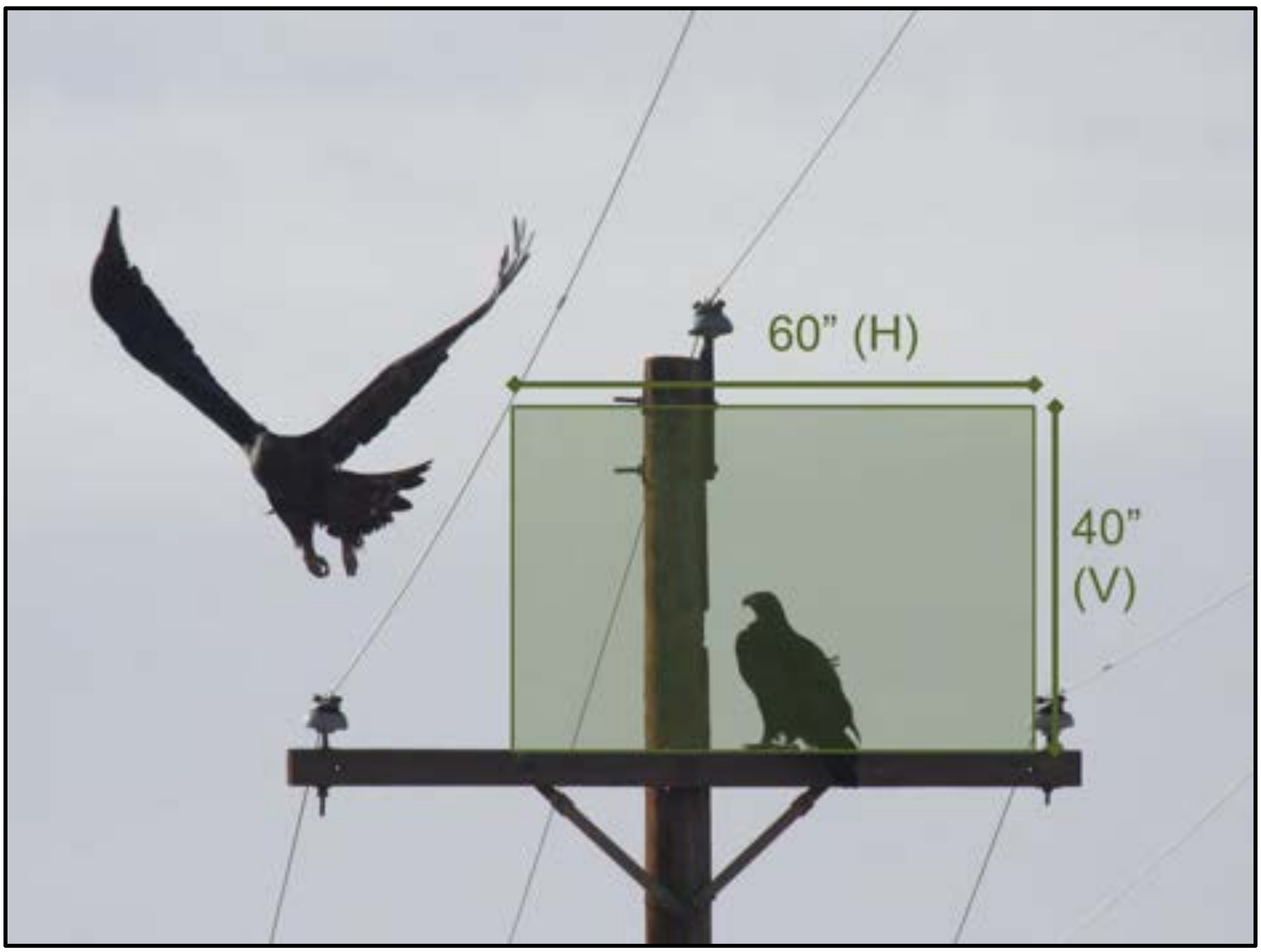

Figure 5-1. Recommended APLIC clearances to minimize electrocution risks.

Structures can be engineered and built to provide avian-friendly clearances, and existing structures may be retrofitted to comply with APLIC recommendations. This chapter discusses measures that can be implemented on new and existing distribution structures to minimize the avian electrocution risk. All other factors being equal, avian-friendly lines are often more reliable because they have fewer wildlife-caused outages. Three primary mitigation strategies are employed to reduce avian electrocutions:

- **Separation** involves framing structures to provide sufficient clearance for at-risk bird species. Separation is primarily used for new construction or line rebuilds.
- **Insulation** uses specialized materials and products to strategically cover key energized or grounded contacts and provide avian-friendly clearances. Insulation is generally not rated to the full-line voltage, nor does it protect linemen.
- **Redirection** refers to the use of barriers to either redirect birds from dangerous areas to safer areas, or to isolate grounded or energized areas from one another.

Figure 5-2 illustrates how separation, insulation, or redirection may be employed to protect birds on a single tangent design. The same strategies are deployed in different ways to protect birds on other designs. Company policies, practices, and protocols may influence local preferences. This chapter contains general suggestions for avian-friendly new construction and retrofits, but implementation may require the development and approval of company-specific standards or protocols.

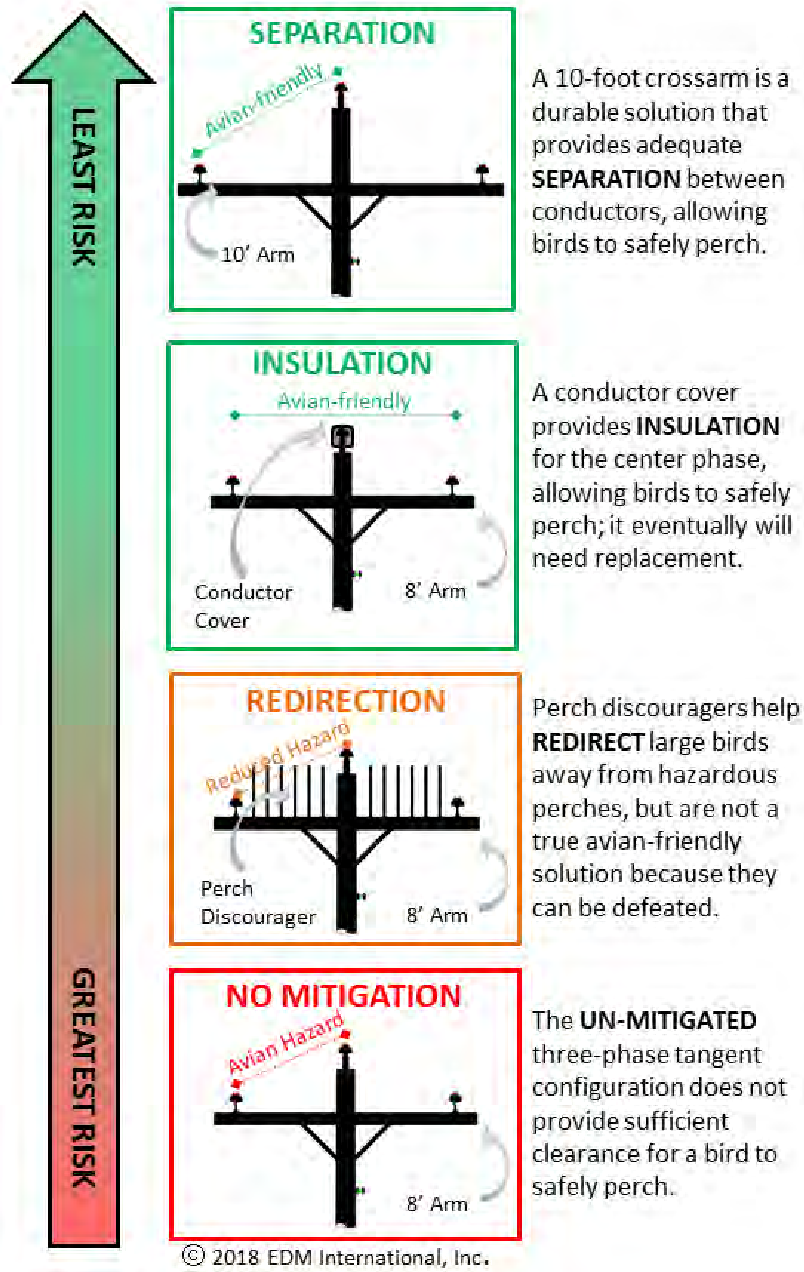

Figure 5-2. Three primary mitigation strategies: separation, insulation, and redirection.

Many retrofitting approaches described in this chapter use commercially available avian-protection products. All products should be compatible with the equipment currently on the system, meet company standards, provide a long and effective service life in local operating conditions, and be acceptable to field personnel. Field crews should also be involved in device selection, as they offer real-world insight into the products likely to work best and those likely to fail on the system. A key product-selection decision relates to products that can be installed "hot" versus those requiring an outage. Typically, products that can be installed hot are more expensive, but save on labor costs. A company's priorities and preferences dictate the materials and devices chosen for a system.

Field performance may differ among devices, materials, and manufacturers. For example, some devices are more resistant to ultraviolet (UV) radiation than others. Degradation from UV and other environmental exposure can result in electrical tracking problems, impaired performance, equipment damage, or faults. Therefore, when any device is selected, material and device properties should be thoroughly reviewed by Engineering and Operations. It may be prudent to install new devices on a limited trial basis.

It is also difficult to directly compare performance among products, as testing methods historically have varied among the manufacturers. IEEE Standard 1656 (IEEE 2010b) created a universal testing framework for wildlife-protection devices installed on overhead electrical distribution systems. The testing sequence is designed to facilitate direct product comparisons. Specific tests describe dielectric performance, flammability, retention and device security, and response to environmental stresses such as UV and salt fog. However, only a small number of manufacturers have carried out the complete IEEE 1656 testing sequence because doing so is prohibitively expensive. Appendix G *Device and Materials Manufacturer Contact List* provides a list of avian protection product manufacturers and contact information.

*Caution: wildlife-protection measures using insulation are **not** designed to protect linemen. Many products are not rated for the full line voltage and are designed to protect animals from incidental contact only. All wildlife protection products must be reviewed and adopted by Engineering Standards prior to deployment.*

Fit, placement, and installation procedures can vary among similar devices. Proper sizing, fit, device selection, and installation are prerequisites to proper function. Therefore, field crews must be fully trained when new devices are introduced, and ongoing refreshers are strongly recommended.

5.1 Primary Wires

This section includes guidance for building avian-friendly structures and for retrofitting existing structures to meet avian-friendly standards. New construction and retrofitting options for common primary configurations are discussed first, followed by a description of pole-mounted equipment, grounding, and other risks. These approaches generally presume the use of a non-conductive wood pole; conductive steel or concrete poles are discussed in Section 5.3 *Grounding*.

5.1.1 Single-Phase Tangent Structures

The most common distribution units located in rural areas are tangent structures. The main electrocution concern with single-phase tangent structures is the spacing between the primary wires and any ground wires or neutral wires. There are several options for making tangents avian-friendly through new construction design or by retrofitting.

Figure 5-3 illustrates a typical single-phase tangent structure constructed on a wood pole. Single-phase lines usually are constructed without crossarms and support a single energized conductor on a pole-top insulator. Single-phase structures without pole-top grounds or pole-mounted equipment generally provide adequate separation for all birds.

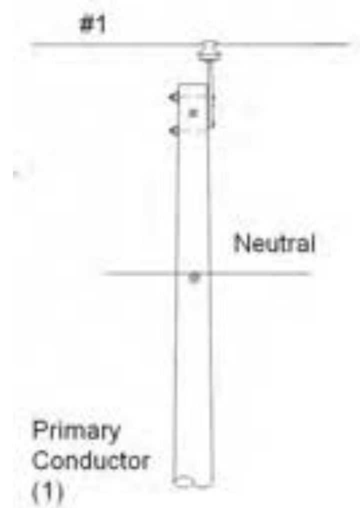

Figure 5-3. Typical single-phase tangent configuration.

5.1.2 Horizontal Tangent Structures

Horizontal tangent units are the most common three-phase structures. They may be constructed with the center phase mounted on the pole top (ridge-pinned) or all conductors may be mounted on the crossarm (flat-top). A common ridge-pinned distribution configuration uses an 8-foot crossarm, mounted 18 inches below the pole top, to support two pin insulators and conductors (Figure 5-4); the third insulator and conductor are mounted on the pole top. In the absence of pole-top grounds or pole-mounted equipment, this configuration provides 48 inches of separation between the conductors, which is adequate for hawks, Osprey, and owls (Figure 5-5), but is not protective of eagles (Figure 5-6). Therefore, additional protection is recommended in eagle habitat to minimize the electrocution risk.

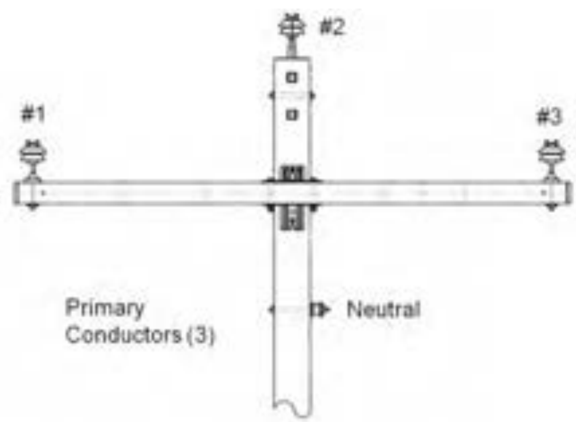

Figure 5-4. Typical three-phase tangent pole with ridge-pinned construction.

Figure 5-5. Typical tangent structure provides adequate separation for hawks.

Figure 5-6. Typical tangent structure does not provide adequate separation for eagles.

Flat-top construction often is used where additional ground clearance is required (e.g., road and railroad crossings). Flat-top construction (Figure 5-7) provides less than 40 inches of separation between conductors and the neutral. As a result, three-phase flat-top configurations place both eagles and smaller raptors at risk.

Figure 5-7. Flat-top unit does not provide adequate separation for hawks.

In eagle habitat, new three-phase tangent structures with 8-foot crossarms should be framed to provide avian-friendly clearance (APLIC 2006). This spacing can be achieved by lowering the crossarm an additional 24 inches on new construction, so it is mounted at least 42 inches below the pole top (Figure 5-8). If insulators are mounted 8 inches from the crossarm end, as is typical of large conductor designs, the 8-foot crossarm must be mounted 48 inches below the pole top to provide 60 inches of horizontal or diagonal separation. Taller poles may be required to maintain sufficient ground clearance with a lowered crossarm, adding to the structure cost.

Figure 5-8. Eagle-friendly three-phase pole configuration using an 8-foot dropped crossarm.

A common alternative to a lowered 8-foot crossarm is using a 10-foot crossarm (Figure 5-9). The longer crossarm provides eagle-friendly separation without using taller poles. It is the most economical approach to avian-friendly new construction. If insulators are mounted 8 inches from the crossarm end, as is typical of large conductor designs, the 10-foot crossarm must be lowered an additional 6 inches (24 inches from the pole top) to establish 60 inches of separation (Figure 5-9).

Figure 5-9. Eagle-friendly three-phase pole configuration using a 10-foot crossarm.

Dielectric conductor covers may be used to retrofit three-phase tangent structures. A typical three-phase ridge-pinned tangent unit requires a single unit on the center phase (Figure 5-10). A typical flat-top tangent unit requires two conductor covers (Figure 5-11). These can be applied either to the neutral and one conductor, or to one conductor on each side of the crossarm.

Figure 5-10. A typical ridge-pinned tangent structure retrofitted with conductor covers (Power Line Sentry, LLC).

Figure 5-11. A typical flat-top tangent structure retrofitted with conductor covers (Eco Electrical Systems).

Conductor covers with a range of materials, properties, and features (Appendix G) are available. For example, some conductor covers can be installed with hot sticks and others are designed to accommodate moderate to heavy line angles. Products must be carefully chosen to ensure they are easy to install and comply with internal standards and practices. Material properties should be reviewed to ensure the devices will provide a long-term solution. Where airborne contamination (e.g., dust, pollution, pollen) is a concern, a product that completely covers the insulator may cause flashovers if it prevents rain from cleaning the insulator. Covering an insulator also makes inspection difficult.

To prevent birds from making phase-to-phase contact when landing on or departing a crossarm, conductor covers should extend a minimum of 3 feet downline on either side of the insulator (APLIC 2006). Many conductor covers have integrated or optional extensions to meet this coverage recommendation (Figure 5-12, Figure 5-13, Figure 5-14, and Figure 5-15). Alternatively, insulating hose can be used with shorter conductor covers to provide adequate coverage (Figure 5-16).

Figure 5-12. Eco Electrical Systems conductor cover.

Figure 5-13. Kaddas Enterprises, Inc. conductor cover.

Figure 5-14. Hendrix Molded Products conductor cover.

Figure 5-15. Power Line Sentry, LLC conductor cover.

Figure 5-16. Conductor cover with additional insulating hose.

Proper installation is a prerequisite to proper conductor cover function, and some degree of field modification may be required. For example, the ends of the Kaddas Enterprises, Inc. Bird Guard cover (Figure 5-13) must be trimmed to fit the conductor. Failure to properly trim the ends may result in displacement by heavy winds. Where wind vibration is a concern, certain conductor covers may accommodate armor rods beneath the avian protection.

Rigid conductor covers do not easily accommodate line angles; therefore, certain units have been are designed specifically for such applications. Also, certain conductor covers accommodate hot line clamps or stirrups better than others. The variety of available products can accommodate nearly any line configuration and system requirement or could be adapted to do so.

5.1.3 Vertical Tangent Structures

Vertical three-phase tangent structures typically provide adequate phase-to-phase separation for even the largest birds. Although birds commonly perch on the highest portion of a structure (Figure 5-17), they also may perch on insulators. Armless structures with line post insulators can pose an electrocution risk to birds when the insulators: (1) are mounted to a wood pole with an exposed ground wire, (2) have bonded and grounded bases (Figure 5-18), or (3) are mounted to a steel or concrete pole. Separation, insulation, and redirection are used to mitigate phase-to-ground electrocution risk on these types of hazardous vertical structures.

Figure 5-17. Prairie Falcon on pole top with overhead neutral (safe location).

Figure 5-18. Vertical tangent unit (grounded).

On a vertical configuration with a pole-top ground wire or an overhead neutral, a bird may simultaneously touch an energized conductor and the ground wire. In such configurations, the ground wire should be insulated (Figure 5-19). Covered ground wire is the most effective and durable solution and should extend at least 40 inches above and 12 inches below the insulator. Ground wire molding is an acceptable alternative to covered wire; however, coverage may be incomplete and the molding may split or disintegrate over time. Composite ground wire molding is more durable than wood molding.

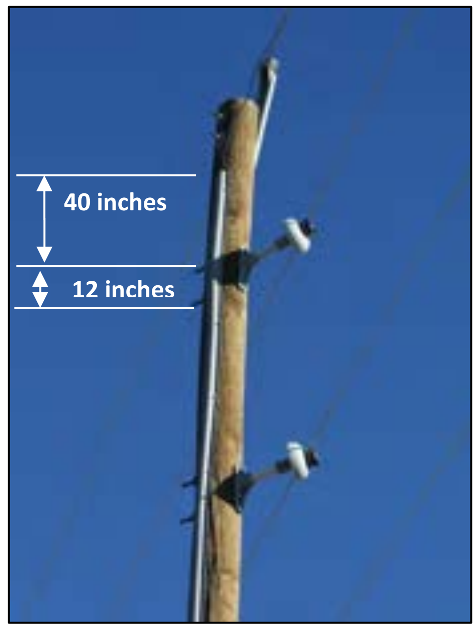

Figure 5-19. Recommended coverage for ground wire protection.

Alternatively, the ground wire can be isolated on some configurations by routing it to preclude incidental contact (Figure 5-20). In general, it is a good practice to simply cover all ground wires so if the pole is ever modified, the ground wire will not pose a risk.

If the insulator bases are grounded, a conductor cover can be installed on each insulator. Bases may be bonded to the ground wire (Figure 5-21), or simply mounted to a conductive (metal or concrete) pole (Figure 5-22). Vertically configured steel and concrete poles can be particularly hazardous to birds because the entire pole is grounded. A phase-to-ground electrocution can result if a bird contacts an energized conductor and the pole (Chapter 6 *Transmission Electrocution Measures* discusses similar concerns for transmission voltages.).

Figure 5-20. Ground wire routed away from hardware and conductors.

Figure 5-21. Bonded insulator bases mean each phase requires a conductor cover (Kaddas).

Figure 5-22. Three conductor covers are required for adequate protection on a steel pole (TE Connectivity).

In an alternative retrofitting approach, the grounded bases can be isolated from the conductors, thereby minimizing the potential for perching birds to make a phase-to-ground contact. Bases can be isolated using either installing barrier plates (Figure 5-23) or perch discouragers (Figure 5-24). Barrier plates are not a preferred option for metal or concrete poles because plates only prevent contact with the area in the immediate vicinity of the insulator base. Section 5.4.2 *Perch Discouragers* provides additional information on deterrents that can be mounted vertically on the pole.

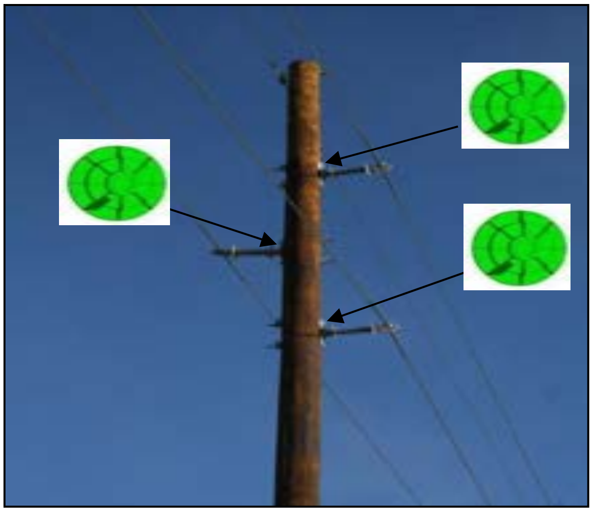

Figure 5-23. Isolating each phase with a barrier plate (Salisbury).

Figure 5-24. Isolating each phase with a perch discourager (Power Line Sentry).

5.1.4 Deadend Structures

A deadend is a structure where conductors terminate. A double deadend has conductors terminating from two directions. Primary jumper wires connect the two sets of conductors. The arrangement of exposed primary jumpers has a strong influence on whether the pole is avian friendly or potentially lethal to birds. For example, a three-phase double deadend structure can be configured with the outer phase jumpers routed either over (Figure 5-25) or under (Figure 5-26) the crossarms. Routing jumpers under the crossarms (Figure 5-26) minimizes avian electrocution risk because it prevents a phase-to-phase contact between the center and outer phase jumpers. Where human-safety concerns require that jumpers be routed over the crossarm (Figure 5-25), all three primary jumpers should be covered to allow incidental contact by perching birds.

Figure 5-25. Three-phase double deadend with exposed jumpers routed over the crossarms.

Figure 5-26. Three-phase double deadend with jumpers routed under the crossarms (center phase still needs deadend covers).

In eagle habitat, additional clearance is needed to reduce the risk of phase-to-phase contact by birds taking off and landing between conductors and/or jumper wires. New three-phase deadend structures can be framed with 10-foot crossarms to provide eagle-friendly clearance. In this case, 60 inches of phase-to-phase separation is achieved by mounting the center phase on the pole 24 inches above the 10-foot crossarm center (Figure 5-27). This recommendation assumes the outer phases are installed 6 inches from the crossarm ends.

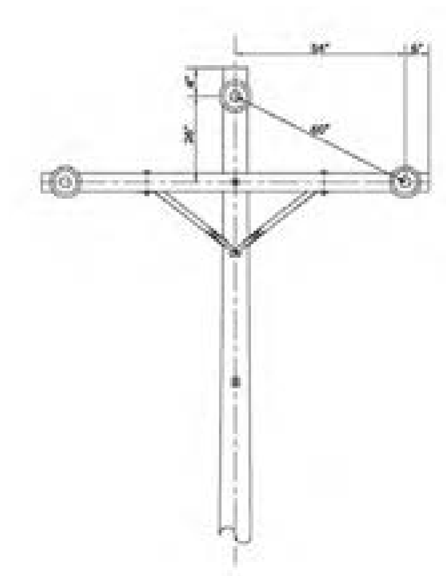

Figure 5-27. Three-phase deadend structure framed as eagle friendly.

Alternatively, extension links can be used to provide eagle-friendly separation using an 8-foot arm. Conductor deadends fitted with an extension link should provide a minimum of 36 inches of separation between the conductor deadend and the crossarm (Figure 5-28). An 8-foot crossarm provides eagle-friendly phase-to-phase separation when an extension link is used on the center phase. When this approach is used for a three-phase tap, care should be taken that the design provides 40 inches of vertical clearance.

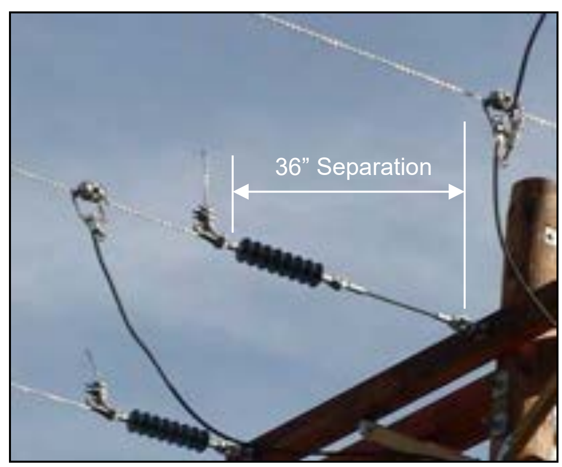

Figure 5-28. Three-phase deadend structure fitted with an insulated extended link.

Double-deadend configurations require links on both sides of the crossarms (Figure 5-29). When the neutral is terminated on the crossarms, additional extension links are necessary (Figure 5-30). Terminating the neutral wire low on the pole is preferable to terminating it on the crossarm because the pole mount allows for greater separation. All jumpers routed above the crossarm on double-deadend structures should be covered. To minimize electrocution hazard, jumpers should be no longer than necessary.

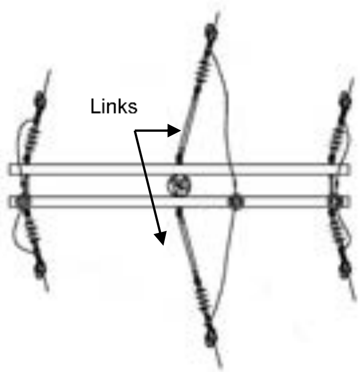

Figure 5-29. Three-phase double deadend structure fitted with two insulated extension links.

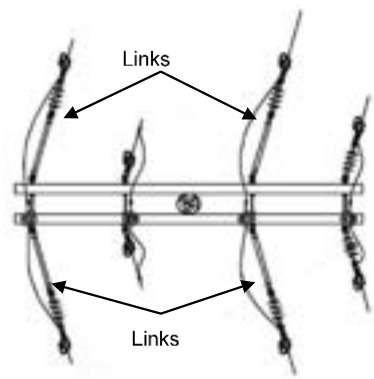

Figure 5-30. Three-phase double deadend structure fitted with four insulated extension links.

Vertical construction is preferred for corner structures to minimize jumper risks. In new construction, care must be taken to prevent phase-ground hazards caused by pole grounds and grounded guy wires (Figure 5-31). Insulating links in the guy wires can prevent many phase-to-ground hazards (Figure 5-32), but only if the guys are not grounded at the pole. It may be difficult to avoid grounding guys that are secured to the pole with metal bands instead of bolted hardware.

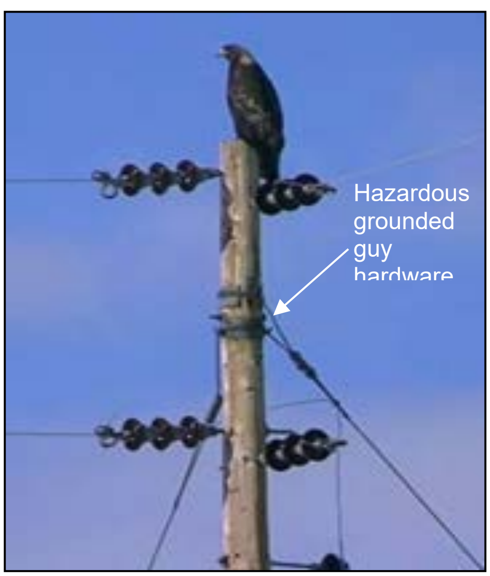

Figure 5-31. Hazardous three-phase vertical design.

Figure 5-32. Avian-friendly three-phase vertical tangent structure with insulating links in guy wires.

Retrofitting three-phase deadend structures generally requires deadend covers to insulate one or more exposed conductors. A typical horizontal three-phase deadend unit requires a single unit on the center phase (Figure 5-33). Deadend covers are available in a variety of materials and some can be installed with hot sticks. Overarm jumpers associated with deadend structures should be covered. Pole mounted perch discouragers may be appropriate for vertical deadend configurations.

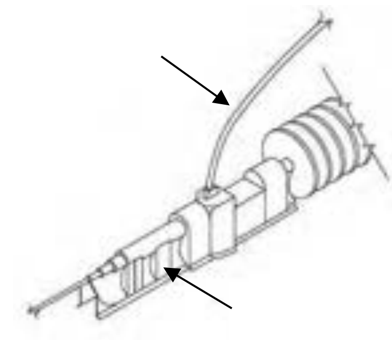

Figure 5-33. Typical deadend cover installation.

5.2 Energized Equipment

Many standard pieces of pole-mounted equipment, such as transformers or reclosers, have energized and grounded contacts nearby. Equipment with exposed contacts generally constitutes an electrocution risk to birds. The issue is compounded when multiple pieces of equipment occur close to each other, such as cutouts on a three-phase line or tank-mounted surge arresters. Most retrofitting uses insulated covers for pole-mounted equipment.

5.2.1 Jumper and Stinger Wires

Primary jumper wires connect circuits on corner, tap, and deadend structures. Stinger wires are used to connect equipment (e.g., transformers, regulators, capacitors, reclosers) to primary conductors. When an energized jumper or stinger wire is near a contact point having a different electrical potential, the wire must be covered to minimize the potential bird or animal electrocution risk. Unnecessarily long jumpers and stingers can increase the electrocution risk; therefore, primary jumpers and equipment stingers should be installed with minimal slack.

Jumpers and stingers almost always should be insulated or covered. Although there are rare circumstances in which bare jumper or stinger wire is avian friendly (e.g., underarm jumpers on a horizontal double deadend primary configuration), covering **all** jumpers and stingers is an avian protection best practice. A broad policy of covered jumpers and stingers ensures that one of the primary avian risk factors (Dwyer et al. 2014) will be addressed as a matter of course at all poles. Because covered jumpers/stingers are a matter of extreme importance, this practice is mentioned in each of the Section 5.2 *Energized Equipment* subsections.

New construction should use covered wire (Figure 5-34) for jumpers and stingers; higher-rated insulated wire, such as 5kV polyethylene covered wire, is preferable. Covered jumper wire is available in sizes from #4 AWG to 795 kcmil. Although these covered jumpers do not protect for the full-line voltage, they provide some level of protection during brief or incidental animal contacts. When retrofitting, it may not be practical to install insulated wire on deadends and tap units. In these situations, split-seam insulation can be installed over existing wire without disconnecting the lead (Figure 5-35).

Figure 5-34. Insulated jumper wire for new installations.

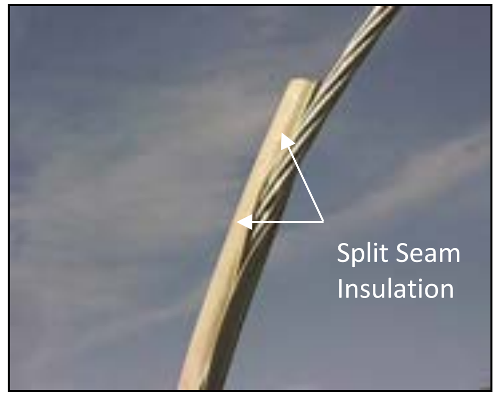

Figure 5-35. Split-seam stinger retrofit (Salisbury insulating SALCOR cover material).

In most cases, energized leads connecting pole-mounted equipment should be completely insulated. To minimize the likelihood of electrocution, there should be no gaps in jumper or stinger insulation. It is essential that stinger insulation provides continuous coverage into equipment caps. Even very small gaps (Figure 5-36) can result in avian electrocutions. Any unavoidable gaps should be covered with insulated fusing tape. No bare wire should be visible.

Figure 5-36. Cutout cover with gap between top of cover and bottom of stinger insulation.

Distribution primary jumpers normally are secured to the top groove of pin-type insulators using wire ties composed of aluminum-covered steel. If the jumper is not completely insulated as it passes over the top of the supporting pin insulator, the potential for phase-to-phase or phase-to-ground contacts remains (Figure 5-37). Even insulated jumpers secured with wire ties may cause an electrocution because most jumper insulation is not rated to the full-line voltage. Covered wire ties may help reduce this problem. Another solution is a vise-top insulator with a nylon insert (Figure 5-38), which supports insulated jumpers without a wire tie. Covering the pin insulator also is an effective approach (Figure 5-39)

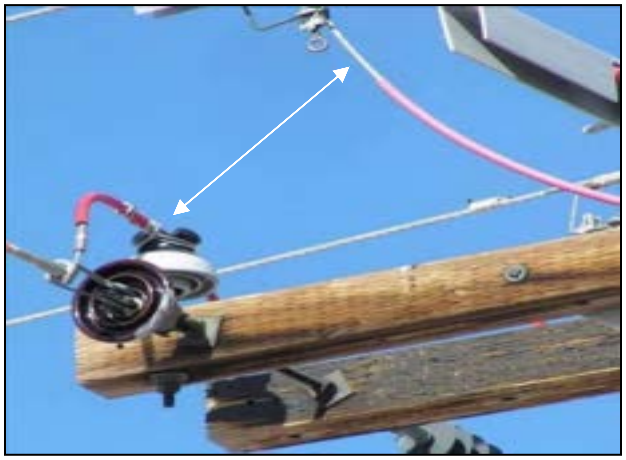

Figure 5-37. Covered jumper with an exposed contact point.

Figure 5-38. Covered jumper supported with a vice-top insulator (Hendrix).

Figure 5-39. Jumper isolated with a pin cover.

5.2.2 Transformers

Transformers step down voltage to the level desired for electrical transmission, distribution, or delivery. Because transformer tanks are grounded, exposed bushings are hazardous even to small birds and other wildlife. Outages often occur when an animal on a grounded transformer tank either touches one energized stinger wire or bridges the distance between two energized stinger wires. Transformer banks are deployed with other equipment that also can cause phase-to-phase or phase-to-ground outages and electrocutions.

Bushing covers should be used with covered stinger wires to minimize avian risk and animal-caused outages. Three options for covering transformer bushings and stinger wires are depicted in Figure 5-40.

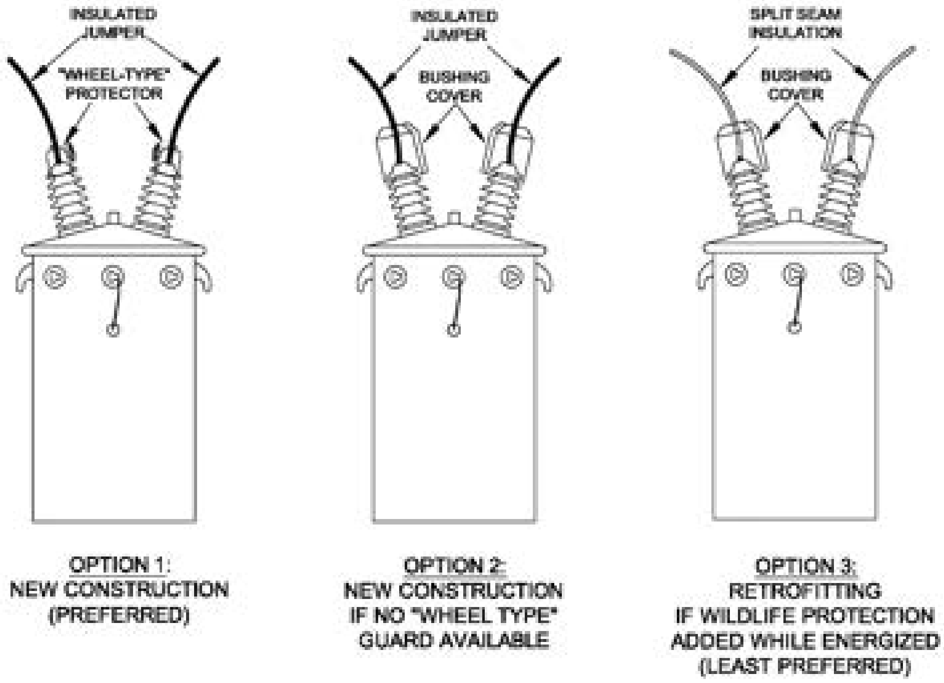

Figure 5-40. Three options for covering transformer bushings and stinger wires.

New transformers can be ordered with a “wheel-type” wildlife protector (Figure 5-41) installed by the manufacturer. If the transformer does not come with a cover, a variety of after-market bushing covers is available (Figure 5-42 and Figure 5-43).

Figure 5-41. “Wheel-type” bushing cover from the manufacturer.

Figure 5-42. After-market bushing covers.

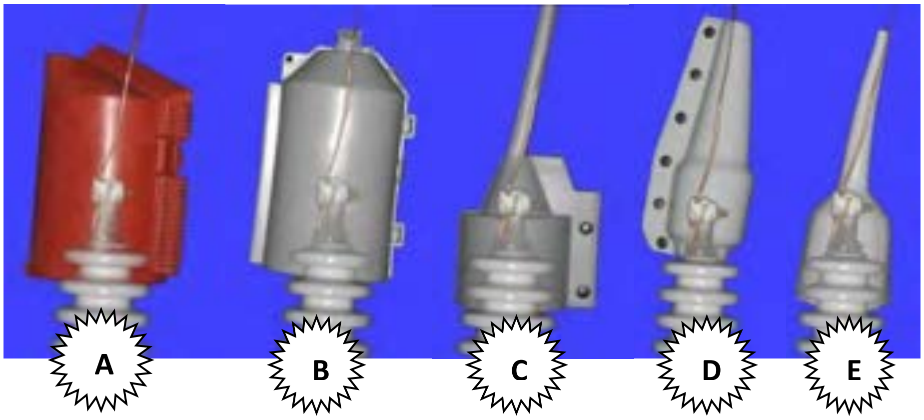

Figure 5-43. After-market bushing covers.

Bushing covers generally are made of track-resistant, high-density polymers that either snap on or slide over bushings. Snap-on covers (Figure 5-43, items A, B, C, and D) allow the cover to be installed without removing the transformer stinger wire. Because slide-over bushing covers (Figure 5-43, item E) require the transformer stinger wire to be temporarily removed during installation, they are best used for new construction and are not generally preferred for retrofitting. Some covers utilize a fire-resistant material, which is less likely to cause a pole fire because it will not burn and drip if subjected to high temperatures. Bushing covers that accommodate gapped arresters also are commercially available; these have a knockout that must be removed and aligned with the arrester.

When using after-market bushing covers, it is critical to follow the manufacturer's installation instructions. Some covers sit on top of the bushing sheds, while others are designed to cover one or two sheds. Figure 5-44 depicts the proper and improper installation for a Hubbell Power Systems, Inc. bushing cover. Improperly installed bushing covers may cause flashovers; therefore, line crews should be instructed on the proper installation method for each product. Where practical, selecting a single bushing cover product to stock may limit confusion and improve installation efficacy.

Figure 5-44. Hubbell Power Systems, Inc. bushing covers installed incorrectly (left) and correctly (right).

No uniform standard exists for bushing covers, and some are more resistant to UV and environmental degradation than others. Materials degradation can lead to tracking problems. When bushing covers are selected, their performance properties should be thoroughly reviewed and line crews instructed on the proper method of installation.

To reduce the risk of outages caused by climbing animals, especially squirrels, transformers also may be fitted with passive (unenergized) or active (low-voltage) barriers. These barriers do not effectively protect birds, however. Passive barriers available from Rauckman Utility Products (Figure 5-45) and Utility Solutions, Inc. (Figure 5-46) are designed to physically isolate energized bushings from the grounded transformer lid. Barriers prevent small animals (such as eastern gray squirrels, with a body length of less than 12 inches) from simultaneously touching a grounded transformer lid and the upper energized portion of the bushing.

Figure 5-45. Passive barrier to deter climbing animal contact (Rauckman Utility Products).

Figure 5-46. Passive barrier prevents phase-to-ground contact by climbing animals (Utility Solutions, Inc.).

Active units clip to the energized bushing and build up an electrostatic charge, designed to deter climbing animals. According to the manufacturers, the mild electric shock is similar to an electrified livestock fence. The animal is not injured, and power service is not interrupted. Two active units are available: the 3M Electrostatic Animal Guard (previously known as the Guthrie Guard) (Figure 5-47) and the Rauckman Utility Products ZAPshield (Figure 5-48).

Figure 5-47. 3M Electrostatic Animal Guard.

Figure 5-48. Rauckman Utility Products ZAPshield (Rauckman Utility Products).

5.2.3 Cutouts

A cutout (or "fused cutout") is an electrical protection device that prevents transformers from being damaged by power surges; it is located between primary conductors or between conductors and equipment. If the fuse fails, this mechanism provides a visible open, which can be seen from the ground. The top plate of a cutout is energized and can be hazardous to birds when mounted near a grounded surface or other energized equipment (Figure 5-49). Covering the cutout and associated stinger minimizes the risk of phase-to-phase or phase-to-ground contact (Figure 5-50).

Figure 5-49. Hawk perched between unprotected cutouts and arresters.

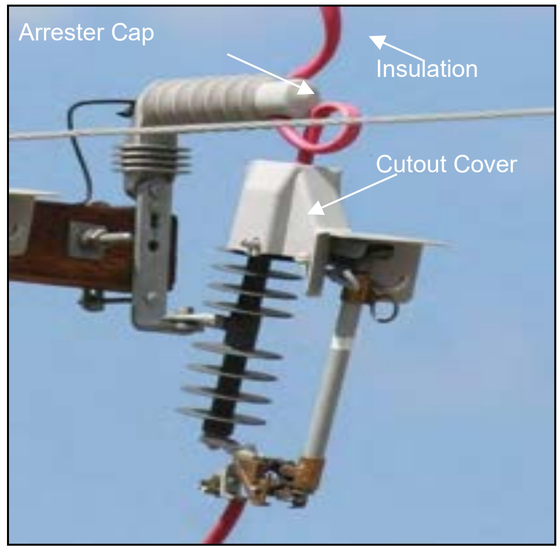

Figure 5-50. Protected cutout/arrester combination.

Due to differences in cutout designs, covers are generally designed for specific brands and types of cutouts. Specialized covers are also available for loadbreak cutouts. Figure 5-51 and Figure 5-52 show examples of covers for non-loadbreak cutouts; Figure 5-53 shows a product designed for loadbreak cutouts.

Figure 5-51. Cutout cover (TE Connectivity).

Figure 5-52. Cutout cover (Cantega).

Figure 5-53. Loadbreak cutout cover (Kaddas).

Some cutout covers leave the upper locking horns exposed. Devices that cover these energized horns should be selected whenever possible. If locking horns are still exposed, perch discouragers should be used as a redundant protection measure (Figure 5-54).

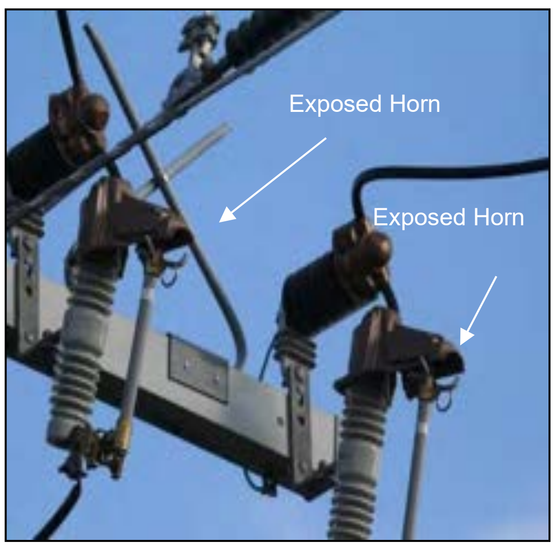

Figure 5-54. Protected cutout/arrester combination with exposed horns on the cutouts.

Cutout covers always should be used in conjunction with insulated stinger wires or covered primary jumpers; however, some cutout covers are not designed to accommodate the larger-diameter primary jumper. If a large jumper wire is forced into the smaller opening of the cutout cover, the side of the cover can flare open (Figure 5-55) reducing the cover's effectiveness. In this situation, the cutout cover opening should be drilled or augured out to accommodate the larger primary jumper.

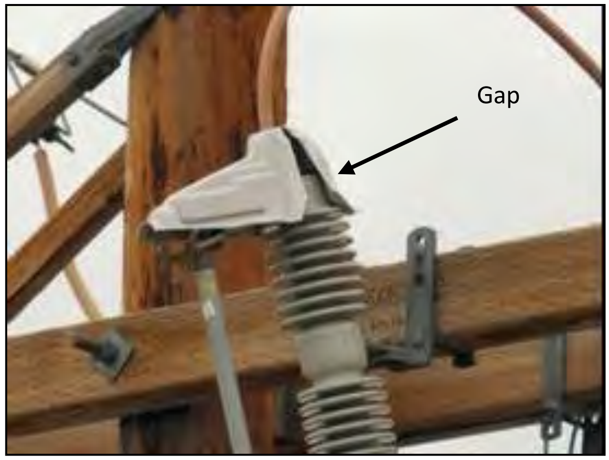

Figure 5-55. Cutout cover with gap due to large-diameter stinger wire and cover.

5.2.4 Surge Arresters

Surge arresters clear over-voltage events such as lightning strikes. Arresters are used on most equipment poles and all underground risers. Most arresters have an energized stinger wire and a ground wire; gapped arresters are nearby, but not connected to, an energized wire. Arresters can be mounted on crossarms or on a transformer tank. All new arresters should be ordered and installed with manufacturer-supplied wildlife caps (Figure 5-56 and Figure 5-57). After-market surge arrester caps are available from several manufacturers.

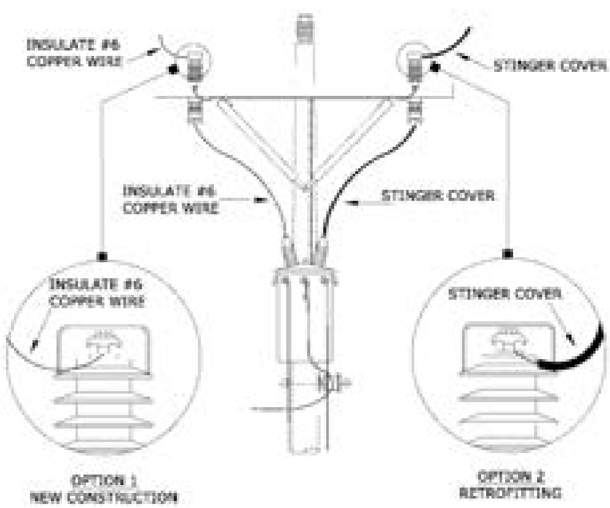

Figure 5-56. Installing new and retrofitting surge arresters.

Figure 5-57. Transformer mounted surge arrester with wildlife cap.

Older gapped arresters (Figure 5-58) can be especially hazardous to small birds, climbing animals, or even insects large enough to span the open gap. Replacing the arresters with non-gapped units is the best solution, but transformer bushing covers with side knockouts (Figure 5-59) can be used to minimize the electrocution risk associated with gapped arresters. When properly aligned, a bushing-cover knockout provides an adequate opening for the spark-gap rod to function properly. However, the arrester may not function correctly if the bushing cover rotates in place or shifts in the wind. Another option for gapped arresters that cannot be replaced is to use a combination cover that fits over both the arrester and bushing cover (Figure 5-60).

The position of an arrester can be modified to reduce potential contact. Installing arresters horizontally, beneath crossarms, reduces exposure to animals (Figure 5-61). Such an installation still requires an arrester cap and insulated stinger.

Figure 5-58. Transformer with gapped arrester.

Figure 5-59. Transformer bushing cover with knockouts for a gapped surge arrester.

Figure 5-60. Combination transformer bushing and gapped surge arrester covers.

Figure 5-61. Underarm horizontally mounted surge arrester reduces animal exposure.

The ground wire exiting the bottom of the arrester is an important avian risk factor. Most ground wires can be adequately protected by routing them beneath a crossarm (Figure 5-62) where it is shielded from contact. Improper routing leaves ground wires exposed to avian contact (Figure 5-63). If the ground wire is near energized hardware and could be contacted by a perching bird, it should be covered (Figure 5-64) or rerouted to minimize the potential for phase-to-ground contact.

Figure 5-62. Bare arrester grounds are shielded from avian contact by the crossarm.

Figure 5-63. Bare arrester ground is exposed to casual avian contact.

Figure 5-64. Surge arrester with cap and insulated ground wire.

5.2.5 Riser Terminators (Potheads)

The transition between overhead and underground electrical systems occurs at a riser pole. The riser pothead is the point where overhead electrical conductors meet sheathed underground cables (Figure 5-65 and Figure 5-66). Riser potheads are energized, but the underground cable sheathing is grounded; therefore, most potheads should be fitted with a snap-on cover (Figure 5-67). Energized areas that cannot be covered should be wrapped with insulating tape. Exposed primary jumpers or stingers associated with potheads should be covered.

Figure 5-65. Unprotected potheads on a riser pole.

Figure 5-66. Unprotected potheads on a riser pole.

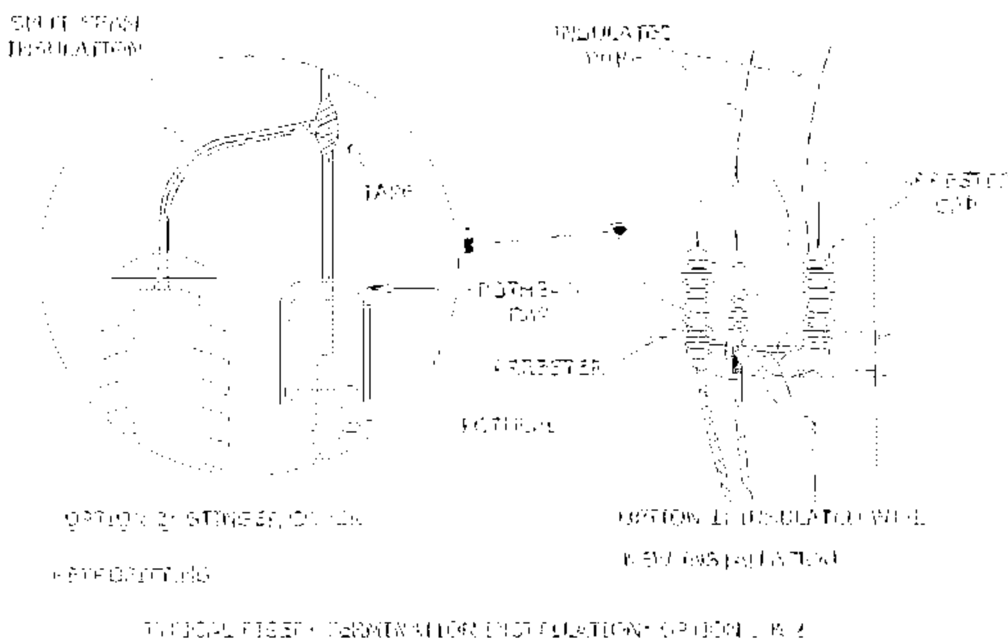

Figure 5-67. Protected riser pole with pothead covers.

Typically, riser potheads are protected by using clamshell-type bushing covers (Figure 5-68, Figure 5-69); however, some vendors produce covers specifically designed for potheads (Figure 5-70). Alternatively, riser poles can be configured to negate the need for a pothead cover. For example, potheads suspended from cutouts generally are far enough below a potential perch that they do not pose a risk to birds or require a cover (Figure 5-71 and Figure 5-72).

Figure 5-68. Protected riser pole (Salisbury by Honeywell).

Figure 5-69. Protected riser pole (Hubbell Power Systems, Inc.).

Figure 5-70. Riser pothead cover (Kaddas).

Figure 5-71. Pothead mounted below cutout.

Figure 5-72. Potheads suspended from cutouts.

Riser poles often include grounded metal brackets, surge arresters, and fused cutouts or switches. The pothead brackets associated offer an attractive perch platform, particularly where trees and other natural perching structures are limited. The tight spacing between these energized and grounded components can place perching birds at risk. Mitigation for riser structures should address all risks on the pole.

5.2.6 Capacitors, Regulators, and Reclosers

A capacitor is an electrical device that stores a charge of electricity and returns it to the line. It is used to balance the inductance of a circuit. Regulators maintain the level of voltage within a prescribed range to maintain efficient equipment operation and prevent equipment damage. Reclosers are devices sensitive to interruptions of current flow in the overhead wires. When a recloser senses an interruption, it automatically opens and then immediately closes. If problems with the current persist after the designated number of reclosings or "shots," the recloser remains open, cutting the power until it is manually reset. Most reclosers are set to remain open after three shots; therefore, unless a bird remains on the line, a recloser may mask a bird electrocution by clearing an interruption. If a bird is killed in a remote location, it may remain undetected.

Exposed bushings on capacitors, regulators, and reclosers pose significant electrocution risk to birds and climbing animals. Energized bushings and stingers should be protected with bushing covers and covered wire (Figure 5-73).

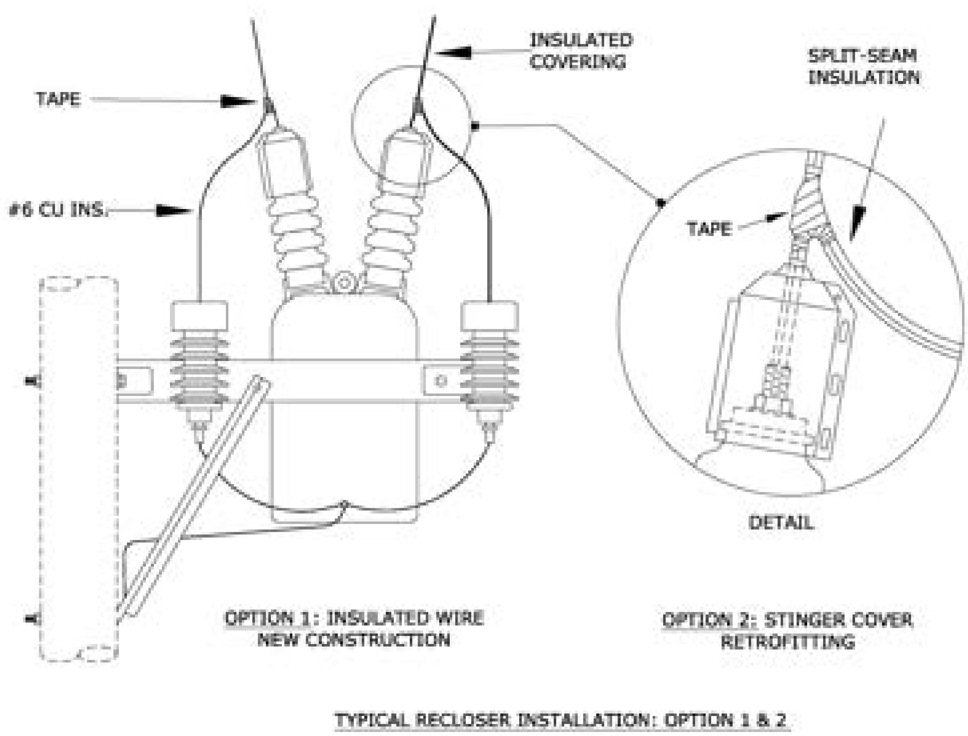

Figure 5-73. Recloser retrofitted with wildlife protection.

Capacitors and reclosers should be purchased with factory-equipped animal protection (Figure 5-74), consisting of custom-fitted bushing covers and insulated stingers. Capacitors and reclosers without animal protection can be retrofitted with after-market bushing covers and split-seam wire insulation.

Regulators may come equipped with horizontally mounted bypass arresters (Figure 5-75). Cantega Technologies, Inc. and TE Connectivity Ltd. manufacture covers specifically designed for bypass arresters (Figure 5-76 and Figure 5-77). Regulator bushings, associated stinger wires, and bypass arresters should be covered.

Figure 5-74. Capacitor bank factory-equipped with animal protection.

Figure 5-75. Regulator with bypass arrester.

Figure 5-76. Regulator with bypass arrester cover (TE Connectivity).

Figure 5-77. Regulator with bypass arrester cover. (Photo credit: Cantega)

5.2.7 Regulator By-Pass Switches and Disconnect Switches

System switches are difficult to insulate because protective devices may interfere with a switch operation. Barrier plates can be used on switches to isolate birds from potential contact points (Figure 5-78 and Figure 5-79). Alternatively, switches can be mounted on nonconductive surfaces, such as fiberglass arms, to minimize potential contact.

Figure 5-78. Barrier plate on switch (TE Connectivity).

Figure 5-79. Barrier plate on switch (Cantega).

5.2.8 Switchgear

Switches are difficult to completely retrofit because of their moving parts; however, barrier plates can prevent many switch-related electrocutions (Figure 5-80, Figure 5-81). Although barrier plates cannot be considered avian friendly, they represent a practical avian-safety improvement to a hazardous piece of equipment.

Figure 5-80. Switch with barrier plate.

Figure 5-81. Switch with custom-formed barrier plates.

New switches can be purchased with fiberglass support arms rather than steel arms. At least one switch manufacturer, S&C Electric Company, produces a unit with wildlife protection installed on the interrupter (Figure 5-82). Switchgear from several companies may also be mounted beneath the crossarm to reduce animal contact. Exposed jumper and stinger wires associated with switches should be covered.

Figure 5-82. Switch with built-in animal protection.

5.3 Grounding

Grounding can reduce phase-to-ground clearances and may require additional energized areas to be insulated or covered. In some cases, risks can be eliminated by modifying the grounding practices.

5.3.1 Pole-Top Grounds

In areas with few trees, utility poles are both attractive perches for raptors and susceptible to lightning strikes. Lightning can cause extensive damage to utility structures and equipment. Where an overhead neutral wire is used for lightning protection, ground wires are a common phase-to-ground electrocution risk. The simplest solution often is installing covered ground wire or covering the existing ground wire with protective molding.

Past construction practices employed running copper ground wire from the pole top to a ground rod or butt plate buried at the pole base. The ground wire was also tied into the neutral wire. This design was meant to shunt lightning down the ground wire to the earth, preventing costly damage to equipment or the pole. However, these pole-top grounds are particularly hazardous to birds, because there is very limited clearance between the conductor and ground wire (Figure 5-83). Modern construction practices have replaced pole-top grounds with surge arresters. Where pole-top grounds exist, the best practice for mitigating avian electrocution risk is replacing the pole-top ground with a surge arrester installed with a covered stinger and arrester cap.

Figure 5-83. Exposed pole-top ground wire

5.3.2 Grounded Brackets

Brackets for risers, cutouts, and arresters can provide an attractive perch platform for birds. Grounded metal brackets significantly increase the avian electrocution risk because of the limited phase-to-ground clearances (Figure 5-84 and Figure 5-85). An animal on a conductive grounded bracket needs only to touch one energized stinger wire to complete a pathway to ground.

Figure 5-84. Single-phase grounded metal bracket with uncovered cutout, pothead, and stinger wires.

Figure 5-85. Three-phase grounded metal bracket with uncovered potheads, arresters, and stinger wires.

For new construction design, nonconductive fiberglass brackets (Figure 5-86) or crossarms made of wood or fiberglass (Figure 5-87) can be used in place of metal brackets. If possible, the metal bracket hardware should not be grounded. When retrofitting, it may not be economical to replace brackets. Instead, it may be more practical to cover exposed wires and equipment. When retrofitting, grounded brackets require that all associated equipment and wires are covered.

Figure 5-86. Single-phase ungrounded fiberglass bracket.

Figure 5-87. Three-phase fiberglass arm with covered cutouts, arresters, and stinger wires. Perch discouragers provide redundant protection.

5.3.3 Guy Wires

Steel guy wires typically are attached to poles with a thimble eyebolt. Guy wires may be grounded when attached directly to anchors embedded in the earth. Grounded guy wires increase the electrocution risk if near an energized contact point. Grounded guy wires on corner deadend structures can be particularly hazardous if the guy wires tensioning the upper crossarm pass nearby energized conductors or stingers on the lower crossarm (Figure 5-88).

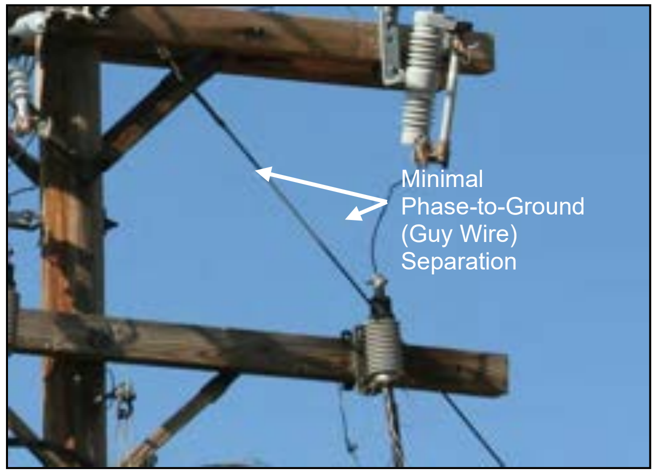

Figure 5-88. Guy wire with inadequate separation.

Fiberglass strain rods (Figure 5-89) or insulating links (Figure 5-90) can be used to eliminate a pathway to ground through down guys. As an ancillary benefit, insulating links also reduce cathodic anchor rod deterioration.

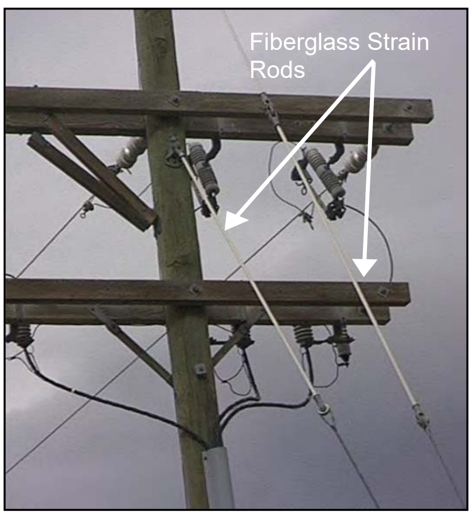

Figure 5-89. Fiberglass strain rods to prevent a pathway to ground.

Figure 5-90. Insulating link to prevent a pathway to ground.

Guy wires may be attached to the pole either with a bolt or metal band. When the guy and attachment are grounded (Figure 5-91 and Figure 5-92), all energized hardware should be evaluated for proper phase-to-ground clearances and insulated accordingly.

Figure 5-91. Guy wires attached to grounded pole bands.

Figure 5-92. Guy wires attached to grounded pole bands.

5.4 Perch Management

Perch management should be structured to either move birds from high-risk areas (Figure 5-93) to low-risk areas (Figure 5-94) or to create a barrier between two differently energized contacts.

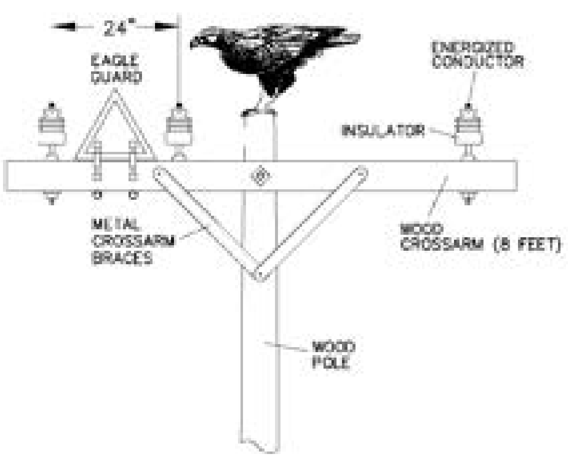

Figure 5-93. Eagle on a three-phase tangent structure with inadequate separation.

Figure 5-94. Elevated perch encourages birds to use a safe location.

The USFWS discourages perch management as a strategy to reduce avian electrocution risks because it is not as effective as separation or insulation and may lead to other issues. Simply displacing a bird may result in an incident on a different hazardous perch nearby. However, perch management is an approach to consider in the following situations:

1. When used with comprehensive insulation as a redundant form of protection.
2. When insulation is not feasible (e.g., horizontally mounted gang-operated switches).
3. To deter perching in areas where raptor predation of sensitive species is a primary concern for a state or federal agency.*

**When used for this purpose, perch discouragers should be placed only on raptor-friendly equipment. Extreme care should be taken to ensure perch management does not increase the avian electrocution risk.*

5.4.1 Elevated Perches

Elevated perches are designed to attract birds to the highest point on the structure. Elevated perches are particularly effective on structures located on raised topography over a prey base. Several vendors manufacture commercial units (Figure 5-95, Figure 5-96, and Figure 5-97). Elevated perches must be installed properly to ensure correct function and limit the potential for future operational problems.

Figure 5-95. Elevated perch (Aluma-Form).

Figure 5-96. Elevated perch (Hughes Brothers).

Figure 5-97. Elevated perch (Bird Powerline Protection Ltd.).

Birds do not always use an elevated perch (Figure 5-98), particularly when seeking shelter from sun or wind, or if the elevated perch does not feel secure (Figure 5-99). An elevated perch can be used as a redundant measure but is not a substitute for proper avian protection.

Figure 5-98. Raptor perching below an elevated perch.

Figure 5-99. Improperly installed elevated perch and unprotected pole.

Custom elevated perches can be designed to discourage birds from using the area beneath the perch. Bald Eagle heights range from 18 to 28 inches. Accordingly, Bald Eagle perches should be located no more than 16 inches above a crossarm (Figure 5-100). However, perch installation must adhere to NESC and all applicable safety requirements.

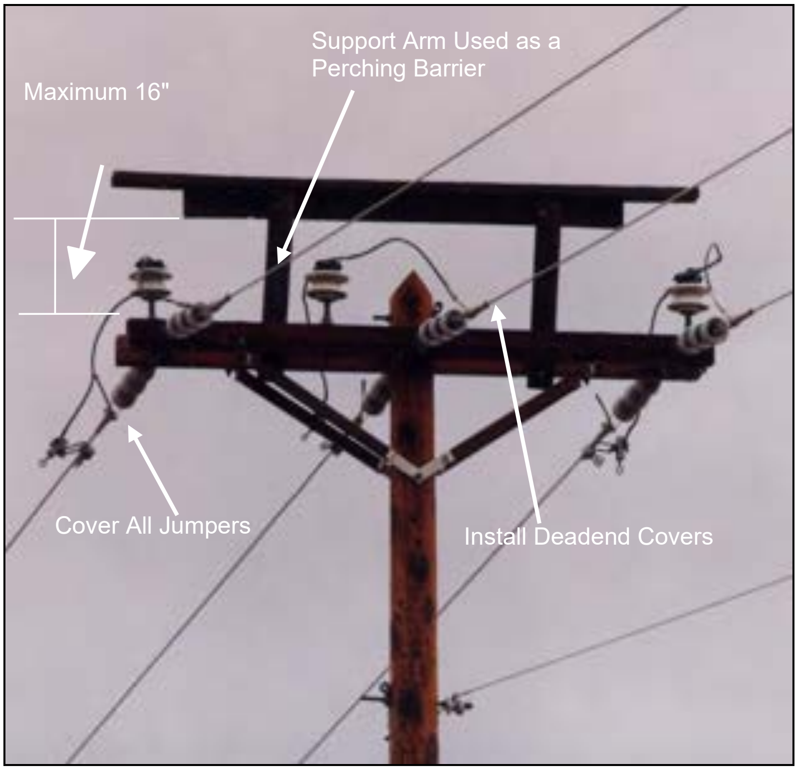

Figure 5-100. Elevated perch on a three-phase tangent structure.

5.4.2 Perch Discouragers

Perch discouragers are designed to manage bird perching behavior. They may be used both to reduce electrocution risk under specific circumstances, and to prevent birds from defecating on suspension insulators and equipment. Perch discouragers constructed of a variety of materials are available from numerous manufacturers. Some devices can be installed with hot sticks, whereas others are bolted to the structure. Unique products manufactured by Power Line Sentry, LLC and Kaddas Enterprises, Inc. (Figure 5-101 and Figure 5-102) are designed to prevent perching beneath the perch discourager. Some discouragers are mounted on top of the horizontal crossarm, which may not be possible when cutouts, arresters, or other equipment are present. In those situations, a unit that mounts on the side of the crossarm is required.

Figure 5-101. Power Line Sentry "Raptor Guard" perch discourager design to deters perching within the triangle.

Figure 5-102. Kaddas perch discourager design deters perching within the triangle.

Although some perch discouragers decrease the frequency and duration of perching events (Dwyer and Doloughan 2013), discouragers can be defeated, particularly on a structure that is a preferred perch site (Figure 5-103). Perch discouragers are most successful when safe portions of the pole remain available for perching (Figure 5-104). Used properly, discouragers influence *where* birds land on a structure, not *whether* they land on a structure.

Placing perch discouragers on pole tops may shift birds lower on the pole near energized equipment or to other high-risk poles (Figure 5-105). When used on double crossarms, perch discouragers must be placed on both crossarm. For new construction, conductor separation through avian-friendly design is a better strategy than installing perch discouragers.

Figure 5-103. Bird perching on a perch discourager.

Figure 5-104. Perch discourager shifting a raptor to the pole top.

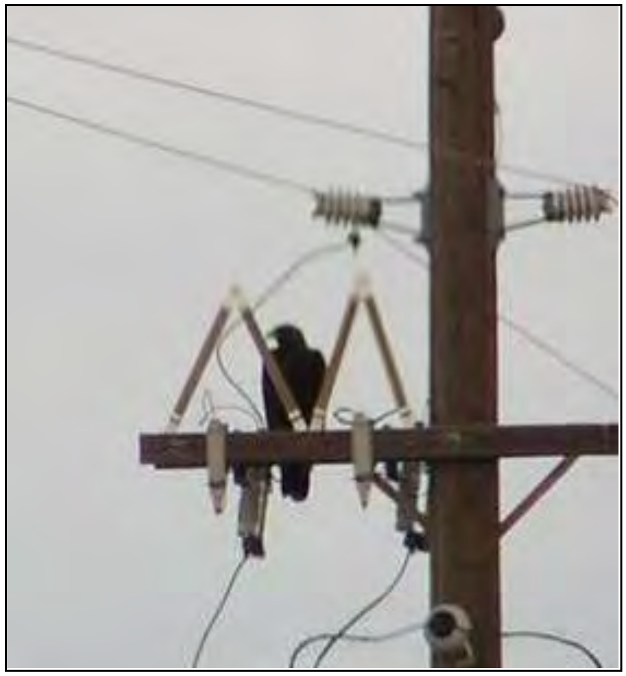

Figure 5-105. Perch discourager shifting a bird to a more problematic area.

Perch discouragers should be sized properly to discourage birds from perching under or adjacent to the discouragers (Figure 5-106) and should have a protective coating to prevent UV deterioration. Makeshift discouragers are generally ineffective and often fail in the field (Figure 5-107).

Figure 5-106. Raptor perching beneath a perch discourager.

Figure 5-107. Inappropriate use of a traffic cone as a perch discourager (Chad Olsen).

Perch discouragers, like other equipment, should be installed in accordance with the manufacturers' instructions and meet NESC requirements. Discouragers mounted too close to conductors can cause flashovers under certain environmental conditions (Figure 5-108). Conversely, providing too much space may allow birds to land in unsafe areas (Figure 5-109).

Figure 5-108. Flash marks on discourager.

Figure 5-109. Eagle perched next to a discourager.

Tests with captive birds reveal that hawks can defeat discouragers if there is more than a 5-inch gap between the discourager and an insulator (Figure 5-110). Eagles can defeat a perch discourager if there is more than a 10-inch gap (Figure 5-111). Therefore, if compatible with local practices and national standards, gaps should be limited to 5 inches if the goal is to prevent hawk and eagle perching.

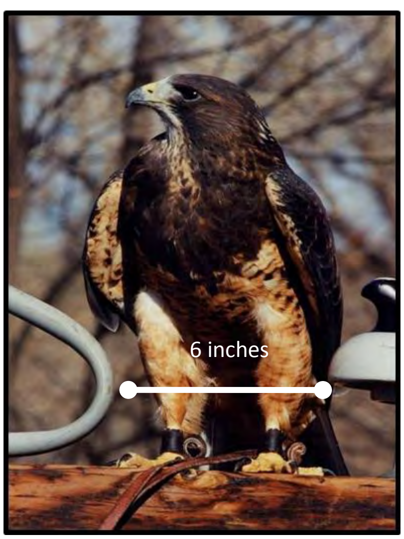

Figure 5-110. Use of perch discouragers to minimize hawk perching – maximum 5-inch spacing.

Figure 5-111. Use of perch discouragers to minimize eagle perching – maximum 10-inch spacing.

Perch discouragers are available in a variety of shapes, sizes, and materials to deter a wide range of bird species in a variety of locations (e.g., utility structures, buildings). However, discouragers are most effective when chosen carefully and sized properly. For example, small spikes will not deter large birds, and small birds may nest in them (Figure 5-112). Small, plastic spikes break easily, reducing their effectiveness. Sharp spikes may also pose a risk to personnel. Perch discouragers are not an effective tool for nest deterrence on distribution structures and may facilitate nesting in some situations (Figure 5-113 and Figure 5-114). However, in certain situations perch discouragers may indirectly discourage nesting by making a bird feel uncomfortable on a specific structure where a nest is unacceptable.

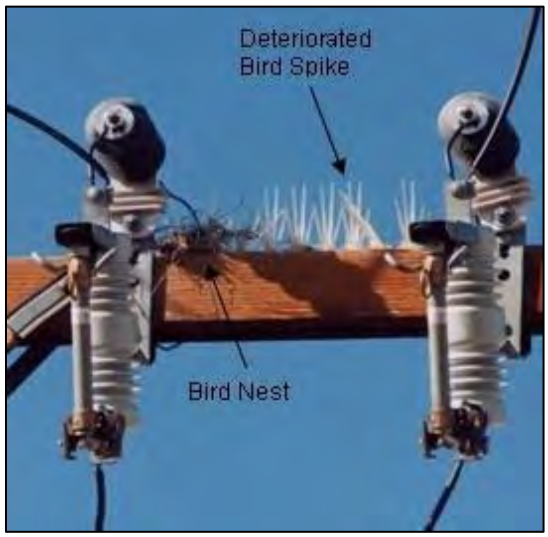

Figure 5-112. Bird nesting in small plastic spikes.

Figure 5-113. Hawk nest between perch discouragers.

Figure 5-114. Osprey nest start in bird spikes.

Life-sized raptor decoys are sometimes mounted on utility structures in hopes of hazing unwanted birds (Figure 5-115 and Figure 5-116). The best results usually are obtained from lifelike reproductions, combined with motion and loud, startling sounds or recorded distress calls. However, habituation to predator decoys is inevitable and their effectiveness rapidly diminishes with time. Accordingly, predator decoys are not a substitute for installing the appropriate avian protection.

Figure 5-115. Plastic owl unsuccessfully preventing perching.

Figure 5-116. Plastic owl unsuccessfully preventing osprey nesting.

Studies have demonstrated the efficacy of vulture effigies at reducing (Avery et al. 2002) or eliminating (National Wildlife Research Center 2006) the use of large roosts. This strategy is best coordinated with the Wildlife Services branch of the U.S. Department of Agriculture Animal Plant Health Inspection Services because the use of an actual vulture carcass comprises possession of a MBTA-protected species. However, imitation vulture carcasses can also be effective and do not require a federal permit. Vulture effigies have been used successfully in substations to manage reliability and damage concerns related to Turkey Vulture and Black Vulture roosting (Figure 5-117). The potential for a negative public response must always be considered when using an effigy because the practice is likely to appear barbaric to an outside observer.

Figure 5-117. An effigy can reduce or eliminate substation roosting by Black Vultures and Turkey Vultures (Cristina Frank).

6 TRANSMISSION ELECTROCUTION MEASURES

Electrical clearances associated with transmission voltages (≥60kV) typically provide adequate phase-to-phase and phase-to-ground separation for even the largest birds. However, birds can be electrocuted on certain hazardous configurations, most commonly found at lower transmission voltages (typically 69kV-138kV).

The same approaches used for avian-friendly construction and retrofits on distribution structures are used on transmission structures: separation (providing adequate space between energized and grounded contacts), insulation (strategically covering energized and grounded contacts), and redirection (using barriers to redirect birds from dangerous areas or to isolate grounded or energized areas). Insulation is less frequently used for transmission structures, since fewer products are available for the higher voltages, and redirection is an imperfect solution.

Separation is usually the best strategy for transmission structures. To ensure sufficient clearances at transmission voltages, APLIC (2006) recommends an additional 0.2 inch of horizontal or vertical separation between energized contacts for each 1kV above 60kV. Therefore, avian-friendly phase-to-phase clearances are proportional to the transmission line voltage. The phase-to-ground voltage is calculated by dividing the phase-to-phase (line) voltage by 1.732; recommended clearances are calculated for the calculated voltage.

Table 6-1 lists avian-friendly phase-to-phase and phase-to-ground clearances for common transmission line voltages. These recommendations are supplementary to NESC Section 235 clearances. Above 230kV, NESC clearances typically exceed APLIC clearances.

Table 6-1. Spacing recommendations for common transmission line voltages to prevent phase-to-phase or phase-to-ground contacts.

		Phase-to-Phase Spacing*		Phase-to-Ground Spacing	
Phase-to-Phase (Line) Voltage (kV)	Phase-to-Ground Voltage (kV)	Horizontal (inches)	Vertical (inches)	Horizontal (inches)	Vertical (inches)
≤60	≤34.6	60	40	60	40
69	39.8	62	42	60	40
115	66.4	71	51	61	41
138	79.7	76	56	64	44
230	132.8	94	74	75	55

*APLIC 2006.

New and emerging technologies, devices, and electrical cover-up materials must be periodically evaluated to better understand what dynamic and evolving options are becoming available. Appendix G contains a summary of manufacturers of associated equipment and devices to minimize avian interactions with power lines.

Most common transmission designs provide adequate phase-to-phase separation for even the largest birds; however, phase-to-ground separation is sometimes inadequate. Most transmission lines have OHS wires for lightning protection; these are grounded at every structure. Pole grounding is often the critical factor determining whether a transmission structure is hazardous or avian friendly.

6.1 Design Approaches

Avian-friendly designs are the most effective, durable, and economical way to prevent electrocutions on new transmission construction. Designs employing suspended insulators are nearly always avian friendly because they do not offer perches in the vicinity of the conductors (Figure 6-1 and Figure 6-2).

*Caution: wildlife-protection measures using insulation are **not** designed to protect linemen. Many products are not rated for the full line voltage and are designed to protect animals from incidental contact only. All wildlife protection products must be reviewed and adopted by Engineering Standards prior to deployment.*

Figure 6-1. Horizontal H-frame tangent structure is safe for perching birds.

Figure 6-2. Vertical davit arm tangent structure is safe for perching birds.

Horizontal line post insulators are commonly used at lower transmission voltages. Line post insulators are generally avian friendly when the bases are not grounded (Figure 6-3). However, when mounted on conductive (usually steel) poles or connected to a ground wire, the insulator base becomes a potential phase-to-ground contact for large birds (Figure 6-4).

Figure 6-3. Avian-friendly vertical configuration with ungrounded insulator bases.

Figure 6-4. Hazardous vertical configuration with metal pole grounding line post insulator bases.

On structures where there is insufficient clearance between a grounded insulator and the energized conductor, the avian electrocution risk can be high. To prevent this hazard, horizontal line post insulators with grounded bases frequently must be oversized, relative to the line voltage, to provide avian-friendly clearances. The critical dimension is the length of the polymer sheds, which in many cases is identical to the insulator strike distance (Figure 6-5).

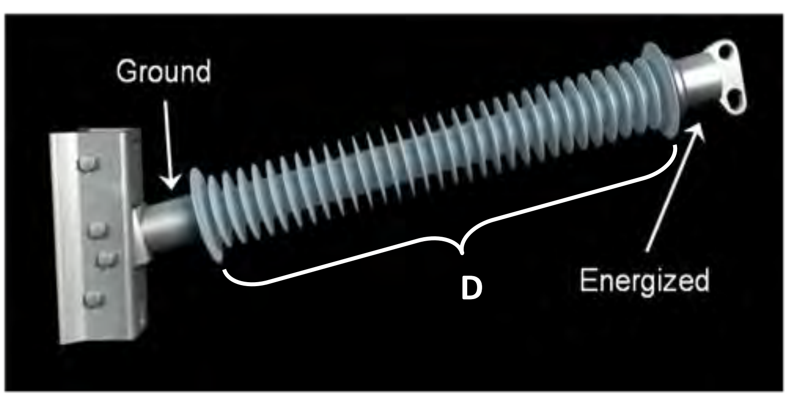

Figure 6-5. Critical dimension (D) for a line post insulator with a grounded base (Hubbell Power Systems, Inc.).

By way of example, a line post insulator for 69kV would require polymer sheds 60 inches long to provide avian-friendly phase-to-ground separation. However, the longest polymer length for an Ohio Brass 69kV line post insulator is 47 inches (Hubbell Power Systems, Inc. 2014). The smallest Ohio Brass line post insulator that provides the minimum 60 inches of horizontal separation is a 161kV model, with a polymer length of 63 inches and an overall length of 75 inches. Therefore, new avian-friendly 69kV construction would require installation of 161kV insulators.

6.2 Retrofitting

Both insulation and redirection can be used to mitigate at-risk transmission configurations that do not provide avian-friendly separation. At transmission voltages, pole-mounted equipment is unusual; therefore, conductor wires, primary jumpers, and associated hardware are the principal energized contacts. The primary grounded contacts are conductive structures (i.e., steel or concrete poles, lattice members), ground wires, guy wires, and insulator bases. The following sections provide transmission-specific information intended to supplement Chapter 5 *Distribution Electrocution Measures*. Information from both chapters will be valuable when planning retrofits or new construction.

6.2.1 Conductors

If phase-to-ground clearances surrounding insulators are inadequate, conductor covers can be installed (Figure 6-6). Conductor covers are available from many manufacturers; however, relatively few models are advertised as suitable for transmission voltages. Only products specifically designed for transmission voltages should be used for these applications.

Figure 6-6. Conductor cover for sub-transmission retrofits (TE Connectivity Ltd.).

Standard-sized braced post insulators provide a more economical design alternative to oversized insulators. Overall, avian risks associated with braced post insulators are believed to be low (Figure 6-7). Like a perch discourager, the insulator brace helps to prevent a bird perched on the outside of the insulator brace from contacting the grounded pole. Although unlikely, a bird perched inside the insulator brace could make a phase-to-ground contact (Harness 2014). Braced post insulators could be made avian friendly with barriers that close the 2.75-inch gap between the two insulators nearest the conductor, and prototypes have been developed (Figure 6-8).

Figure 6-7. Mock 69kV braced post insulator configuration with a Red-tailed Hawk.

Figure 6-8. Kaddas Enterprises, Inc. prototype horizontal line post shield guards against contact with the energized portion of a braced post insulator.

6.2.2 Jumper Wires

Primary jumper wires with inadequate separation from grounded contacts should be covered. Wire insulation is available from many manufacturers; however, relatively few products are appropriate for transmission voltages. Only products specifically designed for transmission voltages should be used for these applications.

6.2.3 Ground Wires

To prevent potential phase-to-ground contact, ground wires should be covered in the vicinity of energized contacts. The minimum coverage above and below each potential perch is determined by the line voltage, but it is often easier to simply use covered ground wire on the upper portion of the pole. In general, it is a good practice to cover the entire ground wire to minimize risk even if the pole is subsequently modified. By itself, insulated ground wire is sufficient to effectively retrofit many transmission configurations. If a ground wire is connected to insulator bases, additional retrofitting measures may be required.

On some configurations, the ground wire can be isolated from the conductors or primary jumpers by routing it on the far side of the pole, where it is shielded from contact. Typically, this is possible on vertical tangent configurations where all conductors are on the same side (Figure 6-9). This approach is durable, is highly effective, and can be employed with or without standoff brackets.

Figure 6-9. Ground wire routed to isolate from conductors.

6.2.4 Grounded/Bonded Insulator Bases

Insulator bases pose a potential phase-to-ground risk, if grounded. If company policies and practices allow, grounded bases can be disconnected for improved avian safety. If insulator bases must remain grounded and the pole is wood or another nonconductive material, isolating discs can be used to mitigate the risk. Isolating discs form a physical barrier that minimizes the likelihood of a phase-to-ground contact. Isolating discs should be used in conjunction with an insulated ground wire.

A creepage extender (Figure 6-10) is an alternative to isolating discs and is designed to increase insulator flashover performance when tracking problems occur. However, creepage extenders can be mounted to insulators for the purpose of minimizing the potential for phase-to-ground electrocutions.

Figure 6-10. Creepage extenders (shown here in a traditional substation application) can also be deployed as barriers on line post insulators.

6.2.5 Grounded Poles

When conductor covers are not an option, steel or concrete poles can be isolated from conductors using perch discouragers. Perch discouragers offer more protection than isolating discs because they simultaneously decrease perching by large birds and create a barrier between the energized components and grounded areas. As barriers, perch discouragers protect a larger area than isolating discs. Perch discouragers designed to mount vertically to the pole should be selected for this application.

6.2.6 Distribution Underbuilds

When transmission lines are constructed with distribution underbuilds, horizontal clearances are often inadequate for hawks and eagles (Figure 6-11). The type of pole (wood versus concrete/steel) used to support an underbuild also influences the electrocution risk.

Figure 6-11. Red-tailed Hawk perching between the narrow phases of a distribution underbuild on a wood pole (inner pin is exposed).

6.2.6.1 Distribution Underbuilds and Pole Type

Steel poles are commonly used in transmission line construction in the U.S., Europe, and other parts of the world. Janss and Ferrer (1999) report stark differences in the avian electrocution rate for wood versus metal power poles. Mitigation methods differ among pole types because measures effective on wooden power poles may not mitigate electrocution problems on metal poles (Negro and Ferrer 1995). In Asia, problems are often associated with steel crossarms on concrete poles (Harness and Gombobaatar 2010, Harness et al. 2013); because there is minimal vertical clearance between the grounded arms and the energized wires, these structures pose a high risk to small birds like kestrels (Figure 6-12 and Figure 6-13).

Figure 6-12. Hawk foot on a pin insulator mounted on a grounded steel distribution crossarm.

Figure 6-13. Lesser Kestrel perched on a grounded steel distribution crossarm.

Safety clearances required for transmission voltages generally provide birds with both adequate phase-to-phase and phase-to-ground separation. When transmission lines are constructed with distribution underbuilds, however, the horizontal clearances are inadequate for both large and medium-sized birds. Phase-to-ground clearance is particularly small between the grounded (e.g., steel) pole and the center phase. These clearances are sometimes small enough to create a high electrocution risk for even smaller birds (Figure 6-14).

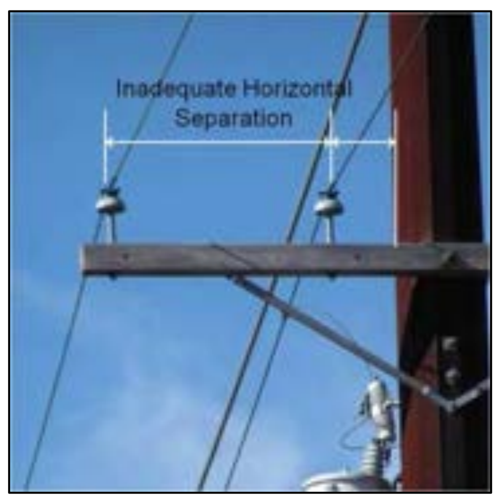

Figure 6-14. Wood distribution underbuild crossarm with inadequate phase-to-phase and phase-to-ground (steel pole) separation.

If steel distribution arms are used instead of wood, the vertical clearance between the energized conductor and grounded crossarm also becomes a critical dimension, resulting in inadequate distribution phase-to-ground (crossarm) separation (Figure 6-15). These configurations are particularly high risk because even relatively small birds can make contact with the energized conductors while perching on grounded arms.

Figure 6-15. Steel distribution underbuild crossarms with inadequate horizontal phase-to-phase separation, plus inadequate horizontal and vertical phase-to-ground separation.

6.2.6.2 Mitigation

For distribution underbuild, a 12-foot wood crossarm with a conductor cover on the center phase usually achieves avian-friendly spacing (Figure 6-16) if the neutral is mounted below the crossarm. However, if the neutral is mounted on the crossarm, a second conductor cover is required. On metal poles with diameter of 16 inches or greater at crossarm height, all three phases would require conductor covers.

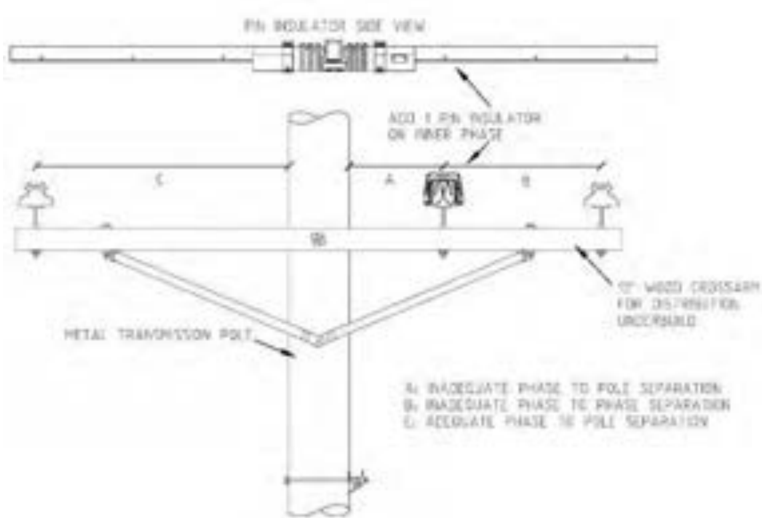

Figure 6-16. Three-phase 12-foot wood crossarm underbuild configuration with one primary pin insulator cover (avian friendly on smaller metal poles).

With steel crossarms on a distribution underbuild, all three phase conductors should be covered to prevent phase-to-phase or phase-to-ground (pole, crossarm, neutral) contacts (Figure 6-17). Because all energized conductors are covered, the neutral can be mounted at any position.

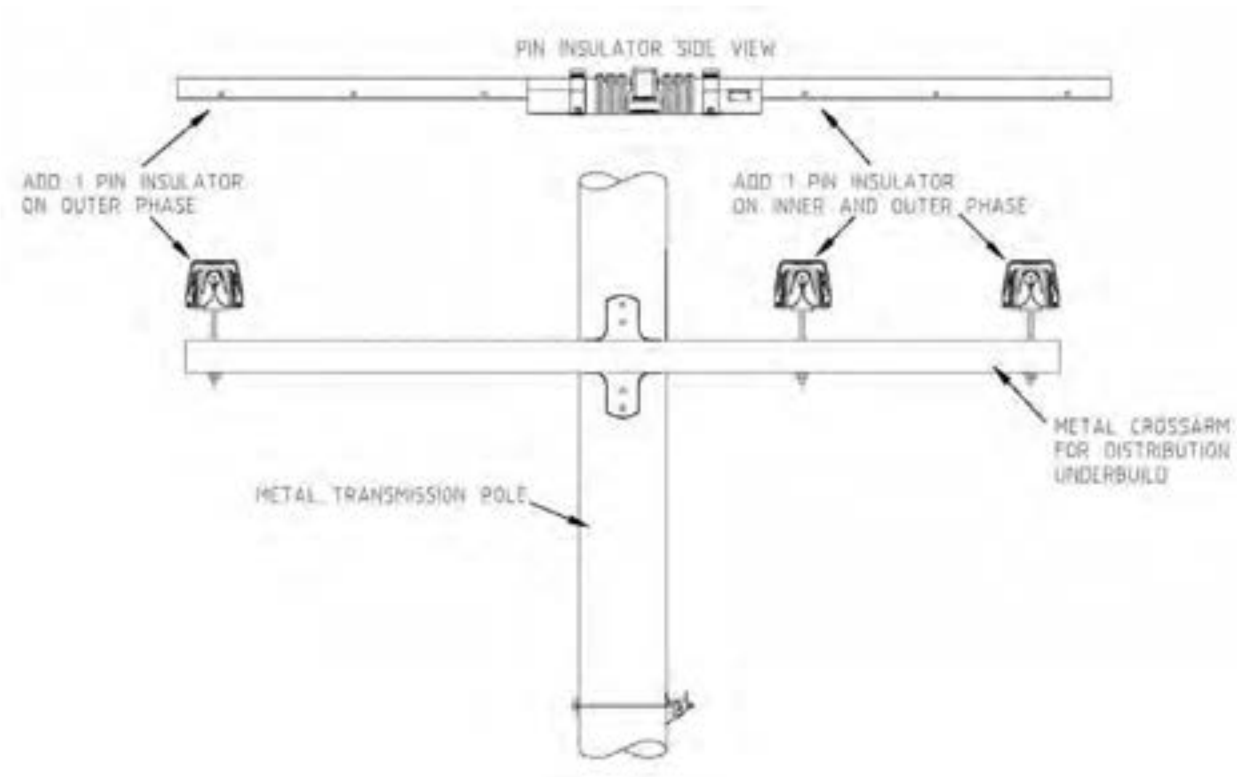

Figure 6-17. Three-phase steel crossarm underbuild configuration with three primary pin insulator covers (avian friendly).

Suspending energized conductors from the crossarm, instead of supporting them on pin insulators, allows birds to perch on the crossarm with little potential electrocution risk. Note that even if the wires are suspended, there is still less than 60 inches of separation between the inner and outer phases. Consequently, the inner phase should be covered to minimize the potential electrocution risk to flying birds (Figure 6-18). The neutral should be mounted below the arm on the pole. If the neutral is mounted on the crossarm, a second conductor cover is required.

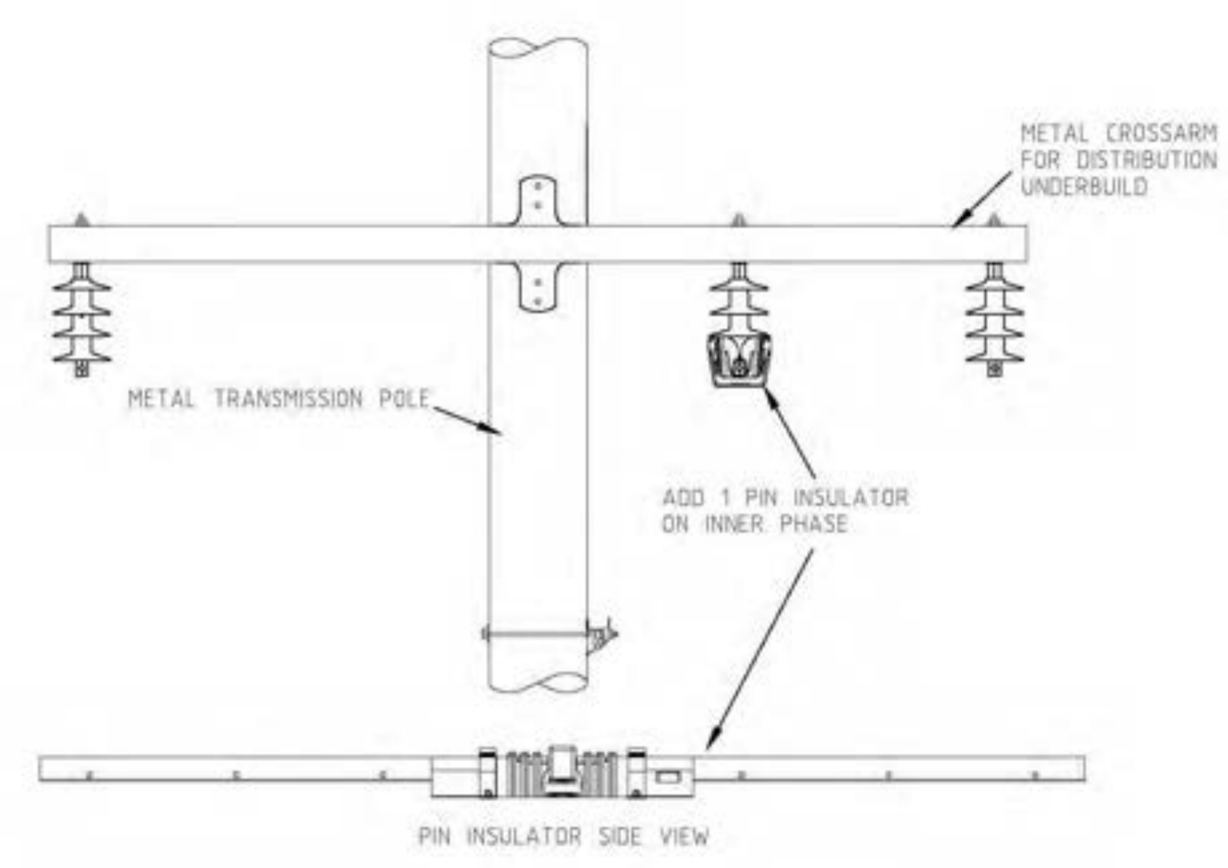

Figure 6-18. Three-phase crossarm underbuild configuration with one primary suspension insulator cover (avian friendly).

7 SUBSTATION ELECTROCUTION MEASURES

Substations, like distribution and transmission lines, vary in the risk they pose to birds and other wildlife. Substations rely on the same mitigation strategies as distribution and transmission: separation (adequate space between energized and grounded contacts), insulation (strategically covering energized and grounded contacts), and redirection (using barriers to isolate grounded or energized areas, or fencing to exclude wildlife). Management practices also can minimize a substation's appeal to small birds and mammals, which in turn reduces the likelihood of predators such as owls, raccoons, or snakes becoming electrocuted and causing an outage. The electrocution risk in substations typically is greatest on the distribution "low side," which has smaller clearances than the transmission "high side."

As with overhead lines, the most effective method to reduce animal-caused substation outages is separation (IEEE 1993). This approach is not always feasible, however, particularly for some substation equipment, such as switches and reclosers, which require cover-up materials to mitigate wildlife electrocution risk (Figure 7-1).

Figure 7-1. Insulating materials applied to substation bushings and busswork.

Cover-up materials and devices must adhere to NESC and company-specific safety requirements. Material properties vary widely and should be carefully evaluated. It is important to recognize most wildlife protection products have not been tested to a uniform standard. The IEEE Standard 1656 (IEEE 2010b) was designed for overhead distribution systems, not substations. Some, but not all, test methods may also be applicable to substation products.

As a rule, substations are more difficult to retrofit than overhead distribution lines because substation configurations and equipment are not-standardized across the industry. Substation insulation products may need to accommodate substation-specific inspections. Certain substation insulation products are specifically designed to be compatible with thermography and/or sight glass inspections. Because of the large number of potential contacts, the absence of standardized retrofitting templates, and specific operations and maintenance considerations, substation retrofits demand a high level of skill and attention to detail from the project coordinator. Several viable substation retrofitting approaches accommodate these considerations:

- Select ready-made commercially available insulating caps and covers
- Rely on heat-shrink insulation, insulating paints and sprays, and fusing tape to cover non-standard or difficult connections
- Order custom-engineered covers

*Caution: wildlife-protection measures using insulation are **not** designed to protect linemen. Many products are not rated for the full line voltage and are designed to protect animals from incidental contact only. All wildlife protection products must be reviewed and adopted by Engineering Standards prior to deployment.*

A few manufacturers have focused on substation retrofitting (Appendix G). These vendors offer a variety of substation insulating covers and barriers. Other commercially available products include heat and cold shrink wraps, coatings, and fusing tapes available for nonstandard equipment shapes. These materials also are available in flat sheets, tubing, and tapes to allow custom-fitted applications.

Many operators have discovered that they can make a strong business case for substation retrofits. Animal outages are typically concentrated at particular substations where the infrastructure is more susceptible to outages, and the surrounding habitat is most amenable to wildlife. Even though substation retrofitting is inherently costly, the payback period can be very brief, because averting just one or two wildlife outages results in substantial savings. For this reason, a three-stage process is recommended wherein: (a) outage records are analyzed to identify substations with poor reliability; (b) outage-prone substations are assessed for wildlife vulnerabilities; and (c) wildlife retrofits and management modifications are implemented, as warranted.

The following sections provide substation-specific information intended to supplement Chapter 5 *Distribution Electrocution Measures* and Chapter 6 *Transmission Electrocution Measures*. Prior to implementing substation retrofits, it is important to be familiar with all three chapters, since each contains applicable information.

7.1 Equipment

7.1.1 Busses

Busswork faults usually occur when an animal simultaneously contacts the energized bus and a grounded bus support. New substations should be constructed so bus supports extend at least 40 inches from grounded surfaces to minimize contact from climbing animals, such as raccoons. The distance of the busbars can be increased by using fiberglass extensions (Figure 7-2). It is also possible to use larger insulators to increase phase-to-ground separation. The recommended phase-to-phase separation is dependent on the species likely to be in the substation (for birds, refer to Table 2-1). Insulation or cover-up materials can be used to provide protection if adequate spacing is not possible (Figure 7-3). Insulation is available either as shrink-to-fit (Figure 7-4) or form-fitted (Figure 7-5).

Figure 7-2. Substation bus supports for animal protection.

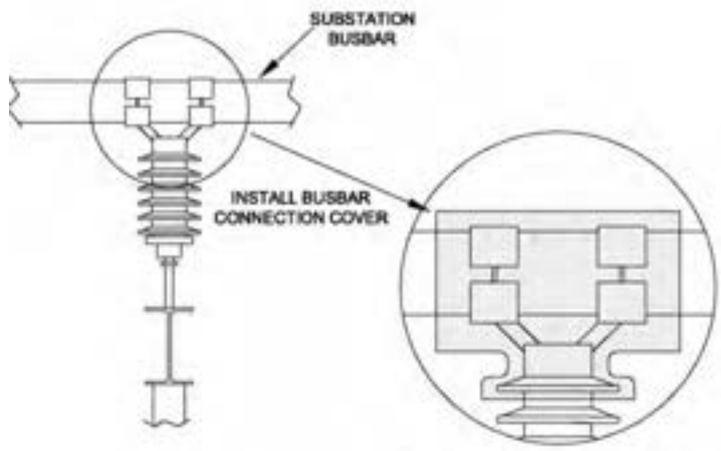

Figure 7-3. Busbar insulation.

Figure 7-4. Shrink-to-fit bus insulation (TE Connectivity Ltd.).

Figure 7-5. Form-fitted bus insulation (Cantega Technologies, Inc.).

7.1.2 Jumpers

Jumpers are used to connect substation equipment to primary conductors and other equipment. Energized jumpers should be covered when they are in the vicinity of grounded and other energized contacts at a different potential. New jumpers should have insulated covering rated to at least 5kV (Figure 7-6). Although 5kV-rated insulation does not protect for the full-line voltage, it does provide protection from flashovers caused by brief or incidental animal contacts. Prolonged contact may cause insulation failure and short circuits, however.

Split-seam insulating hose (Figure 7-7) can be installed over existing wire without disconnecting the lead wire. Split-seam hose with sufficient overlap prevents the seam from opening where the wire bends; therefore, split-seam hoses with extensive overlap are recommended.

Figure 7-6. Insulated (covered) jumper wire for new installations.

Figure 7-7. Insulated (covered) jumper wire for retrofitting.

Energized leads should be completely insulated. Jumper insulation must provide continuous coverage into caps; bare portions of the primary jumper or stinger wires should be visible or present. Even small gaps can cause wildlife electrocutions; therefore, insulated fusing tape should be used to cover small, exposed areas.

7.1.3 Power Transformers

Low-side transformers are a chief cause of wildlife outages in substations (EPRI 2001). Transformer outages may occur when an animal on a grounded transformer bank touches an energized conductor or bridges the distance between two energized phases. Animal-caused outages can be minimized through use of bushing covers and bus/jumper insulation; therefore, transformers should be installed with bushing covers (Figure 7-8) or wrapped with insulating material (Figure 7-9). Roof-top bushings sit on top of switchgear and should also be covered with bushing covers.

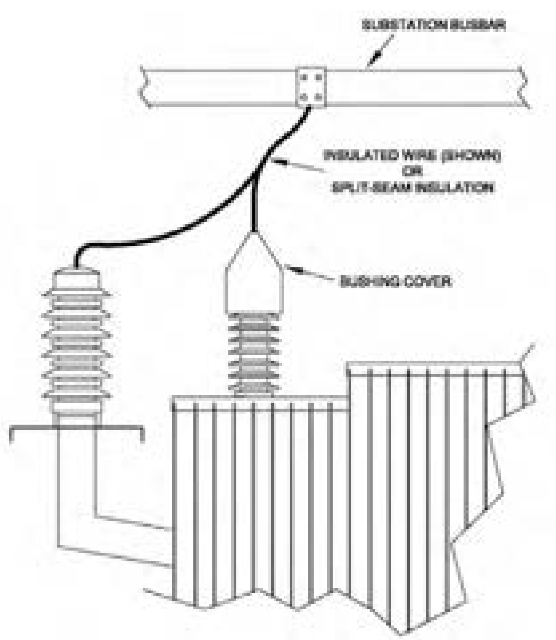

Figure 7-8. Bushing cover.

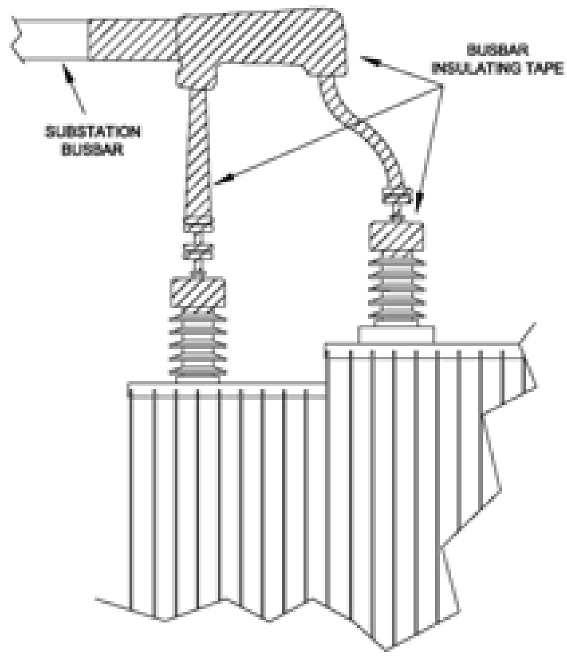

Figure 7-9. Shrink-to-fit insulation.

Bushing covers generally are made of track-resistant, high-density polymers that either snap on or slide over bushings. Snap-on covers allow installation without removing the transformer jumper wire. Slide-over units require the wire to be temporarily removed in order to slide the cover over the transformer bushing. Covers can be ordered in a fire-resistant material.

All bushing covers must be installed according to the manufacturer's instructions. The sheds on bushings are designed to wash themselves of contaminants during precipitation events; to allow for washing, it is important to cover only the number of sheds specified by the manufacturer. It is not uncommon for bushing covers to be installed improperly, which can result in tracking and flashovers.

Substation transformer oil must remain stable for an extended period at high temperatures; thus, some utilities require that bushing covers allow visual inspection of oil indicators from the ground. For utilities requiring thermal scans on their equipment, TE Connectivity Ltd. and Therm-A-Guard (Appendix G) offer bushing covers that allow for visual and thermal inspections, while reducing the electrocution risk to birds and other wildlife (Figure 7-10). Any exposed wire associated with transformer bushings should be covered or insulated.

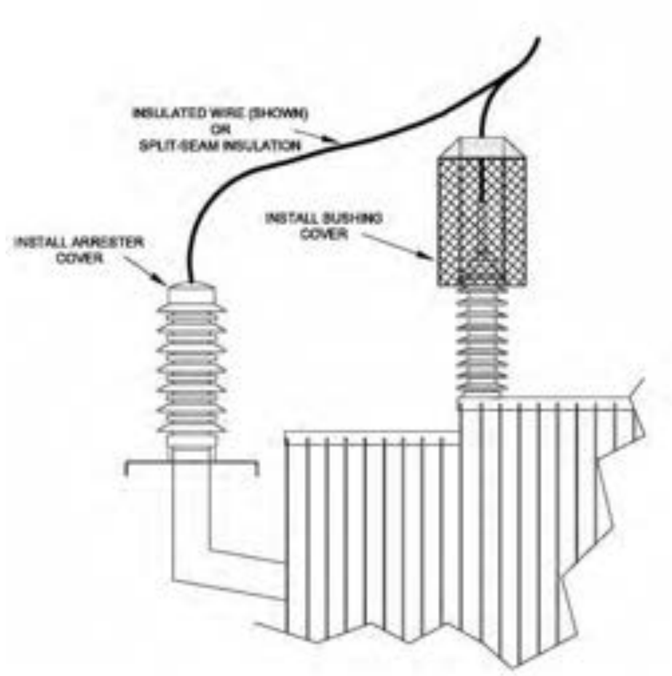

Figure 7-10. Bushing cover allowing thermal imaging.

7.1.4 Cutouts

Cutouts are often installed on metal brackets. If the metal bracket is grounded, the reduced phase-to-ground clearance presents a high electrocution risk even to small or medium-sized birds and other wildlife. Cutouts should be covered (Figure 7-11). Numerous vendors manufacture a variety of cutout covers (Appendix G). Any exposed wire associated with cutouts should be covered or insulated.

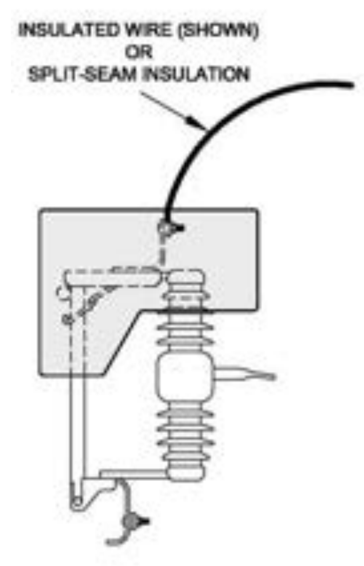

Figure 7-11. Cutout with an insulating cover.

7.1.5 Surge Arresters

Surge arresters should be installed with arrester caps (Figure 7-12) (Appendix G) and insulated stinger wires. Surge arrester ground wires should be routed to avoid potential phase-to-ground contact. If the ground wire is near energized hardware, it also should be covered. Any exposed energized wire associated with arresters should be covered or insulated.

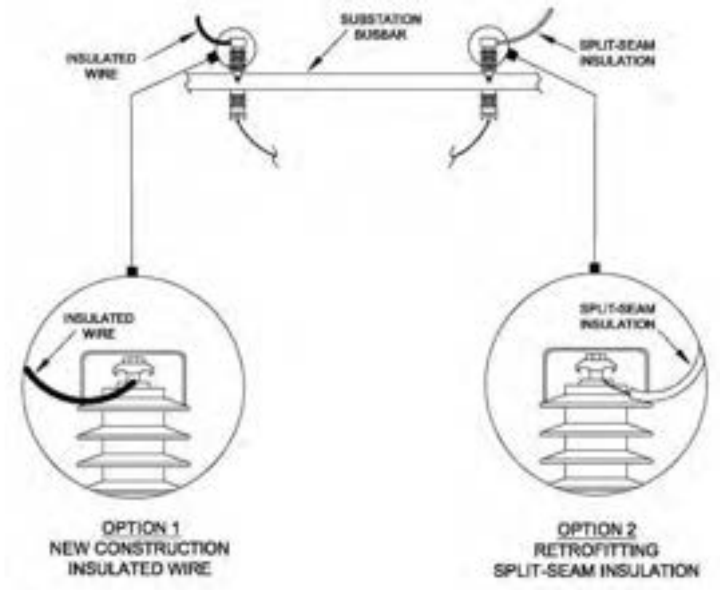

Figure 7-12. Surge arrester with arrester cap.

7.1.6 Risers

Grounded steel pothead brackets associated with riser poles at substation getaways can present a high electrocution risk. Riser potheads should be fitted with a snap-on "clamshell" type cover (Figure 7-13). Hardware that cannot be covered by the unit should be wrapped with insulating tape. No exposed jumper should extend beyond the bushing cover, and leads should be kept as short as possible. Any exposed energized wires associated with risers should be covered or insulated. Riser conduits should be sealed with expanding foam and putty or duct seal to prevent wildlife intrusion.

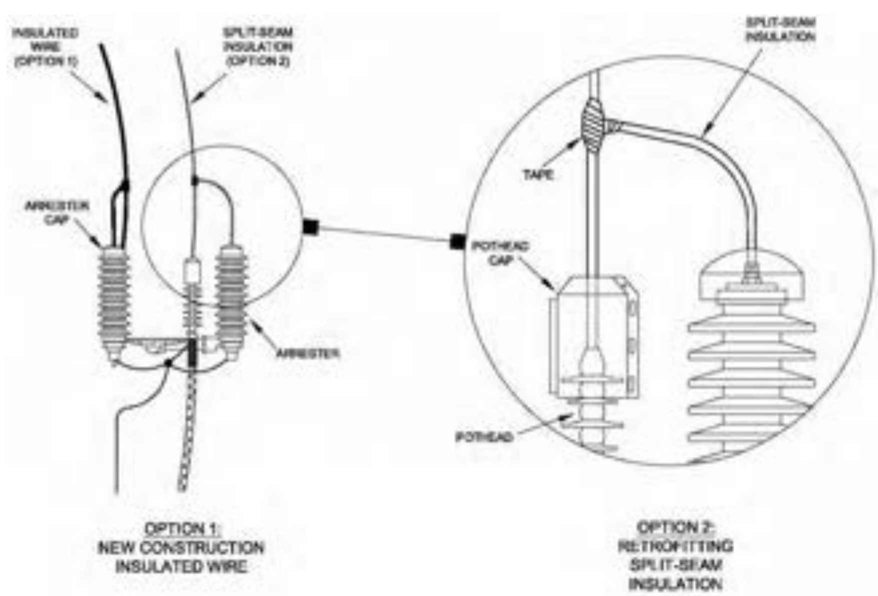

Figure 7-13. Protected riser pole with pothead covers.

7.1.7 Capacitors, Regulators, and Reclosers

Capacitors, regulators, and reclosers can be lethal to birds and animals due to exposed bushings and jumpers. For some utilities, breakers/reclosers account for a substantial portion of total annual animal-caused consumer interruption time (EPRI 2001). Regulators, reclosers, and capacitors should utilize bushing covers (Figure 7-14) and insulated jumpers.

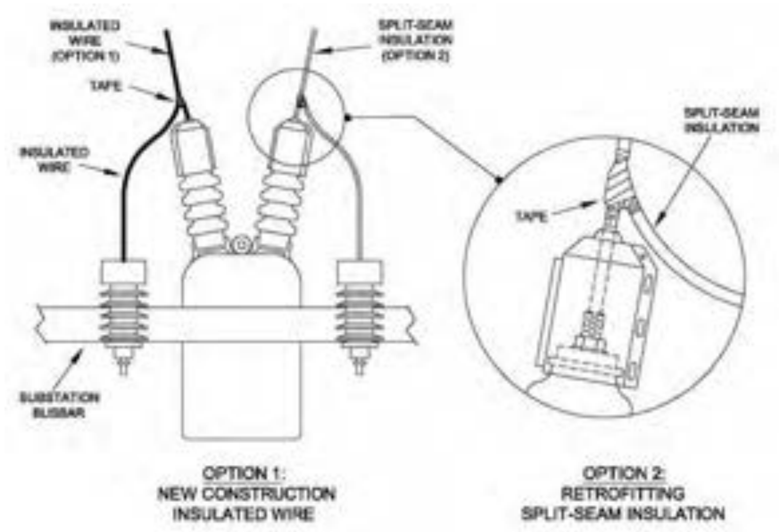

Figure 7-14. Equipment fitted with animal protection.

7.1.8 Regulator By-Pass Switches and Disconnect Switches

Although switches are difficult to insulate, barriers are an effective way to isolate energized areas from grounded ones (Figure 7-15). Switches also can be mounted on nonconductive brackets to minimize potential contact. Associated jumpers and bus work should be insulated or covered. Appendix G provides contact information for manufacturers of barrier plates for switches.

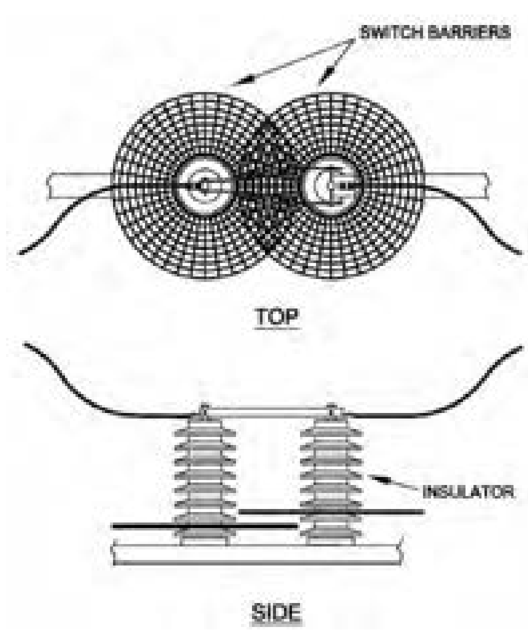

Figure 7-15. Switch barriers.

7.1.9 Three-Phase Switchgear

Equipment switches are difficult to retrofit because they have many moving parts. Figure 7-16 shows barrier plates used on switches to prevent ground contacts. Associated jumpers also should be insulated. Appendix G provides contact information for manufacturers of barrier plates for switches.

Figure 7-16. Switch with custom-formed barrier plates (Cantega Technologies, Inc.).

New switches can be purchased with fiberglass support arms rather than steel arms. At least one switch manufacturer, S&C Electric Company, produces a unit with wildlife protection on the interrupter (Figure 7-17). Switchgear also can be mounted upside down, beneath the crossarm, to reduce the risk of animal contacts.

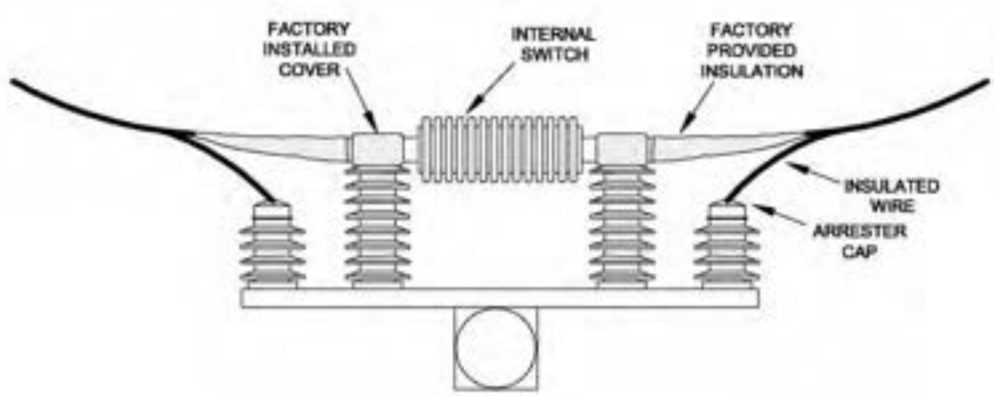

Figure 7-17. Switch with built-in animal protection.

7.2 Perimeter and Internal Fencing

Perimeter fencing is designed to prevent medium-sized to large mammals—and in special cases, small mammals and snakes—from entering substations. Internal fencing is used as a second line of defense around key equipment within the substation such as breakers, reclosers and power transformers. Neither perimeter nor internal fencing excludes birds, nor does fencing prevent subsequent bird-related outages. The simplest perimeter fences are chain link or textured block walls. These barriers allow the passage of small mammals and snakes that can attract foraging raptors. Wildlife-resistant fencing systems are described as passive or active. Passive systems employ smooth surfaces that terrestrial animals cannot climb. Active systems deliver a moderate electric shock to repel climbing animals.

The effectiveness of existing fencing can be increased by adding smooth polycarbonate, sheet metal, or aluminum panels. These barriers should be a minimum of 36 inches high, mounted on the outside of the existing fence, and installed around corner posts. All openings around gates and posts should be blocked using expanding foam or custom-cut strips of wire mesh. If wire mesh is used, it should be fine enough to exclude snakes and rodents. To discourage snakes from climbing over an existing fence, ¼-inch mesh fabric can be installed on the outside of a substation fence, from the ground surface to a height of 36 inches, with the top curled outwards. To discourage burrowing animals, fences should extend at least 12 inches below the ground surface. Exclusion fences can either be constructed (Figure 7-18) or purchased.

Figure 7-18. Animal-exclusion fence constructed to exclude rodents.

The Kinectrics PowerKage is a passive fence designed to minimize ground access to substation equipment by squirrels, raccoons, snakes, and other wildlife. This system consists of a lower fence constructed of structural steel components and wire mesh welded into a single unit and galvanized, and an upper fence composed of heavy-gauge plastics. These plastics create smooth overhanging surfaces that animals cannot climb (Figure 7-19). Gates allow easy entry and exit for maintenance and inspection; in an emergency, maintenance personnel can easily scale the 4-foot fence.

Figure 7-19. Kinectrics PowerKage (Kinectrics).

The TransGard Systems, Inc. fence is an active system that uses an agricultural-type pulsating direct current (DC) voltage system to deter animals with a nonlethal electric shock (Figure 7-20). Galvanized wire grids alternate between positive and negative charges. An animal attempting to breach the fence comes into contact with both fields and receives a shock that deters it from climbing any further. The fence energizer is contained in a weather-resistant control box, typically placed near a gate to facilitate personnel entry and exit. The main on/off switch and voltage meter are located on the outside front of the control box. The TransGard Systems, Inc. fence is engineered to function in severe weather including flooding, ice, and deep snow, by using an elevated gate design and removable step plate.

Figure 7-20. TransGard Systems, Inc. fence (TransGard Systems, Inc.).

The Kinectrics and TransGard systems both incorporate modular designs for easy set up. Shutdowns typically are unnecessary during installation because little or no digging is required. Appendix G provides contact information for manufacturers of perimeter and internal fencing.

7.3 Substation Getaways

Squirrels often use power lines to move about their territories. Overhead lines provide easy access to substations. Squirrels are difficult to deter because they can jump 6 feet high, leap 8 feet horizontally, and drop from a height of 10 feet without injury.

A getaway is a short section of a power line from the substation circuit breaker to the first structure outside of the substation. It is preferable to equip the substation with underground getaways. If this is not possible, an overhead line may be fitted with a spinning line guard, which is a series of free-spinning, hollow polypropylene rollers that attach to a power line (Figure 7-21) (Appendix G). Plastic barriers at each end force squirrels to jump over and land on the roller, which then spins the squirrel off the line. To prevent failure, it is critical to ensure the rollers remain in good condition and do not bind to the wire. It is important to note that getaway barriers can be an important component of substation protection but should not be used as a stand-alone measure.

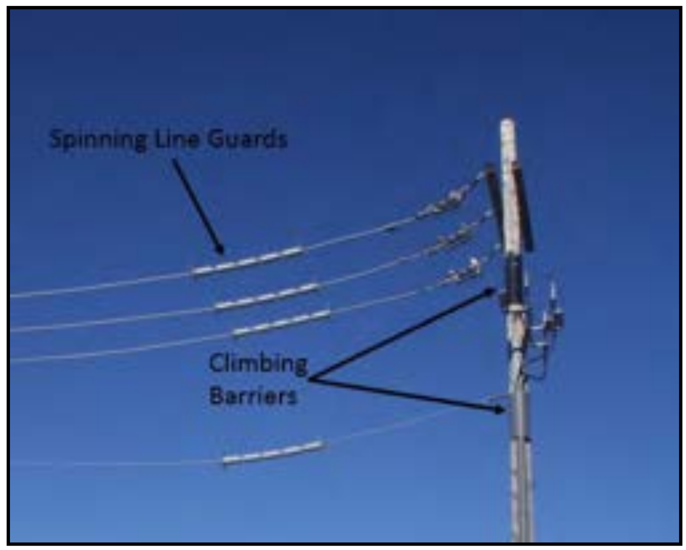

Figure 7-21. Substation getaway pole fitted with spinning line guard and climbing barriers.

An effective best practice for substation perimeter design is to avoid placing other structures within 10 feet of the substation perimeter. When this threshold cannot be met, it may be advisable to install anti-climbing wraps on them. The first pole outside the substation on an overhead substation getaway should also be fitted with smooth anti-climbing wraps at least 6 feet wide (Figure 7-21). Climbing wraps can be constructed out of plastic or metal or may be purchased commercially (Appendix G).

7.4 Substation Management

Management practices can make substations less attractive to small birds and rodents. Not only can these small animals cause damage to equipment, but they may attract larger predators such as owls and raccoons, which are susceptible to electrocution and likely to cause outages. Pipes and other crevices should be capped or filled to prevent access by cavity-nesting birds.

Nests that do exist may be removed, as consistent with federal and state regulations, company policies, and permits.

Landscaping should not include bushes or trees that provide berries and nuts that wildlife and small birds may feed on. Materials stock should not be allowed within the substation because they offer shelter for rodents. If problems persist, rodents may be controlled using bait stations.

To restrict squirrel entry into substations, tree branches should be trimmed so they are no closer than 10 feet from the perimeter fence. Substation perimeter fences also should be regularly inspected and maintained. When possible, fences should extend 12 inches below ground level or should be underlain by concrete to reduce access by digging animals.

8 COLLISION MEASURES

Not all power lines comprise an equal collision risk; avian collision risk varies in place and time based on climate and visibility (Figure 8-1), the presence of line marking (Figure 8-2), and avian movement corridors (Figure 8-3), and other factors. Most avian collisions occur in localized areas where biological, land-use, topographic, weather, and line configuration factors combine to increase the risk of collision. This chapter describes measures to minimize avian collision risk and discusses engineering factors that should be considered when planning a line-marking project, such as loading and corona.

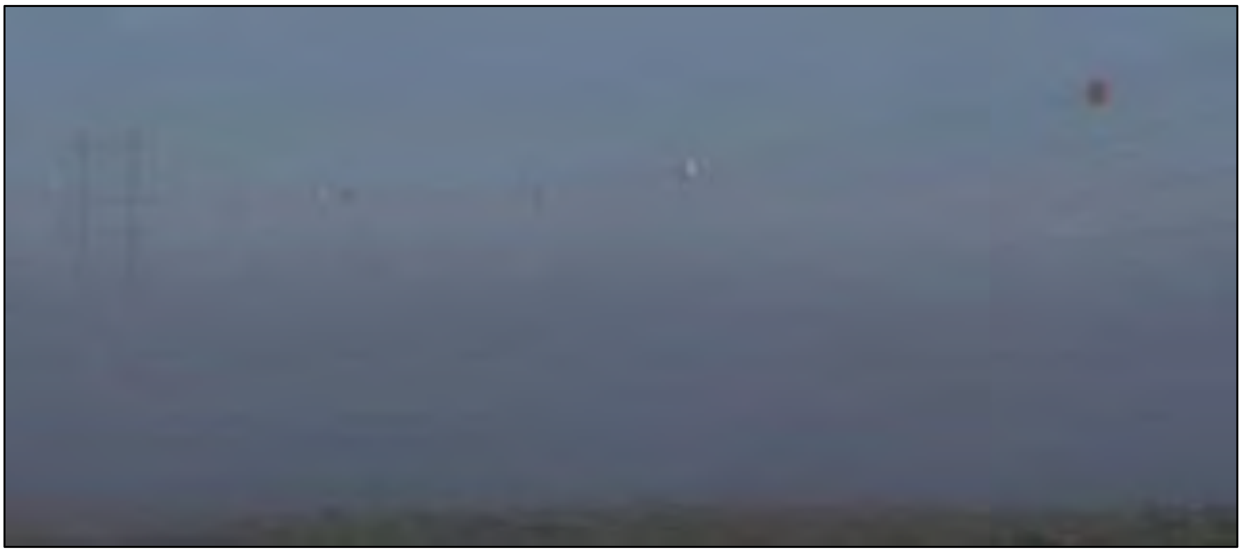

Figure 8-1. Aviation markers improve visibility of transmission lines during inclement weather.

Figure 8-2. Flock of Sandhill Cranes crossing a marked distribution line en route to a feeding area.

Figure 8-3. Transmission line bisecting a reservoir associated with heavy bird use.

Figure 8-4. Birds perched next to spinning diverter.

The primary strategy for reduce avian-power line collisions on existing lines is to improve line visibility for birds (Beaulaurier 1981). Line-marking devices make wires more conspicuous but do not haze or frighten birds (Figure 8-4).

Line marking is a tool that typically reduces, but does not eliminate, collision risk. For example, in several studies, line marking reduced Sandhill Crane collisions by up to 61% (Morkill 1990; Morkill and Anderson 1991, 1993; Brown and Drewien 1995). The most robust line-marking studies normalize the number of collision fatalities by the number of bird crossings. The average mortality reduction after marker installation was 78% in such studies, with reports ranging from 55% to 94% (Barrientos et al. 2011); Jenkins et al. (2010) also found that line-marking efficacy varies greatly. However, line marking does not always reduce the risk of avian collision to an acceptable level (Mojica et al. 2009, Ventana Wildlife Society 2009). Though generally impractical and very expensive, undergrounding is the only failsafe method for eliminating avian collisions.

Two types of line-marking devices exist. “Passive” marking devices do not have moving parts, and rely on the device’s profile, contrast, reflectance, or illuminance characteristics to improve visibility. “Active” marking devices also use motion to improve line visibility. General characteristics of passive and active line-marking products are discussed in this chapter; Appendix G provides detailed information on specific products. Regardless of the product selected, if optical ground wires (OPGWs) are to be marked, the utility should contact the manufacturer to ensure the markers will not void the OPGW warranty.

Relative effectiveness is difficult to assess because few devices have been tested in statistically valid comparative studies, and findings have been inconclusive or inconsistent (Bernardino et al. 2018). Because device effectiveness is affected by species present, types of movements, and installation spacing, comparisons across multiple studies are not scientifically valid. Comparative studies of device effectiveness would help utilities select products that best serve their needs. In general, researchers presume that line marking is more effective if devices are bigger or closer together, comprise brighter colors or more contrast, or incorporate motion (Martin 2011).

8.1 Installation

8.1.1 Line Access

Line access may dictate the type of markers required and may ultimately be the most important factor in determining project budget. Installation via bucket truck are the most affordable and efficient installation options (Figure 8-5). All line-marking products can be installed by hand or hotstick; however, many of the line spans posing the greatest risk of avian collision cross open water or wetlands and are not accessible by bucket truck.

Helicopter installation has long been the primary option for line spans crossing water bodies or wetlands. Helicopter installation can accommodate any line-marking device, but there are many drawbacks, the greatest of which is risk to human safety. Helicopters must hover close to the wires so the technician can affix the marking device (Figure 8-6). For that reason, helicopter line marking generally cannot take place in gusting winds. Helicopter line marking generally is used only on high-profile projects or when a serious avian collision issue has been identified.

In recent years, new solutions for marking inaccessible lines have been developed. A "marking robot" (Figure 8-7) pushes P&R Technologies markers down the line, then triggers the spring-loaded clamp once in place. However, the technology is slow because it only places one marker per trolley round trip and cannot accommodate energized lines.

Drone-based line marking has shown more promise and is now commercially available in the U.S. (Figure 8-8). Drones have been designed to carry multiple markers, allowing the installation of hundreds of markers in a day. Skilled and certified pilots are required, and the Federal Aviation Administration requires that drones stay within the operator's sight. The cost of drone-based marking is about 65% less than helicopter marking and does not risk human life. Drone-based marking should be carried out in temperatures above freezing so battery amperage is adequate to safely handle the marker payload. So far, commercial drone-based marking uses only products with spring-loaded clamps, but strategies for installing other types of markers via drone are currently in development.

Figure 8-5. Marker installation by bucket truck.

Figure 8-6. Marker installation by helicopter.

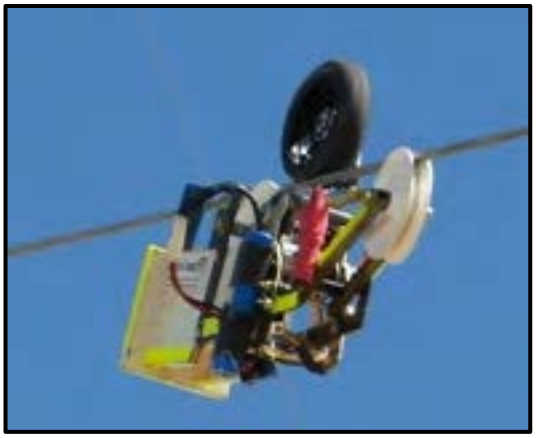

Figure 8-7. Marking robot (Tim Chervick).

Figure 8-8. Drone-based line marking.

8.1.2 Marker Spacing

Optimal marker spacing would maximize effectiveness and minimize both expense and line loading. An upper and lower threshold for optimal marker spacing has not been established in the literature (Sporer et al. 2013) and may be affected by the size of the marker, bird species, load-bearing capacity of the lines, intensity of bird use, and marking goals. The general industry standard is to space markers so they give the appearance of 15-foot spacing, however some manufacturers assert that wider spacing is appropriate for highly conspicuous products. In practice, marker spacing varies for project-specific reasons (APLIC 2012).

An effective strategy for minimizing costs and wire loads while maximizing the apparent device density is to stagger markers on adjacent wires. To give the appearance of 15-foot spacing on three wires, diverters on each wire should be spaced 45 feet apart with the first diverter 15, 30, or 45 feet from the structure on the A, B, or C phase, respectively (Figure 8-9). For two OHS wires, the diverters on each wire would be placed 30 feet apart and staggered to simulate a 15-foot distance (Figure 8-10). Staggered installation is not recommended when wire heights are not similar. For example, on vertical configurations it is best to mark each wire independently, so the spacing between markers would be 15 feet on each individual wire.

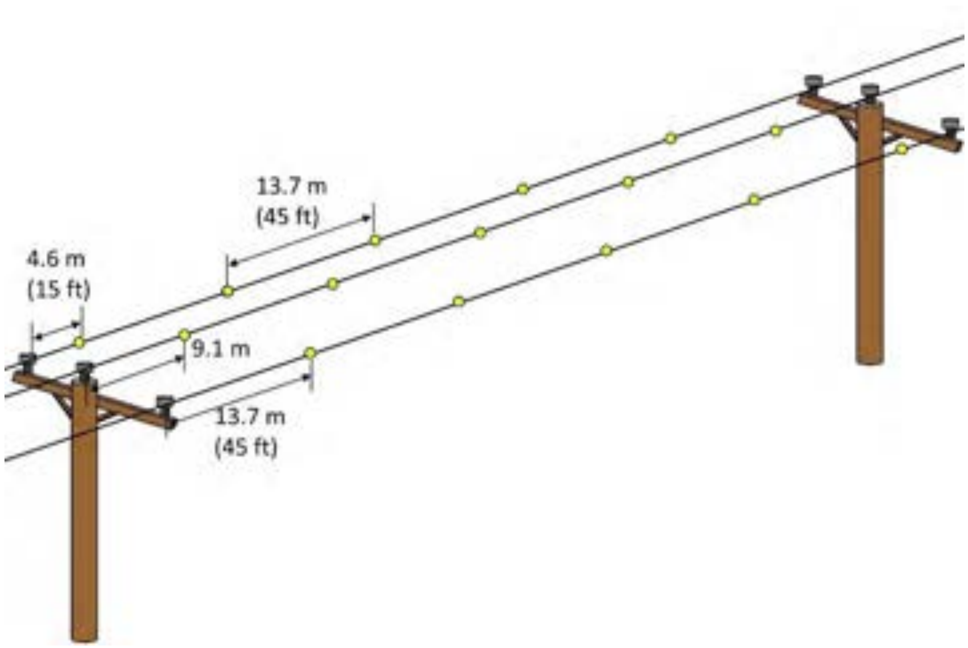

Figure 8-9. Marker placement for three wires in two planes.

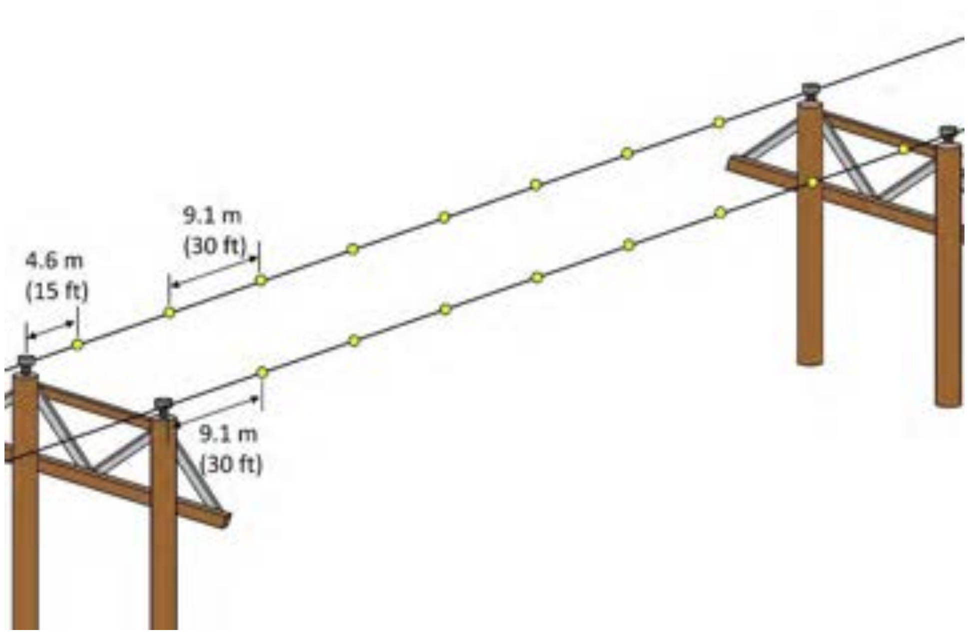

Figure 8-10. Marker placement for two OHS wires in one plane (conductors omitted for clarity).

It can be a challenge to achieve proper device spacing. When stringing the conductors, it is advantageous to paint the conductor at intervals to mark diverter placement, rather than performing measurements after the wire is installed. This is more critical when installing markers with a helicopter than when using a bucket truck.

8.2 Potential Effectiveness Factors

Devices are typically designed and evaluated based on what makes a line more conspicuous to humans; however, avian vision differs significantly from human vision and varies substantially among species (EPRI 2016b). Factors that may affect effectiveness are discussed below with the understanding that any conclusions are preliminary and have not been demonstrated in the peer-reviewed literature, at least not for all collision-prone species.

8.2.1 Line Profile

All line markers increase the line profile to some extent. At a minimum, the Spiral Vibration Damper (SVD) increases the line profile by 1 to 3 inches (Figure 8-11) whereas aviation-marking balls increase the line profile by 18 inches or more (Figure 8-12). Line markers designed specifically to prevent avian collisions generally increase the line profile by 4 to 7 inches, plus the dimension of the clamp, where present.

Figure 8-11. Preformed Line Products SVDs.

Figure 8-12. TE Connectivity AVISPHERE (TE Connectivity).

For humans, an increased line profile has the greatest effect on visibility when the line is backlit by the sky. Thus, line markers relying primarily on increased line profile might be more effective during the day than at night. Similarly, such markers might be less effective when the visual background for an approaching bird is cluttered or comprised of land features instead of sky.

8.2.2 Color and Contrast

While Calabuig and Ferrer (2009, in Bernardino et al. 2018) found that color did not affect marker efficacy in tests of white, yellow, or orange coil-style markers (Figure 8-13), manufacturers continue to offer multiple color choices for the same product. Many markers feature contrasting colors in hopes that high contrast will make the markers conspicuous;

however, bird perception of chromatic contrast does not mimic human perception and even varies by species (Esteban Fernandez-Juricic pers. comm. 2018).

Figure 8-13. Bird Flight Diverters (BFDs) are available in yellow and gray as well as red.

Utilities may select markers with colors and chromatic contrasts that meet their own needs. If they would like the marking to be inconspicuous to their customers, they may choose low-contrast markers that approximate the wire color. Alternatively, high-contrast, brightly colored markers emphasize a utility's avian conservation efforts.

8.2.3 Glow, Reflectance, and Illumination

Figure 8-14. BFD coated to glow in the dark.

Increasingly, line markers are integrating phosphorescent ("glow-in-the-dark") and reflective elements (Murphy et al. 2016a) to improve visibility under low-light conditions, which are associated with elevated avian collision risk. This may be incorporated using coatings (Figure 8-14) or stickers. Not all glow coatings have been tested, but two manufacturers claim illumination times of 12 to 24 hours following a complete sunlight charge. During the summer, a device with 12 hours of illumination would provide both dusk and dawn illumination; however, during the winter—when nights are longer than 12 hours—it would only provide illumination at dusk. A 24-hour charge would provide dusk and dawn coverage throughout the year. In both cases, brightness is greatest immediately after a sunlight charge; presumably the products would be most effective at that time.

The case for reflective properties (Figure 8-15) is more difficult to make, because reflective elements do not emit light themselves. In a best-case scenario, elements might reflect moonlight, but this would only be perceptible to a bird if flying away from the moon. Also, moonlight is diffuse and would not cause a strong reflection under most conditions. However, even if reflectance does not improve marker efficacy, it likely does not harm device effectiveness.

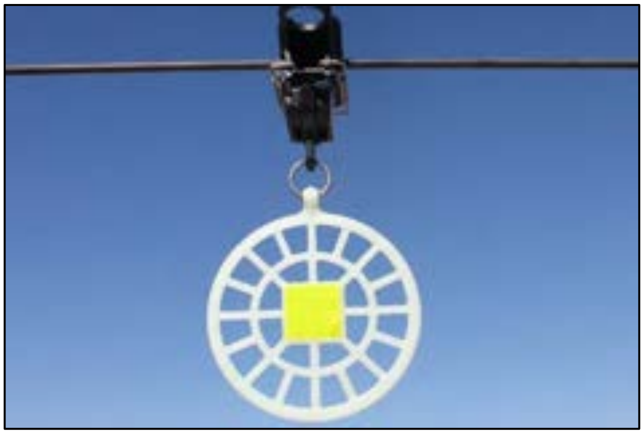

Figure 8-15. BirdMARK BM AG flight diverter incorporates glowing and reflective elements.

At least two lighted avian wire-marking devices are commercially available. Each uses solar panels to charge a battery during the day. A photosensitive switch controls blinking LEDs, which illuminate the line above. Both illuminated markers incorporate elements that should also improve line visibility in the daytime (Figure 8-16 and Figure 8-17). The devices were developed and tested where sensitive African species taking flight at dusk, during the night, and at dawn were colliding with power lines. In the pilot study, spans with illuminated markers had fewer collisions than spans with non-illuminated markers. For obvious reasons, illuminated markers are more expensive than other types, and because they are new to the marketplace, durability is still unknown.

Figure 8-16. Raptor Clamp LED Diverter for improved effectiveness in nocturnal and low-light situations.

Figure 8-17. OWL Diverter for improved effectiveness in nocturnal and low-light situations.

Certain collision-prone species such as coots and grebes, generally fly at night or during periods of low light. Glow-in-the-dark and/or reflective products could be most effective when used in areas where nocturnal collision-prone species are present. Bird behavior is also an important factor. Sandhill Cranes are diurnal migrants and do not prefer to fly at night but will take flight when flushed from their roost during migration stopovers and are then vulnerable to line collisions (Murphy et al. 2016b). In areas where this behavior is likely, illuminated or glowing devices may increase marker efficacy. In some locations, illuminated markers may seem visually intrusive to the public and may not be acceptable, especially if they blink.

8.2.4 Motion

Whereas passive marking devices do not have moving parts, active marking devices use motion to increase the conspicuity of a power line. Motion has not been conclusively demonstrated to improve line-marking effectiveness, though researchers agree that it likely enhances visibility (Martin 2011). Many bird species are keenly attuned to motion, a parameter that facilitates both successful foraging and timely response to threats (Martin 2012).

Active line markers consist mostly of plates or discs that swing freely from a spring-loaded clamp. Other designs have cups or an asymmetrical design that catches the wind and initiates a spinning action. Whether or not active markers catch the eye of birds, they are noticeable to humans. Some active line markers have a target-like appearance that could encourage vandalism in some areas. Linemen have documented active markers with bullet holes (Figure 8-18); shots that miss the line marker may cause conductor damage or breakage, instead.

Figure 8-18. Flapper-type marker with a bullet hole.

8.3 Durability Considerations

Durability is an important concern for line markers. Because installation is resource intensive, markers must provide a long service life. Although notes on durability are not comprehensive, they are provided as a resource. These observations should be used as a starting point for a utility’s own investigations. Additional information can be gathered through manufacturer contacts, by reaching out to colleagues at other utilities for testimonials, or by carrying out small-scale pilot testing of various devices under consideration.

8.3.1 Structural Integrity

Marking devices may be highly impacted by UV light, high winds, and other environmental exposure. Markers that do not maintain their structural integrity will not improve line visibility as designed. Coil-style markers made by Preformed Line Products have proven to be durable over two decades or more of service (P. Dille pers. comm. 2007). Although the devices may break when removed, suggesting some degree of brittleness, breakage is rarely observed when products are left in place. Other types of avian-specific static markers also appear to be durable, although none has been on the market for as long as the PVC coil products. Aviation marker balls also provide decades of service, however, they have fallen out of favor for marking wires to reduce bird collisions (Barrientos et al. 2011) because they could mislead an airplane pilot into believing there is an airport nearby. As a rule, avian line markers are made of UV stabilized materials, though the effectiveness of these additives may vary.

Early versions of some active devices had problems with deteriorating plates (Figure 8-19) and broken hardware (Figure 8-20). It appears that at least some of these problems have been remedied, however, it is clear that movement places additional stress on the markers. It is probably reasonable to expect a shorter service life from active line markers, especially in areas of high wind. One company advises potential customers to select a passive version of its active markers in areas where winds frequently exceed 20 miles per hour. This guidance also may be applicable to other products lines. Active markers may become at least temporarily disabled if the plate become entangled with the clamp (Figure 8-21); this may self-correct over time. While disabled, an active marker still functions as a passive marking device.

Figure 8-19. Flapper-type markers with deteriorated plates.

Figure 8-20. Broken hardware on active line marker

Figure 8-21. Active markers may become entangled, at least temporarily.

Because active devices have greater potential for failure, many companies specify passive marking devices for lines that will require helicopter installation. Other utilities have decided to use passive devices exclusively, until research demonstrates that active marking devices are more effective than passive devices and are durable under the expected climatic conditions.

8.3.2 Color, Glow, Reflectance, and Illumination

Environmental exposure may result in loss of color vibrancy over time. For example, coil markers exhibit considerable fading after 12 years of use, as compared to new markers (Figure 8-22). However, because it is unknown if a diverter's color has any impact on collision mitigation rate, fading may not be associated with any loss of effectiveness.

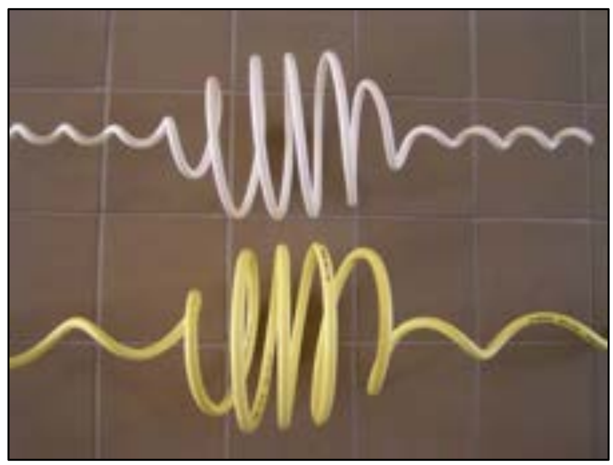

Figure 8-22. Yellow Swan Flight Diverter (SFD) faded after 12 years in the San Luis Valley, Colorado (top), compared to a new yellow SFD (bottom).

Likewise, two devices with glowing elements showed evidence of varying degrees of deterioration over time. The devices were both deployed in an informal pilot study where they were fully exposed to environmental factors on a simulated power line. After 2 years, stickers were securely attached to the devices, but mildew was present on each of the glow strips (Figure 8-23). Glow performance was somewhat compromised though the degree of deterioration varied among products (Figure 8-24).

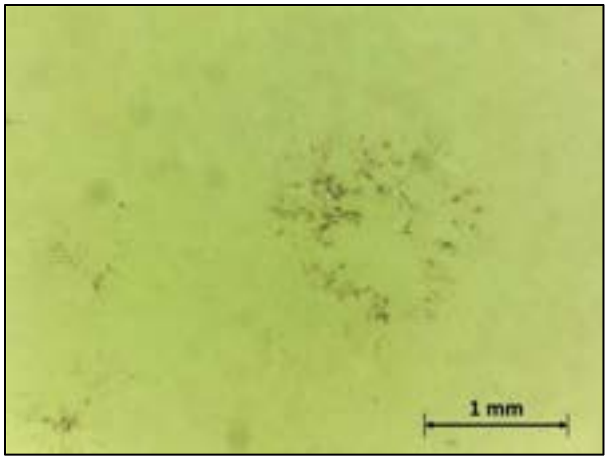

Figure 8-23. Mildew on the surface of of a glow strip after 2 years outdoors.

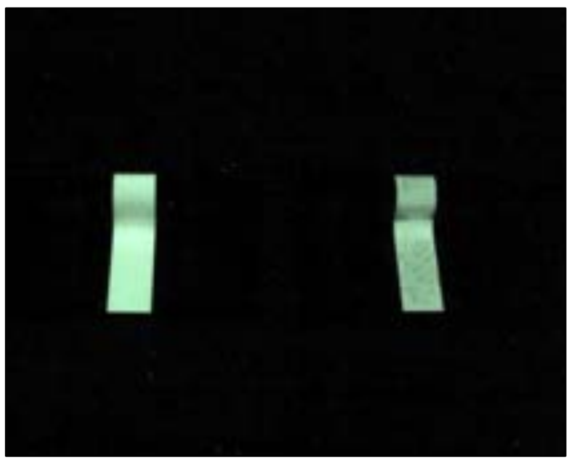

Figure 8-24. Glowing diverter: new (left) and after 2 years outdoors (right).

Durability of illuminated markers is unknown because they are new to the market. Although the core technology is well established and extensively tested, line markers are stressed to a greater degree than similar applications because of wire movement, vibration, and some degree of electrical exposure, even on neutral wires. In addition to concerns regarding the electrical systems, all durability issues associated with non-illuminated active line markers would also apply to illuminated active line markers. As with other active markers, they may be best implemented in areas where bucket truck access would facilitate maintenance or replacement.

8.3.3 Security in Place

All devices must be sized according to the manufacturer's specifications. Different wire sizes may require different marking units. For example, coil diverters are sized according to the wire diameter. Selecting the wrong marker size will allow the units to slide down the wires and group together (Figure 8-25). This issue has also been observed with previous generations of active and passive markers (Figure 8-26 and Figure 8-27, respectively), which sometimes "walked" along the wire as they adjusted to the wind. However, the issue appears to have been addressed, presuming the device is properly sized for the wire.

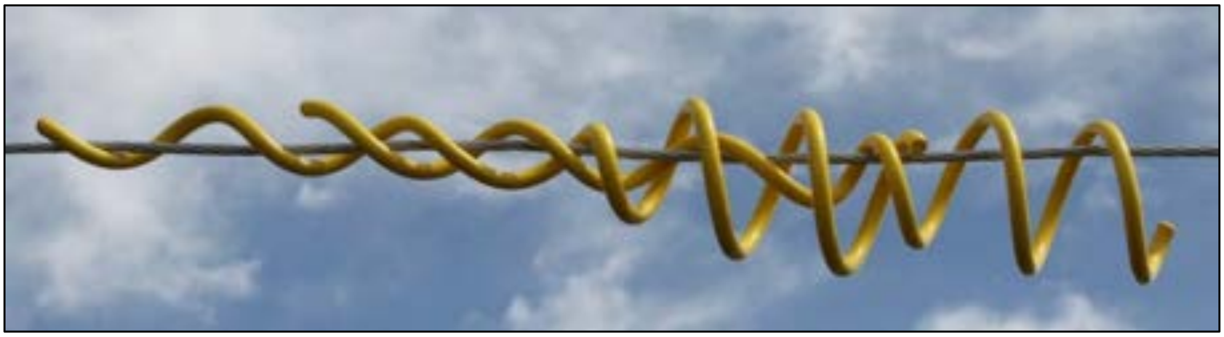

Figure 8-25. Improperly installed markers that have shifted.

Figure 8-26. Flapper-type markers that have shifted.

Figure 8-27. Previous generation passive markers could migrate toward the lowest point in the span.

8.4 Engineering Considerations

8.4.1 Corona

Although marking overhead lines may reduce avian collision risks, certain engineering and maintenance considerations must be addressed when adding marking devices to conductors. One of the issues associated with marking devices is corona discharge (Figure 8-28). Corona discharges occur when surface electric field intensity surrounding an energized electrode exceeds a critical value resulting in a localized ionization of the surrounding gas, in most cases air. Corona activity generates light (mainly in the UV spectrum), sound waves, ozone, and other by-products. Corona activity is frequently associated with sharp edges on energized hardware, broken conductor strands, or defective insulators.

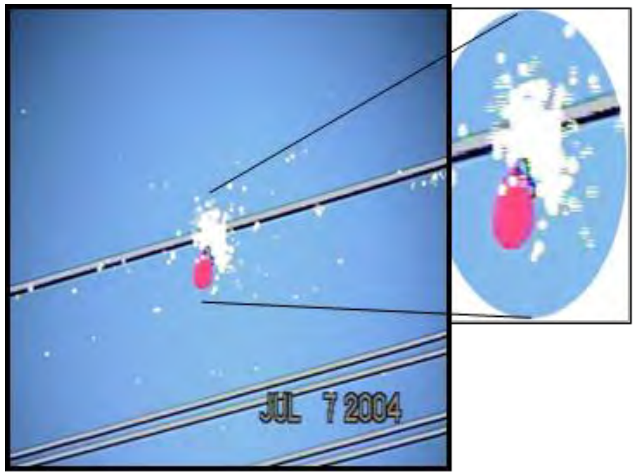

Figure 8-28. UV corona discharge from an active device mounted on an energized 345kV transmission conductor.

Testing has shown that at 115kV, all marking devices have little or no corona (Hurst 2004). At 230kV, all devices have a high level of corona; this corona increases at 345kV. Given the small amount of corona emission found on devices at 115kV, it is assumed devices on energized wires will not emit significant amounts of corona in the lower distribution and transmission voltages of 46kV to 69kV. Corona emission at the intermediate transmission voltages of 138kV and 161kV will be slightly higher than that a 115 kV. Devices placed on energized wires at 230kV and above would be expected to produce high levels of corona and byproducts.

For high-voltage lines, it is recommended that marking devices be placed only on the OHS wires. The exception is for metallic marker balls, which are designed to be installed on energized wires up to 500kV. One manufacturer has developed avian marking devices that have been adapted for use on high-voltage lines; however, it is not clear whether these have been formally tested for corona. Line marking is rarely required for high-voltage lines, since high-voltage conductors are large and bundled conductors require spacers, which further improve line visibility.

8.4.2 Loading

Although marking overhead lines may reduce the risk of avian collisions, engineering and loading issues must also be considered. Prior to installing diverters, Engineering should perform a structural analysis on the line where marking is proposed. If the wire or structures cannot safely support the additional load plus appropriate safety factors for all design conditions, then alternate solutions must be evaluated. Loading issues are exacerbated by devices with greater surface area, which are more susceptible to ice accumulation than smaller devices. If lines cannot safely accommodate increased wind and ice loads, markers may be installed with wider spacing, or marking may be delayed until the line is rebuilt with additional loading capacity.

8.5 Alternatives to Line Marking

Marking lines or undergrounding them are not the only potential solutions for reducing avian collisions with power lines. The use of flat T2 conductor also could improve visibility. Though untested with respect to avian vision, the ribbon-shaped T2 conductor is installed with a modest number of twists at each span (Figure 8-29). These twists give the appearance of downline motion when they respond to even a slight breeze.

Figure 8-29. Flat T2 conductor appears to move downline as it twists in the wind.

Line visibility can also be increased by illuminating the span with a pole-mounted spotlight. Though customers would likely object, a recent pilot study leveraged differences in human and avian vision to illuminate a line span for birds, but not humans. The Avian Collision Avoidance System (ACAS) uses UV light, which is visible to many bird species but not most humans, to mark a span at elevated risk of avian collision (Figure 8-30). A prototype ACAS system reduced nighttime crane collisions by 98%. Over 19 nights with the ACAS turned off, there were 48 collisions; over 19 nights with the ACAS operational, there was just one collision (Dwyer et al. 2019). Though initial results are encouraging, the ACAS system is not commercially available, and testing is ongoing. The system would not be effective for species that do not see in the UV spectrum or are completely diurnal.

Figure 8-30. The ACAS system reduced nocturnal collisions by 98% in a pilot study.

9 NESTING MEASURES

Migratory birds and their nests are protected as described in Chapter 3 *Regulatory Context*. Before taking any action involving a nest, refer to the nest management procedures flowcharts in Chapter 12 *Incident Response and Reporting Protocols*, which details utility-specific regulatory processes and reporting requirements. This chapter describes how to manage nesting problems only *after* the regulatory requirements have been met.

9.1 Introduction

Nests located on power poles can cause problems for utilities and be a safety issue for the nesting birds. Nest material, debris, excrement, and prey items can cause power outages, flashovers, equipment contamination, pole fires, bird electrocutions, and loss of eggs or young (Figure 9-1 and Figure 9-2). Some birds, including Common Ravens, may build nests with conductive materials, such as fence wire, which increases the risk of a fire or outage. Outside the nesting season, nests deteriorate and falling debris may cause outages.

Figure 9-1. Problem Red-tailed Hawk nest on an unprotected distribution line.

Figure 9-2. Problem Osprey nest on a distribution line.

When nesting birds are present on utility structures, line access for maintenance can be restricted. Birds can be aggressive when defending their territory or nest (Figure 9-3) and can be a safety risk to personnel. With their sharp beaks and talons, raptors can inflict serious injuries.

Figure 9-3. Raptor chick defending itself in a nest.

Removing a nest typically does not solve the problem because many species will rebuild at the same location. This chapter addresses nest prevention, as well as practical approaches for managing existing nests. Most nests with eggs or young (i.e., “active nests”) are protected under the MBTA. Eagles and T/E species have additional protection, and it is a violation of federal law to disturb their nests at any time without the applicable permit. Company procedures, regulatory requirements, and permitting needs should be reviewed prior to carrying out an action that could disturb a nest. This chapter describes practical considerations for manage nesting challenges only *after* the regulatory requirements have been met.

9.2 Nesting Platforms

Osprey and other raptors have an affinity for nesting on distribution structures. These birds become attached to sites where they have successfully nested and return to these sites annually to nest (Henny and Kaiser 1996). Simply removing and destroying raptor nests when inactive is rarely an effective strategy, as the birds typically re-nest on the same or nearby structures. A better strategy is to manage nests so they do not pose an outage risk or a safety risk to humans or birds. Often this involves providing the bird with a preferable alternative location

One approach is to provide a stable artificial nest platform. Nest platforms may be installed either on an existing structure (Figure 9-4) or on a non-energized pole set specifically for this purpose (Figure 9-5). A non-energized surrogate pole is preferable because it eliminates concerns associated with nesting material falling into equipment. However, surrogate poles may be difficult to place in narrow or restricted ROWs, or if the adjacent landowner is unwilling to accommodate it. Prior to setting a new pole, the appropriate land rights or permission for the structure must be acquired.

Figure 9-4. Nesting platform above a retrofitted single-phase pole.

Figure 9-5. Nesting platform on a surrogate pole.

Nesting platforms should be placed near the previous nest site, surrounded by similar habitat. The APP Coordinator can provide guidance on how far a platform can be set from an existing nest location. For Osprey, distances between 65 and 325 feet are most common; in addition, the new location should be in sight of the previous location and close to any nearby water body. State and federal biologists are typically consulted on the platform location whenever permits are required, and can provide guidance, even when permits are unnecessary. Their specialized experience can help ensure the project is successful. Nest relocations should be undertaken with caution and supervised by an experienced raptor biologist. If a nesting platform is rejected and the nest fails, Osprey may spend the remainder of the season building frustration nests on nearby poles (Figure 9-6). Sticks shed from frustration nests can result in outages.

Figure 9-6. Osprey frustration nest.

Generally, a raptor nest platform should be at the same height or higher than the old nest. When a nest is relocated to an existing structure, platforms for raptors should be placed on the pole top, if possible. Pole-top extensions can be used to increase the platform height (Figure 9-7). When installed on energized poles, pole-top extensions also increase the distance between the nest and the equipment located lower on the pole. Non-raptor species may accept platforms beneath the crossarms (Figure 9-8). Placement of artificial perches or platforms should mimic the aspect and exposure of the initial nest site (e.g., shade, prevailing wind direction).

Figure 9-7. Osprey nesting on platform attached to pole-top extension.

Figure 9-8. Raven platform below crossarms.

Before installing a nesting platform on an active utility structure, the energized equipment should be covered to minimize electrocution risk to nesting birds. Retrofitting also minimizes the potential for line outages triggered by falling nest materials or bird pollution (i.e., feces). Structures in the vicinity of a nest also should meet avian-friendly standards to protect fledglings from electrocution. Young raptors often make short perch-to-perch flights before they become adept at flying and are likely to land frequently on poles near the nest. Other hazardous configurations nearby also should be retrofitted, if warranted. Retrofits in the vicinity of a nest relocation should use separation and insulation strategies. Perch discouragers are not recommended in the vicinity of a raptor nest because can they provide ready anchor points for nesting materials (refer to Section 5.4.2, Figure 5-113, and Figure 5-114), particularly on single-crossarm configurations where nesting otherwise would be difficult.

Platform design varies by species. Osprey platforms should be large enough (48 inches square) to allow birds to continue adding nesting material in future years. Smaller platforms (36 inches square) are appropriate for buteos such as Red-tailed Hawks. Eagles require larger platforms (60 inches square). Nest platforms are commercially available (Figure 9-9 and Appendix G) or may be constructed in-house with readily available materials (Figure 9-10). The platform design should ensure that nesting materials will not blow off in strong winds; this can be accomplished by building a lip around the edge of the platform, or installing small vertical pegs (Figure 9-11).

Figure 9-9. Osprey platform with an elevated perch on a surrogate pole.

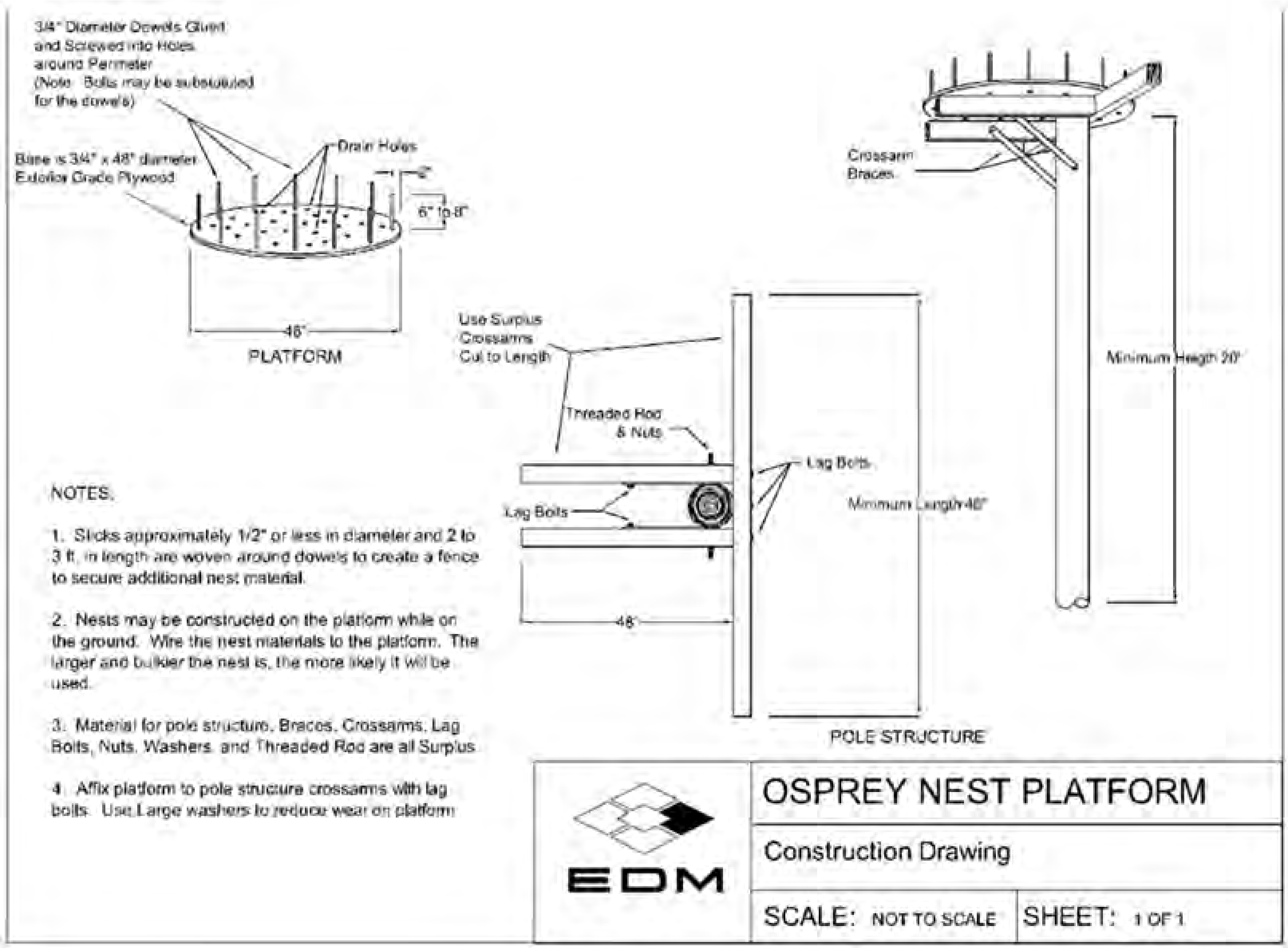

Figure 9-10. Plans for an Osprey nesting platform.

Figure 9-11. Raptor platform with pegs.

Operations and Engineering departments should evaluate the design of the nesting platform and assess the platform and pole's ability to support a large nest, even when wet. If the platform is on an energized pole, all electrical and safety clearances should be evaluated to ensure they meet company standards and all relevant codes. Ideally, the existing nest can be relocated to the new platform. This approach requires federal and sometimes state permits.

From a practical standpoint, many nests are too large, too unstable, or too closely integrated into the substrate to be extricated from the original location intact and moved to a platform. If it is not feasible to relocate an existing nest, placing nesting material on the platform can help entice birds to adopt it. Sticks emulating the size and arrangement of the original nest materials will encourage birds to nest on the artificial platform instead of the original, problematic location.

To construct the ersatz "nest," personnel should weave branches (2 to 4 feet long; ¼ to ¾ inch in diameter) around bolts or pegs at the perimeter of the nest platform to construct an outer "fence." Then, a layer of materials resembling those in the previous nest can be laid with the butt ends along the inside of the branches, with the small ends extending outside the "fence" to form a wreath. The second layer of sticks should be placed in the opposite direction. As more sticks are added, they will extend toward the center of the nest, and sticks can be pushed into the previous layers, locking the structure. Securing some of the larger sticks to the base of the platform also will protect the nest in high winds.

The "nest" can be built on the ground and secured with wire as the pole is being raised. Wire should be removed from the next and lashing material should be trimmed so birds cannot become entangled in loose ends. For an additional measure of security, structures can be fitted with pole wraps to limit access by climbing predators such as raccoons.

Permits are required to relocate nests of protected species, including "inactive" nests. Active nests usually are relocated only in an emergency and also require permitting review. If possible, nest relocations should be timed to avoid the period just before egg laying. Disturbance during this critical period may result in breeding failure. After laying, eggs exposed to severe weather (e.g., rain, cold, heat) can become nonviable in as little as 15 minutes. The USFWS Ecological Services Field Offices can provide detailed guidance on the timing of critical breeding activities for most species. The *National Bald Eagle Management Guidelines* (USFWS 2007b) includes a helpful calendar for typical Bald Eagle breeding activities, by region.

9.3 Stick Deflectors

When a nest is removed or relocated, the original nest pole should be fitted with stick deflectors to discourage re-nesting at the original location. Stick deflectors can be purchased (Figure 9-12 through Figure 9-17, and Appendix G) or constructed with readily available materials such as plastic pipe (Figure 9-18 and Figure 9-19). Stick deflectors should be designed so the nesting material bounces off the structure when dropped. Deflectors are most effective when jumpers are routed beneath the crossarms, making it more difficult for birds to lodge nesting material. Stick deflectors should be installed close enough to the crossarms to deter birds from nesting under the deflectors but cannot compromise electrical clearances.

Figure 9-12. Stick deflector prevents nesting materials from being anchored between double crossarms (Power Line Sentry, LLC)

Figure 9-13. Stick deflector restricts the area to build a nest and flexible tubing makes an unsteady perch (Power Supply Company)

igure 9-14. Stick deflector (Kaddas Enterprises, Inc.).

Figure 9-15. Stick deflector (Utility Solutions, Inc.).

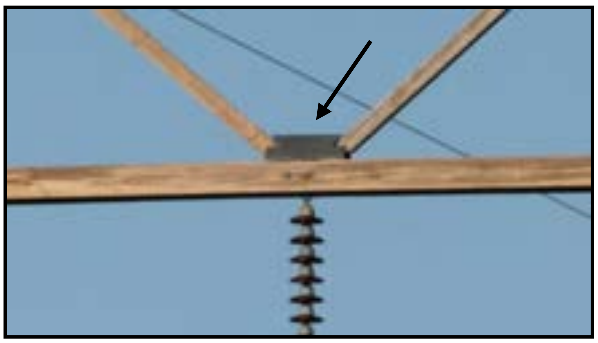

Figure 9-16. Stick deflector specifically designed to prevent nesting above the center phase on an H-frame structure (Power Line Sentry, LLC).

Figure 9-17. Stick deflector specifically designed to prevent nesting above the center phase on an H-frame structure (Kaddas Enterprises, Inc.).

Figure 9-18. Homemade PVC stick deflector.

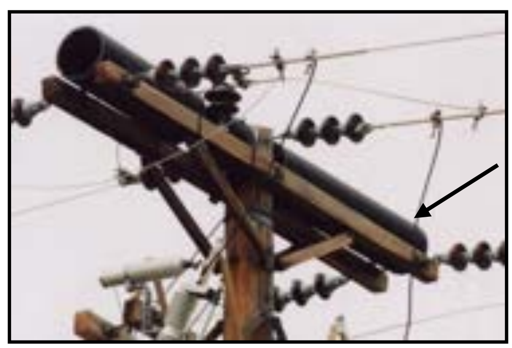

Figure 9-19. Homemade conduit stick deflector.

Operations and Engineering must approve the design of the stick deflector and evaluate all electrical and safety clearances. Stick deflectors should be securely attached to the utility structure and monitored during the nesting season; any sticks that defeat the deflector should be removed immediately. All exposed hardware and equipment on the pole should be retrofitted to an avian-friendly standard to minimize future electrocution risks.

9.4 Cavity Nests

Some cavity-nesting birds (e.g., woodpeckers) create their own nesting and roosting cavities (Figure 9-20), whereas other birds, such as kestrels and sparrows, take advantage of cavities made by other species.

Figure 9-20. Pileated Woodpecker and nest cavity in a wood pole.

Woodpeckers drill wood poles to communicate and advertise their territories, find food, and create nesting and roosting cavities. Unlike drumming and feeding holes, nesting and roosting cavities may compromise pole strength. Woodpeckers are difficult to manage because nesting cavities excavated in a short period of time can pose an imminent threat to pole integrity (Figure 9-21). Attempts have been made to repel woodpeckers using wire mesh (Harness and Walters 2005), pole wraps and coatings (Rumsey 1973, Tupper et al. 2010), alternative pole materials (Brucato 1994), olfactory repellents (Carlson and Cummings 2004), and auditory/visual hazing (Tupper et al. 2011). Thus far, none of these tactics has proven effective, economical, and practical for utilities.

Figure 9-21. Woodpecker nesting cavity resulting in a virtually hollow pole.

Most utilities in woodpecker habitat focus on effectively responding to pole damage. Woodpecker damage may result in a minor to major loss of strength, and make the structure vulnerable to intrusion by moisture, rot, or insects that would further compromise the pole. Depending on the extent of damage, company policies, and other factors, a utility may elect to replace the pole, attempt to repair the damage and restore strength to the pole, or simply stabilize the situation and prevent further damage. Repair or stabilization may be a cost-effective alternative to pole replacement, especially if the pole remains structurally sound despite localized woodpecker damage.

Pole inspection and engineering software like D-Calc™ (EDM International, Inc. 2014) or PLS-POLE (Power Line Systems 2014) can be used to model remaining pole strength or identify high- and low-stress areas of the pole, providing a more accurate assessment of the damage than a simple visual inspection. When the pole retains sufficient strength for the application, a bulking agent may be used to protect the pole from additional damage. Bulking agents fill holes and prevent further moisture or insect intrusion, but do not add strength. Structural void fillers resemble bulking agents in appearance but are designed to also add pole strength. Effective structural void fillers must bond to wood, be cohesive, and be able to transfer load (Harness and Walters 2005). Pole wraps and splints made of composites or metals also can be used to fortify a damaged pole. When planning pole repair, it should be noted that nesting cavities may extend 2 feet or more beneath the opening.

Sometimes woodpecker damage is so extensive that the pole must be replaced immediately. Prior to pole replacement, the cavity should be inspected to determine whether it contains an active nest. Utilities may protect an active woodpecker nest by leaving the old pole in place, or by carefully cutting the pole above and below the nest, and strapping the section to the new pole to mimic its previous location and position (Figure 9-22).

Figure 9-22. Active woodpecker nest accommodated during pole replacement.

Figure 9-23. Bluebird nest in substation support arm.

Cavity nesting in substations by sparrows, starlings, and other species (Figure 9-23) is difficult to prevent but can be minimized by capping pipes and open structures. Although songbird species are too small to cause direct contact problems, their nests may attract predators such as snakes and raccoons that can cause problems. Some birds likely to nest in substation cavities are non-native species. Although nests of non-native species are not protected under federal law, many non-native species are similar in appearance to native species. Prior to removing any active nest, the species must be positively identified by a qualified individual.

9.5 Alternative Construction

Poles with double crossarms are often attractive to birds for nesting. For example, Ospreys regularly construct nests on double deadend structures adjacent to open water. Alternative framing techniques can be used in new construction to reduce these nesting opportunities.

Armless vertical construction makes it difficult for nesting materials to lodge on a structure. Where crossarms are required, a single crossarm can eliminate many nests, especially if there is no equipment on the pole. Engineered crossarms have greater load bearing capacity than wood; in many cases a single heavy duty composite crossarm (or a premium wood crossarm) can replace a typical double wood crossarm (Figure 9-24 and Figure 9-25).

Figure 9-24. Fiberglass deadend single crossarm.

Figure 9-25. Apitong wood double deadend single crossarm.

10 FECES MEASURES

While streamers and pollution are both feces issues, the mechanism and mitigation are different for each. A bird “streamer” is a long jet of excrement released by large birds that can bridge the gap between energized and grounded portions of a structure. Streamer outages are usually a localized problem, most commonly encountered on grounded structures utilized by large birds. Bird pollution is an accumulation of feces from repeated defecation from small or large birds that undermines the dielectric properties of insulator strings. Like streamers, bird pollution typically is a localized problem. For an effective treatment, a streamer or pollution issue should be diagnosed with a high level of confidence before mitigation measures are implemented (Section 2.4.1 *Streamers* and Section 2.4.2 *Pollution*). Appendix G contains a summary of manufacturers of perch discouragers and feces shields and barriers.

10.1 Streamers

To minimize streamer outages on vulnerable structures, key areas can be fitted with perch discouragers or cover-up materials. Perch discouragers should not be deployed across all horizontal surfaces, however, because it is extremely difficult to completely exclude birds from a structure (Lammers and Collopy 2005). Birds intent on perching on a structure often find a way to defeat the perch discouragers (Dwyer and Doloughan 2013). Instead, perch discouragers should be selectively deployed to shift bird use to areas with little risk of streamer faults. At 500kV, perch discouragers should extend 4 feet from the location directly above a conductor (Zhou et al. 2009), however 3 feet may be adequate at lower voltages.

Certain perch discouragers are especially appropriate for transmission structures and streamer issues. Perch discouragers include high-density polyethylene (HDPE) cones designed to enclose the end of lattice arms (Figure 10-1), bird spikes that can be installed on lattice or wood or steel arms (Figure 10-2, Figure 10-3, and Figure 10-4), and pole-top devices to deter perching on the top of steel or wood poles (Figure 10-5 and Figure 10-6).

Figure 10-1. HDPE cones deployed on the arms of a lattice transmission structure (Zena Design).

Figure 10-2. HDPE spikes deployed on the arms of a lattice transmission structure (Mission Engineering).

Figure 10-3. Raptor Guard Spike Perching Excluders with angled spikes to block perching above insulators (Power Line Sentry, LLC).

Figure 10-4. Raptor Guard Spike Perching Excluders being installed to prevent perching and defication on transmission insulators (Power Line Sentry, LLC).

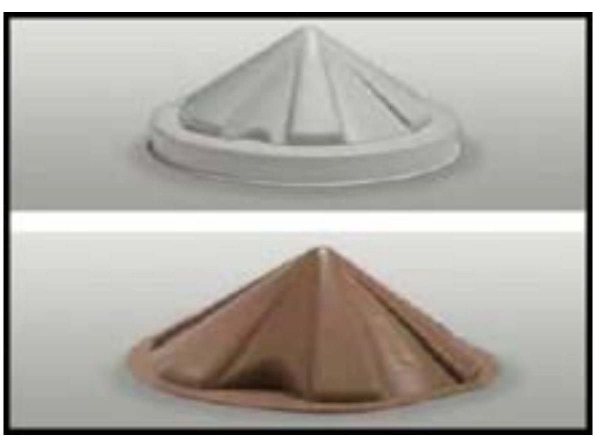

Figure 10-5. Pole caps designed to be deployed on steel (gray cap) or wood (brown cap) poles (Kaddas).

Figure 10-6. Two-piece pole-top guard designed to be deployed on wood, steel, or concrete poles (Central Moloney).

Cover-up devices to minimize effects from bird streamers on primary conductors include conductor covers for both tangent structures and double-deadend transmission structures (Figure 10-7 and Figure 10-8). Transmission line applications may be customized, based on the specific need.

Figure 10-7. Conductor cover on center phase (TE Connectivity).

Figure 10-8. Jumper cover for double deadend transmission structure (TE Connectivity).

10.2 Pollution

An accumulation of bird feces built up on the insulators undermines the insulating qualities and increases the risk of a phase-to-ground flashover across the surface of the insulator string, particularly under wet or moist conditions. As with bird streamers, bird pollution typically is a localized problem.

If fecal contamination is caused by large birds (Figure 10-9), shifting the birds to a more benign location using perch discouragers may prevent future faults (Figure 10-10) (see Section 5.4 *Perch Management*). If the pollution is associated with a nest, removing or relocating the nest can be explored (refer to Chapter 9 *Nesting Measures*). Relocation would require the APP Coordinator to coordinate with federal and state agencies to permit the management action, as discussed in Chapter 4 *Avian Permitting*. Inactive non-eagle, non-T/E nests may be removed without a permit.

Figure 10-9. Turkey Vulture pollution.

Figure 10-10. Perch discouragers designed to shift large birds away from the insulators.

If the pollution is caused by smaller birds (Figure 10-11), cover-up materials may be employed over insulators or conductors or other key areas of specific structures. These areas can be fitted with shields or barriers to divert avian excrement away from the insulators and energized conductors. Generally, shields or barrier materials can be custom fitted to the specific structure configuration to reduce contamination, as shown in Figure 10-12 through Figure 10-15.

Figure 10-11. European Starlings roosting on a transmission tower.

Figure 10-12. Lattice structure with contamination shields (Zena).

Figure 10-13. Feces contamination insulated barrier (TE Connectivity).

Figure 10-14. Bell insulator stream shield (Kaddas).

Figure 10-15. Porcelain bell or polymeric insulator guano shield (TE Connectivity).

SECTION III:

AVIAN MANAGEMENT

11 APPROACH TO AVIAN ISSUES

11.1 Utility Commitments

HCE members care for the environment, and HCE is dedicated to conducting its business activities with respect for the environment. HCE focuses on providing safe, reliable, and affordable energy to customer-members while striving to minimize environmental impacts that result from operations. The following principles guide HCE in protecting and preserving the environment for future generations and serve as guidance for decision-making.

- HCE will comply with relevant safety and environmental laws and regulations to aid in protecting the health and safety of personnel, the public, and wildlife.
- HCE will monitor and report incidents of avian mortality, and make reasonable efforts to construct and alter infrastructure to reduce avian mortality.
- HCE will consider new technologies, systems, and methods of organization that enhance its ability to achieve business, safety, and environmental objectives.
- HCE will periodically review its goals to ensure the needs of its personnel and the public are addressed.
- HCE will commit resources to balance its goal of providing electricity in a cost-effective manner with the regulatory requirements protecting avian species,

The proactive and reactive components of the APP enhance regulatory compliance and avian conservation. APP implementation demonstrates HCE's ongoing commitment to protecting raptors and other migratory birds.

11.2 Development of the Avian Protection Plan

HCE has a history of working to protect birds on its system. In 2003, HCE developed an APP designed to: minimize potential electrocution and collision hazards for birds on its existing power grid using reactive and proactive strategies; enhance system reliability by reducing wildlife-related faults; and improve compliance with the MBTA, BGEPA, ESA, and state wildlife law. In the ensuing decade and a half, HCE invested significant financial and staff resources in upgrading the system with avian protection devices, and also implemented new construction practices that reduce avian risk on the system. For example, HCE:

- Uses caps on surge arresters, energized bushings and terminators
- Uses covered wire for jumpers and stingers
- Replaces grounded aluminum equipment brackets with non-grounded fiberglass

- Builds all 3-phase tangent poles as avian-friendly with a dropped 8-foot crossarm
- Builds many 3-phase deadend poles as avian-friendly
- Marks wires on newly constructed river crossings
- Has retrofitted many of the high risk structures identified in 2003
- Limits Osprey nesting (and associated electrocution risk) by using stick deflectors, or replacing double crossarms with single arms

As part of an ongoing commitment to protect birds, HCE initiated an APP update in 2019 to ensure the document was in accordance with the APLIC and USFWS Guidelines (2005), current best industry practices for avian protection (APLIC 2006, 2012), and federal and state regulations. The 2019 APP is designed to serve as the primary resource for activities relating to avian protection for HCE management and field personnel. The document addresses avian protection issues, the regulatory context for avian protection, regulatory compliance procedures, training programs in avian protection, and various avian-protection strategies. HCE will periodically review this APP to evaluate the program's implementation and success and will update the APP and management procedures, as necessary.

11.3 Bird Species Susceptible to Utility Interactions

A wide range of avian species occur in Colorado. Those susceptible to interactions with power lines are listed in Table 11-1 in taxonomic order. Appendix H *Avian Species Summaries* provides the following information for each susceptible species:

- Federal and state regulatory status
- Risk factors (i.e., electrocution, collision, nesting, streamers/pollution)
- Distribution
- Habitat
- Diet

Table 11-1. Bird species potentially in the HCE service territory susceptible to electrocution and/or collision risk and possible issues with streamers or equipment pollution.

COMMON NAME	SCIENTIFIC NAME	TYPICAL RISK[1]
Native Species		
Waterfowl (e.g., ducks, geese, swans)		C
Wading birds (e.g., herons, egrets)		C, E, S
Sandhill Crane	*Antigone canadensis*	C
Whooping Crane	*Grus americana*	C

Table 11-1. Bird species in the HCE service territory susceptible to electrocution and/or collision risk and possible issues with streamers or equipment pollution, continued.

COMMON NAME	SCIENTIFIC NAME	TYPICAL RISK[1]
American White Pelican	*Pelecanus erythrorhynchos*	C
Great Blue Heron	*Ardea herodias*	C, E, S
Turkey Vulture	*Cathartes aura*	E, P
Osprey	*Pandion haliaetus*	E, N, S
Golden Eagle	*Aquila chrysaetos*	C, E, S
Bald Eagle	*Haliaeetus leucocephalus*	C, E, N, S
Swainson's Hawk	*Buteo swainsoni*	E, N
Red-tailed Hawk	*Buteo jamaicensis*	E, N
Rough-legged Hawk	*Buteo lagopus*	E
Ferruginous Hawk	*Buteo regalis*	E
Great Horned Owl	*Bubo virginianus*	E, N
Black-billed Magpie	*Pica hudsonia*	E, N
American Crow	*Corvus brachyrhynchos*	E
Common Raven	*Corvus corax*	E, N
Non-native Species		
Rock Pigeon	*Columba livia*	N, P[2]
Eurasian Collared-Dove	*Streptopelia decaocto*	N[2]
Monk Parakeet	*Myiopsitta monachus*	N2
European Starling	*Sturnus vulgaris*	N, P2
House Sparrow	*Passer domesticus*	N[2]

[1]Typical Risk: C=Collision, E=Electrocution, N=Nesting, S=Streamers, P=Pollution
[2]Non-native species that commonly nest in substations.

Additional information on bird species found in Colorado and/or the HCE service territory may be found at the following:

https://cobrc.org/Reports/Checklist.aspx
https://coloradocountybirding.org/Checklists/
https://cobirds.org/CFO/Resources/Checklist.aspx
https://ebird.org

11.4 Sensitive Species

Familiarity with federally and state-listed species is important, particularly for planning purposes. The ESA also provides protection for designated critical habitats of listed T/E species.

Depending on the species, critical habitat designations could impact vegetation management along utility ROWs. Table 11-2 presents birds that are federally listed as threatened or endangered by the USFWS or state-listed in Colorado.

Table 11-2. Federally and state-listed bird species.

SPECIES	FEDERAL[a]			CO[b]		
	E	T	CRITICAL HABITAT DESIGNATED	E	T	SC
Greater Sage-Grouse						✓
Gunnison Sage-Grouse		✓	✓			✓
Columbian Sharp-tailed Grouse						✓
Plains Sharp-tailed Grouse				✓		
Lesser Prairie-Chicken					✓	
Western Yellow-billed Cuckoo		✓	✓			✓
Greater Sandhill Crane						✓
Whooping Crane	✓[c]		✓[d]	✓		
Western Snowy Plover						✓
Piping Plover		✓	✓[e]		✓	
Mountain Plover						✓
Long-billed Curlew						✓
Least Tern	✓			✓		
Bald Eagle						✓
Ferruginous Hawk						✓
Burrowing Owl					✓	
Mexican Spotted Owl		✓	✓		✓	
American Peregrine Falcon						✓
Southwestern Willow Flycatcher	✓		✓	✓		

E=Endangered, SC=State Species of Special Concern (*not a statutory category*), T=Threatened
[a] U.S. Fish and Wildlife Service (USFWS 2018)
[b] Colorado Parks and Wildlife (CPW 2018)
[c] Experimental Population, non-essential
[d] Wherever found, except where listed as an experimental population
[e] Designated habitat occurs outside Colorado (USFWS 2018)

11.5 Avian Awareness

Education is an integral part of an APP and essential to its success. Education can consist of both training opportunities for HCE staff and external communications with the public. Building public awareness of avian issues is also an important component of an APP. Educating the public about HCE's avian protection efforts helps build strong community relationships and support for HCE's environmental programs. Increased public awareness also leads to additional opportunities to collaborate with local and regional organizations on avian enhancement projects.

11.5.1 Personnel Training

Avian protection training is provided to applicable personnel, including managers, line supervisors, engineers/designers/stakers, and field staff. During initial training, personnel are informed of HCE's corporate commitments and are introduced to pertinent APP sections. New personnel are familiarized with HCE's standards for new construction and maintenance, including avian-friendly pole configurations and retrofitting approaches for existing high-risk structures. Another critical component of new-personnel training is maintaining legal compliance while appropriately responding to avian incidents and nests on the system.

Avian training refreshers are conducted annually, typically preceding the spring nesting season; additional refreshers are provided on an as-needed basis. These refreshers are opportunities to alert staff to any changes in the regulatory framework, permits acquired by HCE, reporting procedures, new construction design standards, and new retrofit approaches. Refer to Appendix I *Avian Protection Training Syllabus and Raptors at Risk DVD*, which also may be used during new staff trainings and refreshers. Certain training materials were developed during this 2019 APP update based on specific avian friendly and non-avian friendly practices observed on the HCE system. These materials help field personnel recognize situations, configurations, and practices that could cause avian harm, and ensures field staff will be familiar with preferred mitigation approaches.

11.5.2 Published Training Resources

Many published resources are available to supplement the training and internal resources described above. The resources listed below are some of the most valuable and can provide guidance for addressing unusual issues that may arise.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for avian protection on power lines: the state of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA.

> This document contains biological and ecological information on birds and bird behavior relevant to electrocution; information on habitat, land use, and power line modifications; and an extensive bibliography.

APLIC. 2012. Reducing avian collisions with power lines: the state of the art in 2012. Edison Electric Institute and APLIC. Washington DC.

> This document contains biological and ecological information on birds and bird behavior relevant to collisions; information on habitat, land use, and power line modifications; and an extensive bibliography.

Electric Power Research Institute (EPRI). 2014. Field guide: visual inspection of avian issues on transmission and distribution structures. EPRI, Palo Alto, CA: 2014. 3002003719.

This document contains photos illustrating avian issues pertaining to nesting, structural issues and damage, health issues, and mortality (electrocution and collision).

The Institute of Electrical and Electronics Engineers (IEEE). 2015. Guide for animal deterrents for electric power supply substations. IEEE Standard 1264-2015 (Revision of IEEE Std. 1264-1993), New York, NY.

This document provides information regarding animals and the problems they cause at electric power supply substations. The guide presents methods and designs used to mitigate interruptions and equipment damage resulting from animal access into substations.

National Rural Electric Cooperative Association. 1996. Animal-caused outages. Rural Electrical Research (RER) 94-5, Arlington, VA.

This book focuses on understanding and preventing animal-caused outages. It describes common problems for transmission, distribution, and substation systems; the animals involved; and available products and techniques for mitigating outages. This book includes information on mammals, as well as birds.

National Wildlife Health Center. 2007. Avian influenza (HPAI) H5N1.

The global spread of H5N1 increases the likelihood that it will eventually be detected in North America. There are several pathways through which the virus could be brought to this continent including introduction by wild migratory birds. Updated information is available at https://www.usgs.gov/national-wildlife-health-center.

New Mexico Avian Protection Working Group. 2006. Lineman's guide to avian diseases, Albuquerque, NM.

This report provides an overview of diseases and bird-handling procedures. A copy of this report is presented as Appendix J. An electronic version of the document may be downloaded at:

http://gailgarber.com/NMAP/wp-content/uploads/2011/10/Guide_to_Avian_Disease.pdf.

Field guides for bird identification include the following:

Brinkley, E.S., and C. Tufts. 2007. National Wildlife Federation field guide to birds of North America. Sterling Publishing, New York, NY.

Dunn, J.L., and J. Alderfer. 2011. National Geographic field guide to the birds of North America. National Geographic Society, Washington, DC.

Sibley, D.A. 2014. The Sibley guide to birds. National Audubon Society: Alfred A. Knopf, New York, NY.

Stokes, D., and L. Stokes. 2010. The Stokes field guide to the birds of North America. Little, Brown and Company, New York, NY.

11.6 Public Awareness, Outreach, and Environmental Enhancement

HCE strives to informally educate the public regarding threats to birds, regulatory protections afforded to birds, the availability of professional care for injured birds, and HCE's efforts to protect and enhance avian populations, during the course of regular HCE activities. The goal of HCE outreach efforts is to convey to the public that electric utilities are responsible stewards of the environment working cooperatively with wildlife managers and agencies to reduce avian mortalities while continuing to provide safe, reliable, and affordable power to its members.

HCE plans to capitalize on opportunities to increase public awareness of avian issues and HCE's efforts to protect birds. Such opportunities may include habitat enhancements such as the installation of new nesting platforms, a successful raptor nest relocation, a line marking project conducted at the request of a member, or the completion of proactive retrofits within a defined portion of the service territory. HCE may also sponsor programs or events planned by state agencies or non-governmental organizations that further HCE's public outreach and educational goals.

HCE outreach associated with these occasions may consist of a press release or the distribution of a pamphlet or bill insert describing HCE's APP and avian protection accomplishments. Alternatively, topics could be introduced at annual member meetings, board meetings, in the cooperative's regular newsletter, or via social media.

12 INCIDENT RESPONSE PROTOCOLS

A system for documenting significant avian interactions with the system is an important part of successful avian management (APLIC and USFWS 2005). This chapter outlines HCE's internal avian procedures and reporting systems, which are key components of effective APP implementation. Avian mortality and injury tracking can help identify areas with elevated potential for avian electrocution and collision. These areas can be targeted for mitigation designed to reduce avian risk and mortalities. Defined internal processes ensure incidents are properly documented, appropriate agencies are contacted, and permits are sought, as warranted. The APP Coordinator is responsible for coordinating every stage of incident response.

HCE has developed the following management procedures to streamline the field reporting and communication processes between field personnel and the APP Coordinator. The APP Coordinator is the main contact for reporting animal-caused outage issues, dead or injured birds, and nesting on HCE's distribution, transmission, and substation systems. These procedures comply with federal and state regulatory requirements.

To successfully carry out HCE protocols, personnel must be able to discriminate between "emergency" or "non-emergency" situations.

Emergency: An emergency is a situation where migratory birds, nests, or eggs are at risk or there is a direct threat to human health and safety, and immediate corrective action is necessary. An emergency includes actual or potential electric outages to critical facilities, a structure fire, electrical arcing, and any scenario that would put humans in danger. The safety of HCE personnel and the public are the first priority, and no measures should be implemented for the protection of T/E species, eagles, or migratory birds (or their habitats) if doing so may place personnel or the public in danger.

- An emergency is an unexpected and dangerous situation that calls for immediate action.
- A direct threat to human health is when migratory birds, nests, or eggs pose an immediate, specific threat of exposure to pathogens.
- A direct threat to human safety involves a threat of serious bodily injury or a risk to human life.

Non-emergency: A non-emergency is a situation encompassing all other circumstances where immediate corrective action is not necessary. Nuisance nests are considered a non-emergency.

Applicable laws are discussed in Chapter 3 *Regulatory Context*. If federal and/or state permits are necessary, the applicable permits are discussed in Chapter 4 *Avian Permitting*.

12.1 Personnel Responsibility

Activities involving possession of a bird carcass, potential disturbance of an eagle, or removal of a nest must follow the guidelines and procedures in this section. All personnel are responsible for familiarity with the HCE APP and complying with its directives. The APP Coordinator is responsible for contacting the USFWS and state agencies whenever permits are necessary or guidance is advisable (see Appendix E *Agency and Avian Rehabilitator Contact List*). Any contact with a federal or state wildlife officer should be treated as a regulatory inspection, and personnel must follow HCE procedures.

12.2 Record Keeping

In response to an avian incident (dead or injured bird, problem nest, etc.), field personnel complete a Bird Incident Tracking Form (Appendix K) and submit it to the APP Coordinator. If retrofits are planned and implemented, the APP Coordinator reviews and approves the completed work and updates the form to reflect successful completion. Reports and internal documentation for activities involving bird injury, bird mortality, or nest management, and the short-term and long-term response to all incidents, are maintained by the APP Coordinator. These records provide a basis for future retrofit evaluations and are critical documentation of mitigation activities.

12.3 Personnel Safety Precautions

Parasites and diseases can be transmitted through contact with wildlife or nests (see Appendix J). When coming in contact with wildlife or associated materials, HCE personnel take specific safety precautions in addition to following normal HCE safety procedures.

HCE personnel cannot remove a nest unless directed to do so by the APP Coordinator. If instructed by the APP Coordinator to handle a nest, HCE personnel must wear protective clothing, including gloves that can be disinfected or discarded. Coveralls and rubber boots are recommended, if available. Paper breathing filters are recommended because dried bird feces may be dispersed into the air when a nest is moved. Careful handling can limit the degree to which materials become airborne. Personnel should not eat, drink, or smoke while handling a nest. Afterward, hands should be washed with soap and water or disinfected with alcohol. All work surfaces and equipment also need to be disinfected.

As a matter of policy, HCE personnel do not touch injured birds or carcasses. However, under extremely rare circumstances, the APP Coordinator may determine that handling an injured bird or carcass may be advisable, generally in response to a USFWS request. This would likely involve minimal contact with the bird or carcass, such as reading a band number. Practical safety instructions for doing so are the same as for nests, and an extra degree of vigilance is advised. Direct contact frequently can be avoided altogether by using available debris to touch a carcass, which can later be discarded at the site. If a hotstick or another piece of equipment contacts a dead or injured bird, it should be decontaminated.

HCE prohibits its personnel from handling any injured birds under normal circumstances because they may be difficult and dangerous to handle. Raptors and wading birds have powerful defenses, such as sharp talons and beaks that can cause eye injuries or other serious harm to personnel. Wild birds are unpredictable and will aggressively defend themselves. Even a seriously injured bird may be dangerous.

Personnel may observe wildlife professionals using specialized techniques when responding to an injured bird. Experts may cover the bird, or its head, with a loosely woven cloth. This minimizes stress on the bird while still allowing it to breathe. This is done on large species only when wearing heavy gloves and eye protection, and only if the bird can be covered while maintaining a safe distance from the animal. Professionals handle and look at the bird as little as possible. A professional gently picks up the bird by first wrapping it with a heavy cloth to prevent being struck by a talon or beak. The bird is placed in a ventilated cardboard box or similar container with a lid and towels or paper towels placed on the bottom of the container.

12.4 Injured Bird Procedures

Figure 12-1 outlines the detailed procedures for addressing injured birds on HCE's system. If a bird is injured at a HCE facility, field personnel determine whether the bird is an eagle, non-eagle, or a non-native species, then contacts the APP Coordinator as soon as possible for further instructions. The APP Coordinator initiates contact with a federally licensed and trained rehabilitator, if warranted, who arranges for transport to the rehabilitation facility. Rehabilitators are authorized by the USFWS and the State of Colorado to transport injured wildlife. The rehabilitator is likely to request species information because it could influence transportation arrangements. The APP Coordinator then relays instructions to the field personnel.

If the bird is injured at an HCE facility, a Bird Incident Tracking Form (Appendix K) is completed on site. The crew documents the location with GPS coordinates and the pole number, and takes many photographs of the infrastructure from a variety of perspectives, angles, and zoom levels. Additional photographs document the injured bird and the general setting. When possible, field personnel take photos of the bird with enough detail to aid in identifying the bird species. If photos are not possible and the species is unknown, an overall description of the bird's size and appearance is recorded as field notes. If the bird has a leg band, the band number is recorded on the Bird Incident Tracking Form, unless the employee cannot read the band without handling the bird.

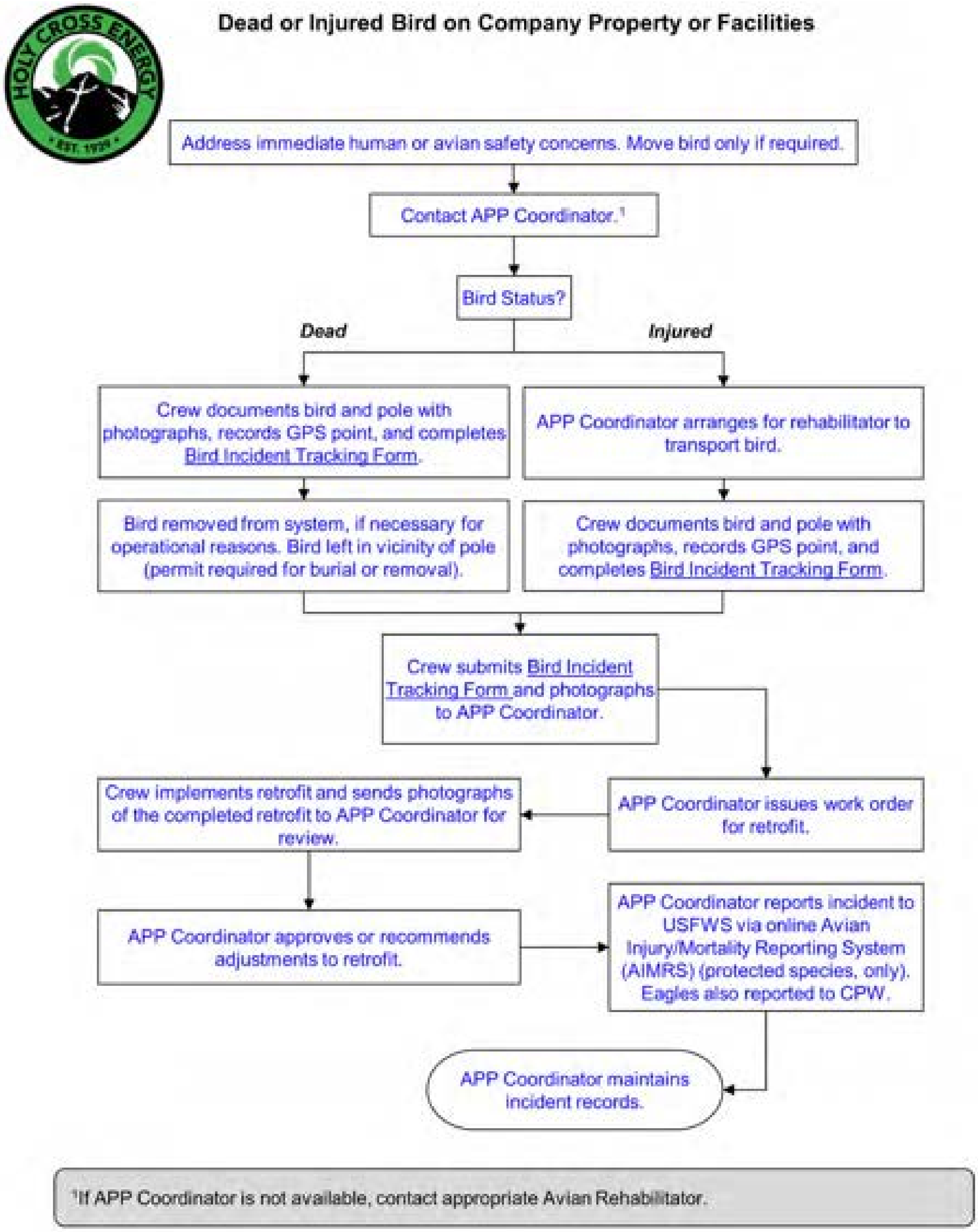

Figure 12-1. Dead or injured bird management procedures.

All information is submitted to the APP Coordinator within 1 business day of the initial discovery. The APP Coordinator issues a work order for an avian-friendly retrofit, which also may include adjacent poles or other similar poles nearby. Operations completes the work order as soon as practical and documents the successful completion with photographs. Once the retrofit has been reviewed and completed to the APP Coordinator's satisfaction, it is approved, and the incident file is updated with the retrofitting documentation.

On 1 January 2019, the USFWS switched to a new voluntary Avian Injury/Mortality Reporting System (AIMRS) for use by the electric utility industry. Agency guidance for users is available at:

https://www.aplic.org/uploads/files/2640/USFWS_BirdFatality_FilerInstructions.pdf

When the incident has been resolved, the APP Coordinator reports the incident to the USFWS through the AIMRS system, with all relevant documentation. Depending on the response timeline and AIMRS guidance, the report may be filed before the incident and retrofit have been resolved then updated later. The incident also may be reported directly to a USFWS representative, but this report is supplementary and is not a replacement for the formal online report. Reports are not necessary for non-protected species. If an eagle is injured, it is also reported to CPW.

12.5 Dead Bird Procedures

Figure 12-1 also outlines procedures for responding to an avian mortality incident on HCE facilities. HCE policy is to leave carcass in place without relocating it. Burial or removal of protected species requires a USFWS *Special Purpose Utility Permit* (see Section 4.1.1) or a *Special Purpose Salvage Permit* (see Appendix B); HCE has not acquired either of these. When a bird carcass is found at or near a HCE facility, field personnel contact the APP Coordinator for guidance as soon as feasible.

If a dead bird does not present an operational issue (an emergency does not exist), field personnel do not touch or move the carcass. HCE prohibits its personnel from handling carcasses unless the APP Coordinator identifies an exception to this policy. If a bird carcass is tangled in electrical equipment and it must be removed to restore power, it is removed with a hotstick as part of the emergency response. Once removed from the system, the carcass is not handled. Under no circumstances are feathers, talons, or other bird parts collected.

Documentation and reporting procedures for dead birds is identical to procedures for injured birds, discussed in Section 12.4 *Injured Bird Procedures*. If an eagle carcass is in relatively good condition, the USFWS may request the carcass be transported and stored in a freezer until it can be collected by the USFWS for delivery to the National Eagle Repository in Denver, Colorado, which was established to provide Native Americans eagle parts for religious uses. HCE policy is to not handle dead birds and any exception would occur at the explicit direction of the APP Coordinator. Under no circumstances is an eagle carcass transported without written authorization from the USFWS.

12.6 Nest Procedures

Nests on distribution and transmission structures can cause operational problems and increase the risk of outages, pole fires, and bird fatalities. Access to important equipment may also be hampered. The avian breeding season in the HCE service territory generally extends from February through August, with species such as the Bald Eagle and Great Horned Owl initiating nesting early in the season. Federal laws protect active nests of MBTA species; nests of eagles and T/E species receive additional protections and cannot be removed at any time without a permit.

Nest removal alone typically does not provide a long-term solution because many species will rebuild at the same location. However, stick deflector installation, nest relocation, nesting platform installation, and alternative structure designs can help minimize nest problems (see Chapter 9 *Nesting Measures*).

The purpose of this section is to ensure HCE personnel comply with federal and state requirements pertaining to bird nests. These guidelines help ensure that a project is not delayed due to regulatory non-compliance. Appendix F contains the USFWS Nest Memorandum (USFWS 2018b), which provides additional guidance for conditions when nest destruction would be either legal or would not be prosecuted. Information contained in Appendix C and Appendix D also may be relevant.

12.6.1 Nest Discovery, Identification, and Evaluation

When encountering a nest that is an operational problem or could become one, field personnel notify the APP Coordinator and complete the Bird Incident Tracking Form (Appendix K). Except in an emergency, an employee does not remove a nest unless directed by the APP Coordinator. HCE procedures vary based on species and other factors. Flowcharts for multiple scenarios are presented in this chapter; however, it is essential to review related APP materials to ensure the charts are carried out appropriately.

If the nest poses an operational or maintenance problem, the following must be determined:

1. *What is the nesting species (i.e., protected by BGEPA, MBTA, or ESA or non-protected)?*

In the HCE service territory, species nesting on utility structures would be protected by the MBTA or BGEPA or would not be protected; there are no federally or state-listed bird species that would nest on a utility structure (see Section 11.4 *Sensitive Species*). It is important to ensure a nesting bird is not an eagle because eagle nests are protected throughout the year. Eagle nests are much larger than those of hawks, Osprey, and other raptors.

Incorrect identification can result in the violation of state and/or federal law. If uncertain about the identification of a nest or bird, personnel contact the APP Coordinator. In non-emergencies, it is a best practice for a qualified biologist to identify the species; sometimes this can done via photograph, obviating the need for a site visit. It is good practice to document any nest and associated birds with photographs and field notes in case it becomes necessary to defend the management actions based on the species identification. This documentation should be submitted to the APP Coordinator with the Bird Incident Tracking Form (Appendix K).

2. *Is the nest active (i.e., containing eggs or young)?*

Nest activity is an important management question, and during the breeding season, the APP Coordinator may request that a biologist assess a site and bird activity for signs of breeding or nesting behavior. If the nest of an MBTA (non-eagle) species is active (contains eggs or young), it is protected, whereas if it is inactive (empty) the material can be removed with no USFWS involvement. When nest building is in progress, it is critical to know which species is involved. If the species is a non-eagle and protected by the MBTA, an incomplete assemblage of materials is not considered a nest and it can be removed. If built by eagles, an incomplete assemblage of materials is fully protected as if it were a nest. It is advantageous to identify nest sites prior to the nesting season to facilitate removal of MBTA-protected nests while inactive.

3. *Does the nest pose an emergency (i.e., immediate threat to human health or safety)?*

The proper response protocol is also based on whether the nest comprises an emergency or a non-emergency (See Chapter 12 *Incident Response Protocols*). Figure 12-2 shows a non-emergency nest on a distribution pole.

Figure 12-2. Red-tailed Hawk safely nesting on an avian-friendly distribution pole: non-emergency.

A description of permits and how they are obtained is provided in Chapter 4 *Avian Permitting* and Appendix B. Copies of the applicable permit must be present at the site during any nest removal or relocation.

12.6.2 Nest Protection and Management Actions

The following sections describe nest regulatory protections and recommendations, as well as nest management options based upon the species and the nest's use status.

12.6.2.1 Eagles

Bald Eagles and Golden Eagles are protected by the BGEPA (Section 3.1.2) and MBTA (Section 3.1.1). Both active and inactive eagle nests are protected, as are incomplete nests. USFWS coordination (and possibly permits) are required for any activities potentially affecting eagles including construction, operations, and ROW maintenance.

Eagles are legally protected from disturbance. The *National Bald Eagle Management Guidelines* (USFWS 2007b) provides USFWS recommendations for avoiding disturbance to Bald Eagles from new or intermittent activities proposed near eagle nests. Activities are separated into eight categories (A through H), based on the nature and magnitude of typical impacts. Power line construction is considered a Category A activity. The APP Coordinator works with the USFWS if a construction or maintenance activity is planned within 660 feet of a known active Bald Eagle nest or communal roosting site. If a helicopter is involved with the project, coordination occurs if the activity is within 1,000 feet.

Impacts often vary, depending on whether the activity is within the line of sight from the nest, and whether similar activities are already occurring in the area. Visibility is a factor because eagles are generally more susceptible to disturbance when an activity occurs in full view. For this reason, the USFWS guidelines recommend that activities should be located farther from a nest in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The guidelines also consider the existence of similar activities in the area. The continued presence of nesting Bald Eagles near the existing activities implies the eagles in that area may have habituated and can tolerate more human activity than can be expected from eagles in areas experiencing fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, the USFWS recommendations for Category A activities are summarized in Table 12-1.

Table 12-1. U.S. Fish and Wildlife Service (USFWS)-recommended buffers for Category A activities near Bald Eagle nests.

ACTIVITY CATEGORY	IF THERE IS NO SIMILAR ACTIVITY WITHIN 1 MILE OF THE NEST	IF THERE IS SIMILAR ACTIVITY CLOSER THAN 1 MILE FROM THE NEST
Activity Visible from the Nest	• Activities should be no closer than 660 feet from the nest. • Landscaping buffers are recommended.	• Activities should be no closer than 660 feet from the nest (or as close as existing tolerated activity of similar scope). • Landscaping buffers are recommended.
Activity NOT Visible from the Nest	• Activities should be no closer than 330 feet from the nest. • Clearing, external construction, and landscaping between 330 and 660 feet should be done outside breeding season.	• Activities should be no closer than 330 feet from the nest (or as close as existing tolerated activity of similar scope). • Clearing, external construction, and landscaping within 660 feet should be done outside breeding season.

Source: USFWS 2007b.

If an eagle nest poses a threat to system safety or reliability, the APP Coordinator contacts the USFWS as soon as the field notification is received and a preferred plan of action has been developed, typically in cooperation with a wildlife biologist (Figure 12-3). Permission also is sought from the CPW District Wildlife Manager. The plan of action and permitting expectations are then negotiated with regulatory agencies. Unless the nest comprises an emergency, active and inactive eagle nests may not be removed without first obtaining an Eagle Nest Take Permit (see Appendix B). Refer to Section 3.1 *Federal Regulations* for additional information on federal protection beyond disturbance.

12.6.2.2 Federally and State-Listed Species

Removal or relocation of a federally or state-listed species nest is a special case and requires close coordination with and mandatory requirements through the USFWS Ecological Services Field Office or the CPW District Wildlife Manager. Because there are no federally or state-listed T/E species that might nest on utility infrastructure in the service territory, nest management for these species is largely theoretical.

The federal permit required to remove or relocate the nest of a federally listed species is described in Appendix B. Permission must also be sought from the CPW District Wildlife Manager. The relocation or removal of a state-listed species nest would be a special case requiring close coordination with CPW. Figure 12-3 shows HCE procedures for T/E species.

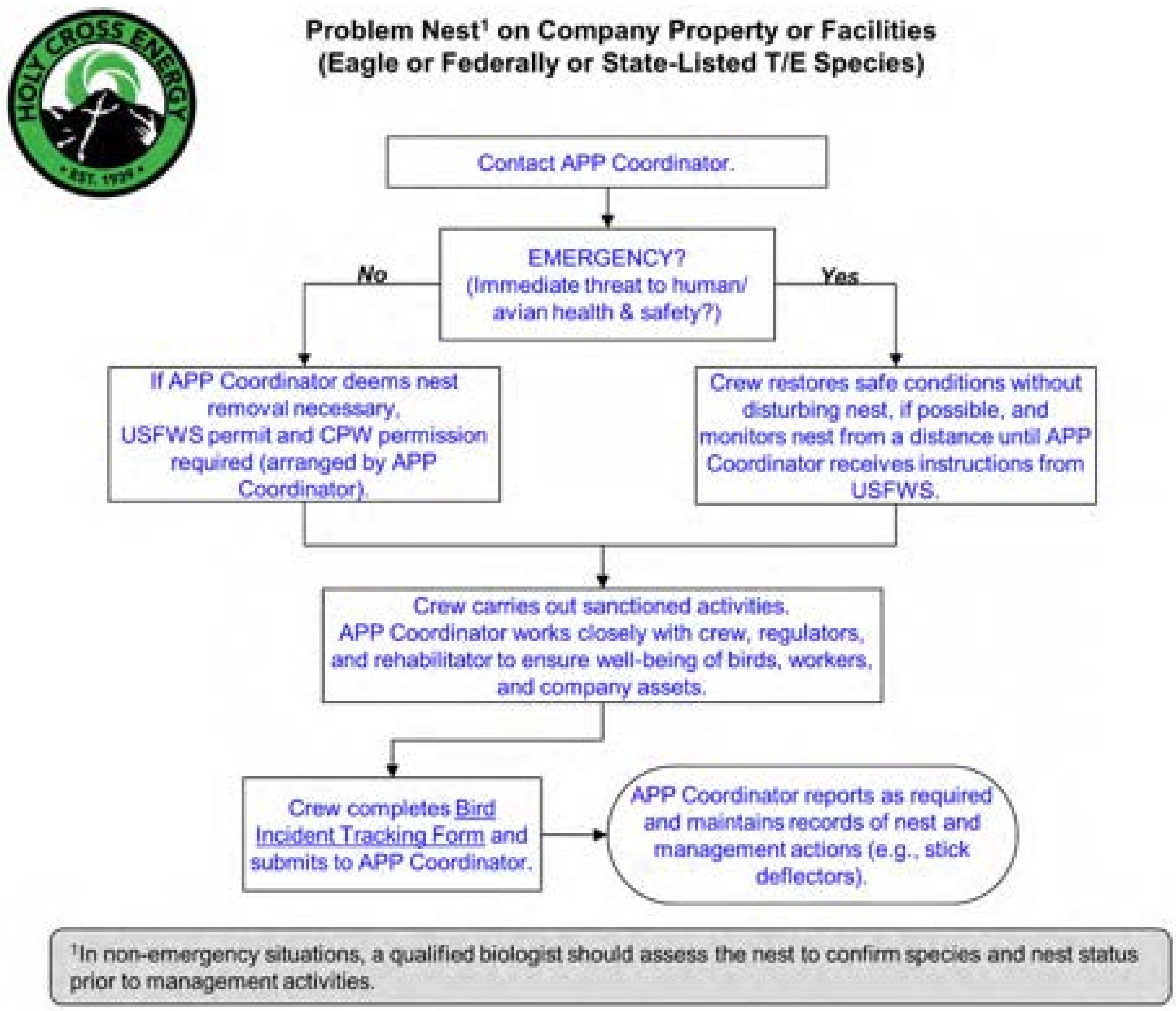

Figure 12-3. Nest management procedures for eagles and federally or state-listed species.

12.6.2.3 MBTA Species

Most nests encountered within the HCE service territory will be those of MBTA species. Different permits are required depending on whether a nest would be relocated or removed, and whether it is active or inactive.

The MBTA protects nests only when active. Removal of an inactive nest does not require a federal permit unless it is the nest of a Bald Eagle, Golden Eagle, or federally listed species. It is important to note that a federal permit, the SPUT (see Section 4.1.1), is required to relocate an active migratory bird nest. The USFWS Region 6 Migratory Bird Permit Office will be contacted for the most recent information pertaining to relocation of inactive migratory bird nests if it would be beneficial to do so.

A Depredation Permit is required to remove or destroy an active nest (see Appendix B), and a licensed wildlife rehabilitator must be on site to care for the eggs and/or young from the nest. The USFWS Nest Memorandum (Appendix F) provides additional detail on nest removal. In addition, permission must be sought from the CPW District Wildlife Manager. Permits require planning, which may be impossible during an emergency. HCE nest management procedures for MBTA species are shown in Figure 12-4.

CPW recommends that operators seasonally avoid raptor nests, and roosting areas and foraging habitat for certain species. Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (Appendix L) provides species-specific guidance. The document addresses recommended buffers, the level of human activity that should be restricted, and the periods of sensitivity. These recommendations are considered during construction, operations, and maintenance planning.

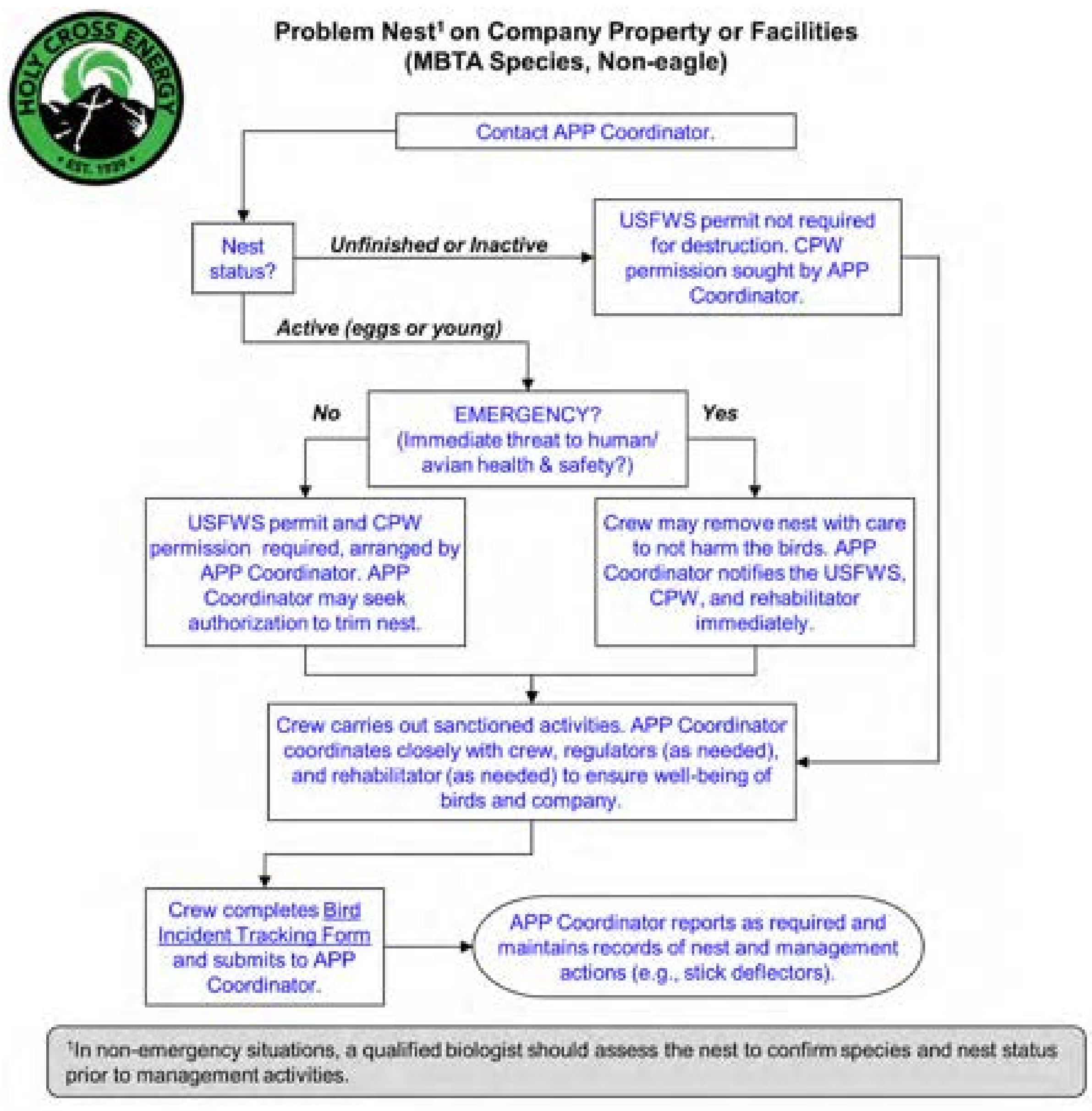

Figure 12-4. Nest management procedures for non-eagle species protected by the Migratory Bird Treaty Act.

12.6.2.4 Non-MBTA Species

Nests of non-native species are not regulated by federal or state law. Unprotected non-native species include the House Sparrow, European Starling, Rock Pigeon, Eurasian Collared-Dove, and Monk Parakeet. Although non-native species are unregulated in Colorado, the CPW District Wildlife Manager should be contacted if a Monk Parakeet nest is encountered. HCE nest management procedures for non-protected species are shown in Figure 12-5. Upland game birds are non-MBTA species, but would not nest on utility infrastructure.

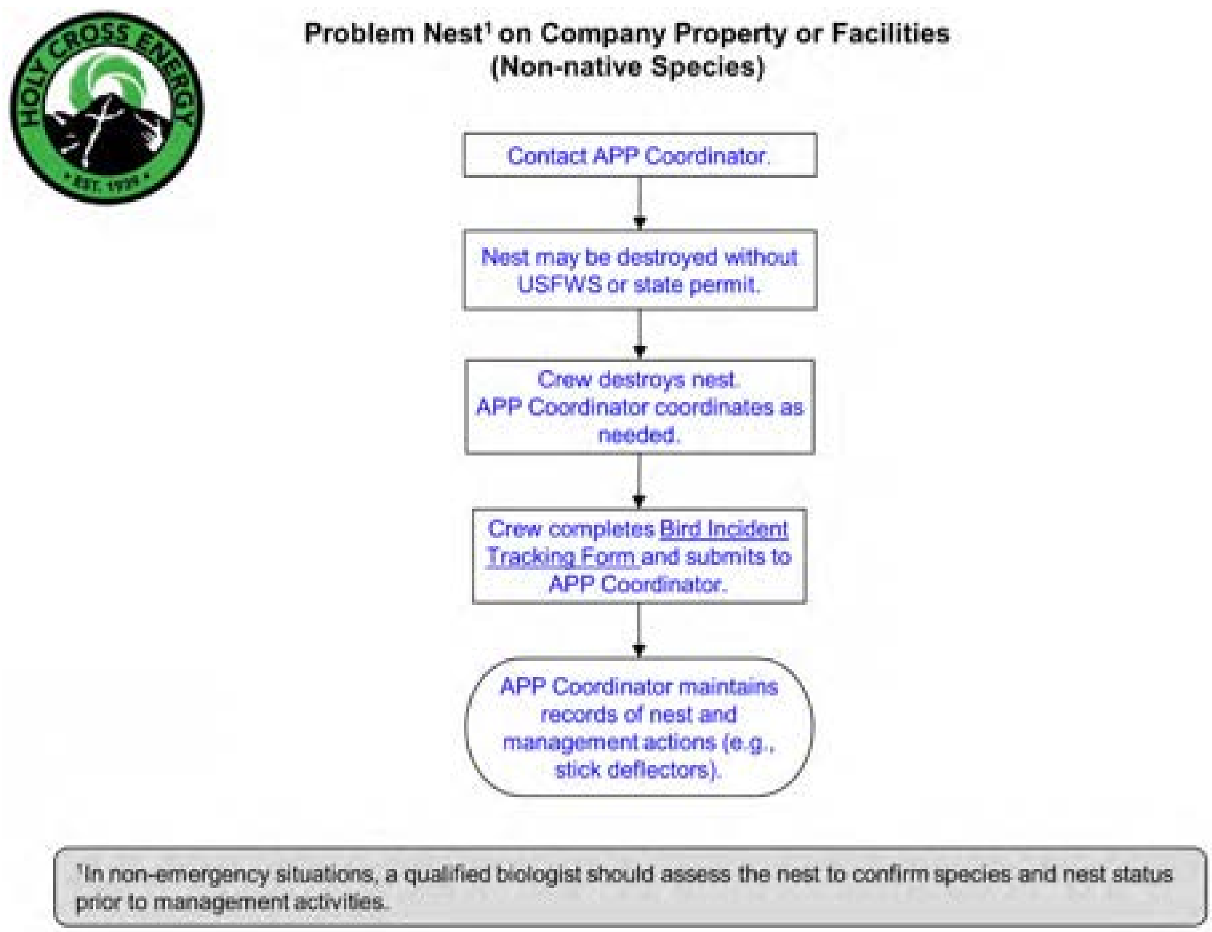

Figure 12-5. Nest management procedures for species not protected by the Migratory Bird Treaty Act (non-native, non-game bird).

12.6.3 Nest Removal, Relocation, and Destruction

Mask, gloves, and safety glasses are used during nest removal. All removed inactive nests are disposed of on site by dispersing the nesting material widely. This discourages birds from re-nesting at the same location and avoids inadvertently possessing a nest, which would comprise a violation of the MBTA and/or BGEPA. If an active nest is removed in response to an emergency, the nest is not disposed of until the USFWS is notified and instructions are given. Public reaction to nest management must be handled with appropriate sensitivity. All calls or inquiries from the public, press, or other media are directed to HCE’s APP Coordinator or CEO.

12.6.4 Pre-construction Nest Surveys

Construction projects, including rebuilds in existing ROWs and new construction projects, require a nest survey. These surveys document species, surrounding habitat, nest status (active/inactive), and the level of human activity near the nest. Other variables are also recorded to assist in nest tracking, including nest location (coordinates, description), nearest pole number, distance to the nearest water body, distance to planned activities, and the GPS location of the structure and nest. Nests are photographed and mapped, and a full survey report is submitted to the APP Coordinator. Tracking nesting on the HCE system allows to APP Coordinator to identify nests that could be of concern to project operations and provides baseline information for potential permitting and compliance activities.

13 PROACTIVE AND REACTIVE AVIAN MANAGEMENT

An effective avian protection program requires reactive and proactive elements. Proactive avian management is designed to enhance avian conservation and prevent potential issues before they occur. Reactive components involve responding appropriately to avian incidents to prevent future incidents. HCE uses both proactive and reactive elements to enhance avian populations and reduce power line mortality while improving service reliability. Specific practices are described below.

13.1 Proactive Strategies

13.1.1 Avian Risk Assessment

A well-developed ARA provides the foundation for an objective approach to proactive retrofitting. ARA data can be used to facilitate short- and long-term planning and focus limited resources on projects that will yield greatest conservation and reliability benefits. An ARA also provides an opportunity to document existing avian-friendly practices and identify maintenance issues on the system (Figure 13-1 and Figure 13-2).

Figure 13-1. Failing transformer mount discovered during an ARA.

Figure 13-2. Compromised pole discovered during an ARA.

In 2003, EDM conducted an ARA for avian collisions and electrocutions in the HCE service territory. Each span or pole sampled was ranked on a 1-3 scale (high risk to low risk, respectively) based on habitat and pole characteristics, pole-specific retrofitting recommendations were developed. The 2003 ARA remains the most complete assessment of avian risk performed on the HCE system. Data from the 2003 ARA are included in Appendix M *2003 Avian Risk Assessment Results*. These results provide a roadmap for proactive retrofits that will reduce avian risk on the HCE system. ARA methods are detailed in Chapter 14 *Avian Risk Assessment Approach*.

In 2019, EDM conducted additional observations in the HCE service territory, focusing on three-phase lines in high-quality habitat. EDM sampled poles meeting these criteria to identify: (a) best practices that HCE has effectively implemented; (b) practices that could be modified for improved avian safety and conformance with latest industry best practice; and (c) any adjustments that could improve avian safety. The intention was to efficiently assess a broad variety of configurations and practices that would adequately represent the full population of HCE structures. These field observations provided the basis for on-site training provided in October 2019.

13.1.2 Utility Standards

HCE uses avian-friendly construction approaches for new tangent poles and many deadend poles that conform to APLIC's *Suggested Practices* (2006) and *Reducing Avian Collisions with Power Lines* (2012). The strategies described in Chapter 5 *Distribution Electrocution Measures*, Chapter 6 *Transmission Electrocution Measures,* Chapter *Substation Electrocution Measures, and* Chapter 8 *Collision Measures* provide the tools necessary to ensure infrastructure meets APLIC (2006, 2012) guidelines. In addition, Powder River Energy Corporation, an RUS borrower serving northeast Wyoming and southeast Montana, maintains an extensive online library of RUS-compatible standards and makes them available for adoption by other cooperatives at http://www.precorp.coop/construction-engineering-standards.

13.1.2.1 New Construction Design Standards and Practices

Utilities can minimize avian electrocution and collision risks by implementing avian-friendly standards for new construction. To minimize risks from electrocution or collision, the majority of HCE transmission and distribution lines built after adoption of this APP will be constructed using avian-friendly designs that meet or exceed standards presented in APLIC (2006) and APLIC (2012). Engineers and designers can reference Chapter 5 *Distribution Electrocution Measures* and Chapter 6 *Transmission Electrocution Measures* for a complete discussion of avian-friendly construction standards. The following measures apply to most new construction:

- Horizontal separation of 60 inches is provided between exposed contacts at different electrical potential. When this is not feasible, insulation or redirection measures are used.

- Vertical separation of 40 inches is provided between exposed contacts at different electrical potential. When this is not feasible, insulation or redirection measures are used.

- New arresters include caps; gapped arresters are no longer purchased.

- New transformers, capacitors, reclosers, and regulators include bushing covers.
- Cutout covers will continue to be evaluated and will be used if a suitable type is found. Covered wire is used for primary jumpers and stingers as a general practice.

13.1.2.2 Retrofit Standards and Implementation

HCE considers many factors to direct proactive retrofits including, but not limited to, ARA retrofitting priorities, geography, pole density, ideal project size/budget, and travel time. Retrofitting methods are evaluated and modified as needed based on priorities, engineering considerations, line design, available products, and site-specific factors.

Since 2003, HCE has retrofitted many poles and marked many lines using HCE's standardized work practices, which have evolved over time. HCE personnel periodically review new and emerging technologies, devices, and electrical cover-up materials to better understand the commercial marketplace. Retrofit projects should always reflect current best industry practices in order to yield maximum conservation and reliability benefits for HCE.

Proactive power pole retrofits can be used as compensatory mitigation for federally permitted eagle take, often associated with large-scale wind power generation projects. Specific issues and considerations associated with compensatory retrofits are described in an APLIC document, *Developing Power Pole Modification Agreements for Compensatory Eagle Mitigation for Wind Energy Projects* (APLIC 2014). APLIC (2014) also provides recommendations helpful to a utility considering entering into such an agreement. Funding associated with compensatory mitigation can be used to accelerate HCE's existing pole retrofitting program.

13.1.3 Facility Construction and Line Routing

HCE employs a wide variety of techniques, activities, and work processes to avoid and/or minimize avian impacts when siting, designing, and constructing new facilities. HCE reviews all large projects during the siting and design phases to identify potential avian risks and develop appropriate avian protection strategies. These strategies include, but are not limited to, avoidance of sensitive areas, construction outside of the breeding season, and other best practices. As necessary, HCE implements avian studies during the planning process. Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors (Appendix L) is an important reference for this process. HCE projects having a federal nexus (e.g., ROWs on federally managed lands, RUS funding) also are subject to the National Environmental Policy Act (NEPA) review process.

13.1.4 Site Cleanup

Site cleanup is an important strategy for minimizing future bird-related issues. After construction or maintenance work is completed, extra materials such as wire ties, jumpers, nuts, bolts, and broken insulators are removed from the ground and salvaged or disposed of off site. Corvids and raptors often use shiny material in their nests, which increases outage risk when nests are built on power poles. In some cases, it is necessary to clean up legacy waste and trash not associated with HCE operations to manage such risks.

13.1.5 Inspection

After a major project is completed, the APP Coordinator reviews the avian protection measures. If not implemented effectively, Operations/Engineering addresses the deficiencies and makes appropriate adjustments, and another inspection is completed.

13.1.6 Right-of-Way Management

Properly maintained ROWs provide access to the electric lines and reduce the risk of tree contact with energized conductors. Where vegetation management is necessary, HCE uses best industry practices. Mechanical, chemical (herbicide), cultural, and biological control methods are evaluated in selecting the most suitable control method for the circumstances. The optimal approach meets safety needs and regulatory standards and maintains or improves avian habitats.

Spring and summer ROW activities potentially affect nesting birds. During the breeding season, HCE field personnel check for signs of active nests in and around the work areas before ROW management activities are initiated. Guidelines in Chapter 9 Nesting Measures outline procedures to follow. All vegetation management activities comply with federal and state laws. Personnel uncertain about whether an activity is legal contact the APP Coordinator, who ensures that HCE remains in compliance with federal and state law. CPW provides species-specific guidance regarding raptor nest avoidance during the breeding season (Appendix L).

13.2 Reactive Strategies

13.2.1 Initial Incident Response

An example of reactive avian management would be the response to an electrocuted bird. Carcass discovery is followed by internal coordination, data collection at the scene of the incident, and external reporting, as described in 12.5.1 *Carcass Discovery and Reporting*. HCE tracks avian mortality and injury to identify problem areas using the Bird Incident Tracking Form (Appendix K).

The Avian Incident Tracking Form must be completed by field personnel in a timely manner, while are forensic clues (e.g., burn marks, carcass condition) are fresh. Extensive information is required for USFWS incident reporting. Photos are critical to identify species, analyze the event, and develop an effective retrofit strategy. Incident location and post-incident retrofitting are also requested by the USFWS. Once internal tracking forms have been completed, HCE's APP Coordinator reports the incident using the USFWS AIMRS system.

13.2.2 Post-incident Retrofits

Existing infrastructure can be modified or retrofitted to reduce avian risk. If a bird is killed or injured on a HCE facility, lines are retrofitted to provide avian-friendly clearances using separation and/or insulation techniques. If this is not possible, redirection is used to mitigate risk. Retrofitting measures are detailed in Section II *Avian Risk Reduction* of this APP.

Following an avian electrocution, the incident pole and other nearby high-risk poles are mitigated to prevent future incidents. The APP Coordinator works with Operations/Engineering to develop and implement an appropriate retrofitting approach. Field crews must document any reactive retrofits with photographs, which are reviewed by the APP Coordinator and approved when the poles meet avian-friendly standards. When the retrofit has been completed, documentation is submitted to the USFWS.

13.3 Adaptive Strategies

HCE conducts a regular review of APP implementation to identify successes and challenges. Metrics include mortalities (from electrocution and collision mortalities reported) and injuries, training review (individuals trained, contact hours), pole retrofitting (number of poles, proportion of poles successfully meeting the APLIC clearances with no remedial work) and field personnel's subjective input. HCE uses the review as an opportunity to modify problematic program elements and update the APP to reflect improved practices, procedures, products, and commitments. This adaptive approach ensures an ever-improving program that is tailored to HCE's specific needs. The APP is updated to reflect the program's evolution over time. These updates are tracked in the APP Change Log.

14 AVIAN RISK ASSESSMENT APPROACH

The most effective and efficient approach to reducing avian mortality is to focus remedial efforts on infrastructure posing the greatest risks to birds (APLIC and USFWS 2005). In 2003, EDM conducted a field risk assessment for HCE. Because it is not feasible to inspect every electric distribution pole or line span within HCE’s service territory, the electrocution and collision risk assessment surveyed targeted areas. The field examination focused on three-phase lines in proximity to known bird use areas, with fewer surveys of single- and two-phase lines (EDM 2003). Pole-specific retrofitting recommendation were provided for each structure. The following section summarizes how the 2003 ARA was developed.

ARA results are presented in Appendix M *2003 Avian Risk Assessment Results*; however, many poles have been addressed since then. In cases where recommendations have not been fully implemented, staking sheets should be developed based on current field conditions. Staking sheets are recommended because configurations or equipment may have changed, mitigation products may have been applied to some equipment, and relevant best practices have changed in some circumstances. For example, 2003 retrofitting recommendations relied heavily on perch discouragers, which are no longer a preferred mitigation approach for most situations.

14.1 Avian Electrocution Risk Assessment

ARAs typically use primary configuration, equipment, and habitat variables to identify infrastructure most likely to be associated with an avian electrocution or collision. The two components of avian electrocution risk are avian exposure and pole hazard (Figure 14-1).

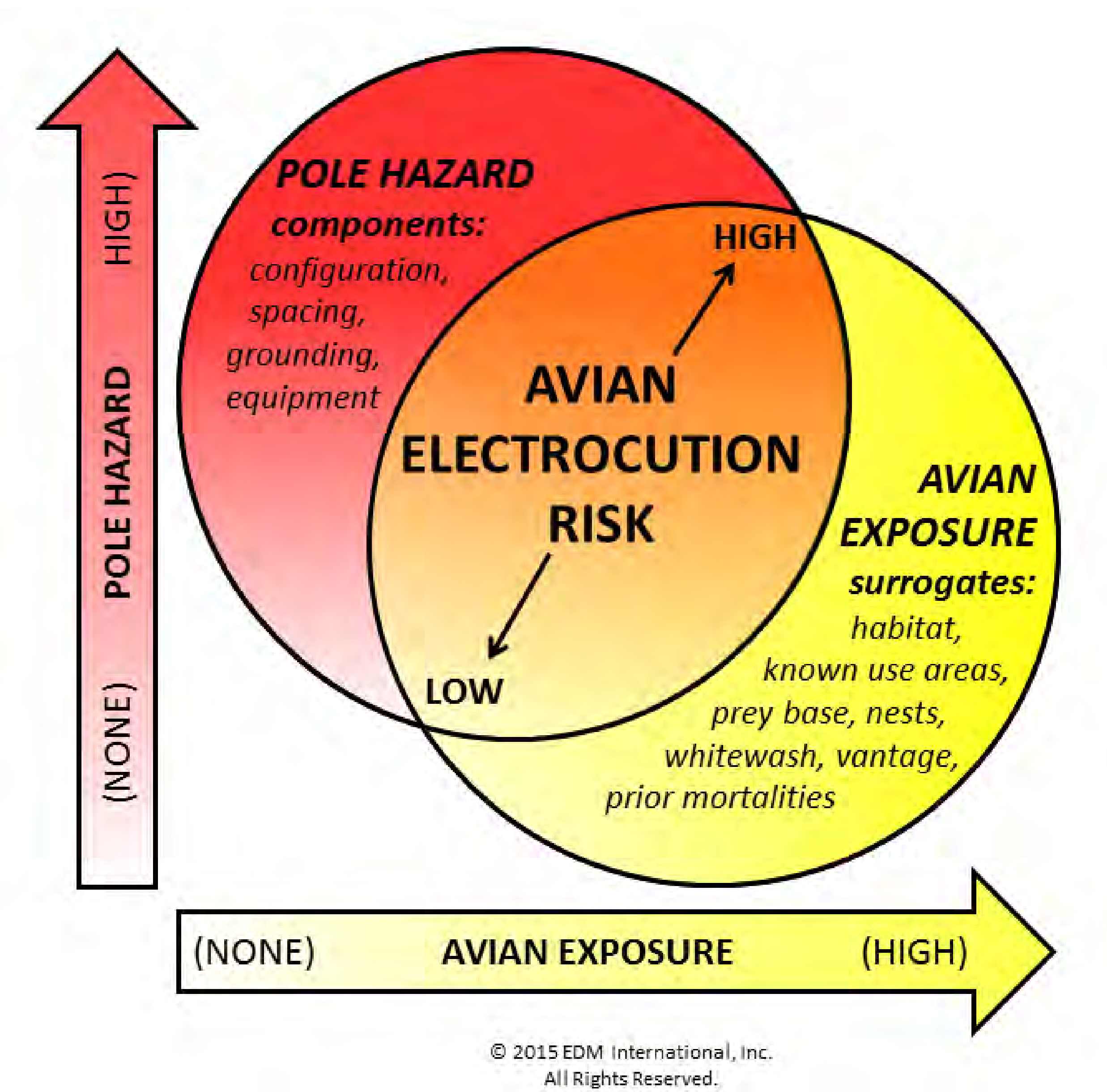

Figure 14-1. Conceptual model of relationship between exposure, hazard, and avian electrocution risk.

Exposure describes the relative likelihood that a pole will be encountered by susceptible species. Because exposure cannot be directly measured during a brief field visit, surrogate variables are used to assess avian exposure: surrounding habitat, whitewash, known mortalities, pole vantage, nearby prey base, nests, and avian-use areas. Geographic location, landscape features, and the associated habitats are as important as the utility pole configurations and span locations in determining the risks of avian interactions with power lines (APLIC 2006, 2012; Mañosa 2001).

Pole hazard is a measure of the inherent danger of a pole and describes the relative likelihood a perching bird can be electrocuted. Pole hazard is a function of the number, spacing, and configuration of primary wires; jumper and stinger wires; pole-mounted equipment; and grounding. Poles that are regularly used by birds (high avian exposure) and lack avian-friendly clearances (high pole hazard) pose high risk of avian electrocution. In contrast, poles that are rarely used by birds (low avian exposure) or have avian-friendly clearances (minimal pole hazard) pose little or no risk of electrocution.

In 2003, these principles were used to develop an electrocution risk matrix. Habitat factors and pole factors were each subjectively evaluated. Electrocution risk was then determined as a function of these two independent variables, and ranked, from Priority 1 (high risk) to Priority 3 (low risk).

14.2 Avian Collision Risk Assessment

Many variables affect avian collision risk (Chapter 8 *Collision Measures*) posed by power lines. The 2003 ARA was based on binary responses to questions about individual spans from map data and field observations. The collision risk model incorporated the following biological factors, landscape features, land use, human activities, known avian mortality history, and economic considerations:

- Line voltage class (i.e., distribution versus transmission)
- Line configuration (i.e., vertical versus horizontal)
- Presence of OHS wires
- Existing line marking or shielding of the conductors or OHS wires
- Presence and proximity of other power lines
- Biological habitats and land use
- Presence of water
- Line orientation
- Topography
- Bird-use data
- Observed bird species and behavior
- Likely presence of T/E species
- Characteristic weather and visibility
- Historical mortality information

Collision retrofitting priorities:

Priority 1 – High-risk Span
Priority 2 – Moderate-risk Span
Priority 3 – Low-risk Span
Priority 4 – No Retrofit Recommended

These variables were used to assess avian collision risk. Initially, all spans were considered Priority 4 and a desktop analysis of avian-use and habitat data from publicly available sources was used to identify spans with higher-than-background potential for avian collision risk. During field assessments, all Priority 3 spans were visited and evaluated. The Priority 3 rating was then adjusted to reflect factors important in collision risk including physical setting, existing marking, relative cost of marking, safety factors, status of land ownership/management, extent of birds present or likely present, status of species present, proximity of nesting areas, and whether previous bird collisions have occurred at this site (Figure 14-2). The initial priority of 3 was adjusted by +1 for each factor reducing collision risk and adjusted by either -1 or -2 for each factor increasing collision risk. The sum of all values for each factor was calculated to identify a final priority number for marking a collision area. Total values less than or equal to 1 were consolidated to Priority 1; total values greater than or equal to 4 were consolidated to Priority 4.

14.3 Present Day Use of 2003 ARA Data

ARA results are presented in Appendix M *2003 Avian Risk Assessment Results*, however, many poles have been addressed since then. In cases where recommendations have not been fully implemented, staking sheets should be developed based on current field conditions. Updated staking sheets are recommended because configurations or equipment may have changed, mitigation products may have been applied to some equipment, and relevant best practices have changed in some circumstances. For example, 2003 retrofitting recommendations relied heavily on perch discouragers, which are no longer a preferred mitigation measure. Staking sheets should reflect current best practices, as described in Chapter 5 *Distribution Electrocution Measures*, Chapter 6 *Transmission Electrocution Measures*, Chapter 7 *Substation Electrocution Measures*, and Chapter 8 *Collision Measures*.

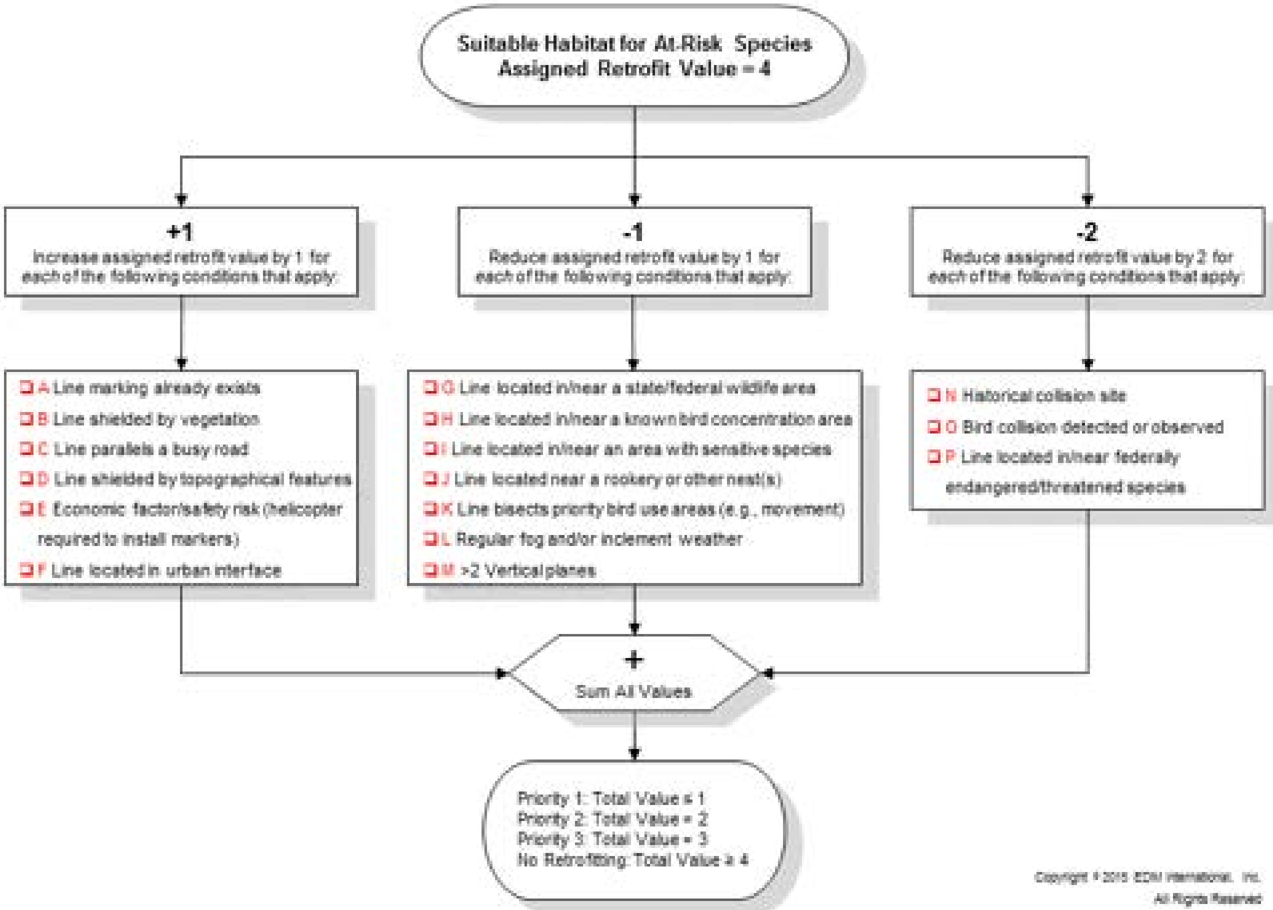

Figure 14-2. Collision risk assessment weighted factors.

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APPENDIX A

TERMS, DEFINITIONS, AND SCIENTIFIC NAMES

TERMS AND DEFINITIONS

Depredation Permit (MBTA) – a permit issued by the USFWS that allows the permittee to take, transport, and temporarily possess migratory birds and active nests under approved situations.

Emergency – a direct threat to human health and safety where immediate corrective action is necessary. An emergency could include actual or potential electric outages to critical facilities, a structure fire, electrical arcing, and any scenario that would put humans in immediate danger. The safety of HCE personnel and the public are the first priority, and no measures should be implemented for the protection of T/E species, eagles, or other migratory birds (or their habitats) if doing so may place personnel or the public in danger. An emergency is an unexpected and dangerous situation that calls for immediate action.

- *Direct threat to human health* – when a federal, state, or local public health agency recommends removal of migratory birds, nests, or eggs posing an immediate, specific threat to human health when conditions deem it to be conducive to the transmission of human or zoonotic pathogens are created or found.
- *Direct threat to human safety* – a threat of serious bodily injury or a risk to human life. Nests may not be removed in situations where migratory birds or their nests are merely causing a nuisance.

Eagle Incidental Take Permit (BGEPA) – a permit issued by the USFWS that allows a permittee to take Bald and Golden Eagles (live or eggs) where the take is compatible with the preservation of the Bald Eagle or Golden Eagle, is necessary to protect an interest in a particular locality, is associated with, but not the purpose of, the activity, and cannot be practicably avoided. Allows the permittee to disturb or take a Bald Eagle or Golden Eagle if deemed necessary to protect an interest. The incidental take of Bald or Golden Eagles is addressed on a case-by-case basis and requires close coordination with both the federal USFWS and appropriate state wildlife agency. The permittee must comply with any mitigation measures determined by the USFWS.

Eagle Nest Take Permit (BGEPA) – a permit issued by the USFWS that allows the permittee to relocate or remove a Golden Eagle or Bald Eagle nest. The removal or relocation of a Golden Eagle or Bald Eagle nest is addressed on a case-by-case basis and requires close coordination with both the federal USFWS and appropriate state agency.

Endangered Species – the classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Human Health and Safety Emergency – a situation where human health or safety is at risk and immediate corrective action is necessary. Some outages may fall into this category.

Listed Species – a species, subspecies, or distinct vertebrate population segment that has been added to the federal lists of Endangered and Threatened Wildlife and Plants as they appear in sections 17.11 and 17.12 of Title 50 of the Code of Federal Regulations (50 CFR 17.11 and 17.12).

Migratory Bird – any bird, whatever its origin and whether or not raised in captivity, which belongs to a species listed in 50 CFR Parts 10 and 21, or which is a mutation or a hybrid of any such species, including any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. The majority of bird species in the U.S. are considered to be migratory and protected under the MBTA, except for introduced species (e.g., House Sparrow, European Starling, Rock Pigeon, Eurasian Collared-Dove) and some non-migratory game birds (e.g., Wild Turkey, grouse, quail, Chukar, Gray Partridge, Ring-necked Pheasant). Refer to 70 FR 12710 for a list of all species not covered by the MBTA.

Nest (MBTA) – any readily identifiable structure built, maintained, or occupied for incubating and rearing of protected species offspring. Nests can be found on the ground, in trees, or on structures.

- *Active Nest* – nest containing either eggs or young.
- *Inactive Nest* – nest that does not contain eggs or young.

Eagle Nest (BGEPA) – any assemblage of materials built, maintained, or used by Bald Eagles or Golden Eagles for the purposes of reproduction (81 FR 91507 16 December 2016).

- *In-use Nest* – nest currently being used for reproductive purposes.
- *Alternate Nest* – nest that is not currently being used for reproductive purposes.

Non-emergency – a situation that would encompass all other circumstances where immediate corrective action is not necessary.

Possession – detention and control of a protected species. This includes picking up or handling of any migratory bird, as defined above. Possession may also include moving or transporting.

Protected Species – any bird either federally or state protected by regulatory statute. Federally protected species include any federally threatened or endangered species found in 50 CFR § 17.11 and § 17.12, Bald or Golden Eagle found in 16 U.S.C. 668 668d 54 Stat. 250 and Amendments, or migratory bird found in 50 CFR 10.13.

Raptor – any bird that kills with its feet (e.g., hawks, eagles, falcons, Osprey, owls). Also known as "bird of prey."

Recovery Permit (ESA) – a permit issued by the USFWS that authorizes the permittee to relocate the nest of a federally listed species.

Special Purpose Miscellaneous Permit (MBTA) – a permit issued by the USFWS that can authorizes the permittee to relocate an active or inactive nest of a migratory species (depending on the Region.) The applicable Regional USFWS Migratory Bird Permit Office should be contacted for the most recent information pertaining to the relocation of inactive migratory bird nests.

Special Purpose Salvage Permit (MBTA) – a permit issued by the USFWS that authorizes the permittee to pick up dead birds, abandoned nests, nonviable eggs, and their parts from the wild. All salvaged birds must be tagged and transferred to a designated holding facility.

Special Purpose Utility (Avian Monitoring) Permit (MBTA) – a permit issued by the USFWS that authorizes utilities to collect, transport and temporarily possess migratory birds found dead on utility property, structures, and rights-of-way for avian mortality monitoring or disposal purposes.

Structure Hazard – relative danger, as determined based on primary configuration, equipment present, and existing wildlife protection products.

Sub-transmission – a transmission line with voltage of 34.5kV.

Take (Eagles) – to pursue, hunt, shoot, shoot at, wound, kill, trap, capture, collect, or molest or disturb (alive or dead), or to attempt to engage in such conduct. The USFWS published a final rule in the Federal Register defining the term "disturb" (FR 31132 Volume 72, No. 107 June 5, 2007). Under the BGEPA the term disturb means "to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

Take (Federally Endangered or Threatened Birds) – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect (alive or dead), or to attempt to engage in such conduct. Take includes habitat degradation.

Take (Incidental) – to harm or harass as a result of an otherwise lawful activity where the harm or harassment is not the purpose of the activity.

Take (Migratory Birds) – to pursue, hunt, shoot, wound, kill, trap, capture (alive or dead), or to attempt to engage in such conduct.

Threatened Species – the classification provided to an animal or plant likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

SCIENTIFIC NAMES

The list below contains the common and scientific names of bird species mentioned in this APP.

COMMON NAME	SCIENTIFIC NAME
American Coot	*Fulica americana*
American Crow	*Corvus brachyrhynchos*
American Kestrel	*Falco sparverius*
American Wigeon	*Anas americana*
American White Pelican	*Pelecanus erythrorhynchos*
Bald Eagle	*Haliaeetus leucocephalus*
Black Vulture	*Coragyps atratus*
Black-billed Magpie	*Pica hudsonia*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Brown Pelican	*Pelecanus occidentalis*
California Condor	*Gymnogyps californianus*
Canada Goose	*Branta canadensis*
Cattle Egret	*Bubulcus ibis*
Common Raven	*Corvus corax*
Cooper's Hawk	*Accipiter cooperii*
Eurasian Collared-Dove	*Streptopelia decaocto*
European Starling	*Sturnus vulgaris*
Ferruginous Hawk	*Buteo regalis*
Golden Eagle	*Aquila chrysaetos*
Great Blue Heron	*Ardea herodias*
Great Horned Owl	*Bubo virginianus*
Greater Sage-Grouse	*Centrocercus urophasianus*
House Sparrow	*Passer domesticus*
Killdeer	*Charadrius vociferus*
Least Tern	*Sterna antillarum*
Lesser Kestrel	*Falco naumanni*
Monk Parakeet	*Myiopsitta monachus*
Mourning Dove	*Zenaida macroura*
Northern Bobwhite	*Colinus virginianus*
Osprey	*Pandion haliaetus*
Pileated Woodpecker	*Dryocopus pileatus*
Piping Plover	*Charadrius melodus*
Red-tailed Hawk	*Buteo jamaicensis*
Rock Pigeon	*Columba livia*
Rough-legged Hawk	*Buteo lagopus*
Sandhill Crane	*Antigone canadensis*
Sharp-shinned Hawk	*Accipiter striatus*

Common Name	Scientific Name
Snow Goose	*Chen caerulescens*
Snowy Egret	*Egretta thula*
Swainson’s Hawk	*Buteo swainsoni*
Trumpeter Swan	*Cygnus buccinator*
Turkey Vulture	*Cathartes aura*
Whooping Crane	*Grus americana*
Wild Turkey	*Meleagris gallopavo*

APPENDIX B

DESCRIPTIONS OF ADDITIONAL FEDERAL AVIAN PERMITS

If a utility must regularly move nests or remove and dispose of carcasses, the utility should consider obtaining a Special Purpose Utility Permit under the Migratory Bird Treaty Act (MBTA). The activities allowed under a Special Purpose Utility Permit and the associated requirements are excerpted and summarized in Section 4.1.1 *Special Purpose Utility Permit* (MBTA) and in Table 4-1 (U.S. Fish and Wildlife Service [USFWS] 2014).

Other individual permits for specific actions are available on a case-by-case basis. These permits also are listed in Table 4-1 (USFWS 2014) and excerpted and summarized in this appendix. The USFWS permit applications and associated requirements are periodically updated; current versions may be accessed at: www.fws.gov/permits/ApplicationMain.html. Experiences vary, but permitting is a demanding process that frequently takes weeks or months to complete. Utilities are advised to plan ahead, to the extent possible, to ensure permits will be in place when needed. Although emergency permits are sometimes available, a last-minute approach to permitting is not recommended.

Special Purpose Salvage Permit (MBTA)

Purpose

The USFWS regulations set forth in 50 CFR 21.27 govern the issuance of Special Purpose Salvage Permits. A Special Purpose Salvage Permit is required to collect dead migratory birds, abandoned nests, nonviable eggs, and their parts for which the permittee has no part in the killing or death thereof, for wildlife conservation education purposes. Orphaned young and eggs must be turned over to a federally licensed wildlife rehabilitator or authorized agency personnel.

If the carcass of a migratory bird, T/E species, or eagle must be disposed of, a Special Purpose Salvage Permit is required. According to USFWS Region 6, disposal of a carcass implies possession; therefore, a salvage permit is necessary because a bird carcass may not be possessed without a permit. Without a permit and authorization from USFWS Office of Law Enforcement, all bird carcasses must be left on site.

Additional Authorization

Personnel must carry a copy of this permit when engaging in permitted activities. In order for the Special Purpose Salvage Permit to be valid, the permittee also must comply with relevant state, tribal, and local requirements. Additionally, written authorization, permission, or permits from the appropriate federal or state agency, landowner, or custodian is required to salvage specimens on federal or state lands or other public or private property.

Collection and Storage Requirements

Approval must be obtained from a USFWS Law Enforcement Officer before disposal of any dead migratory bird, eagle, or threatened or endangered (T/E) bird species found. Even with a permit, the USFWS Office of Law Enforcement must be notified within 24 hours of discovery for an eagle or T/E species, and within 48 hours of discovery for other species protected under the MBTA before moving the carcass.

Prior to moving the carcass, photographs should be taken to assist with species identification. The USFWS recommends the carcass be double-bagged, with photos and a tag placed in the outer bag. Double-bagging minimizes the potential for employee contact with the carcass (thus reducing the potential for disease transmission), and improves documentation by keeping field forms and photos with the carcass, but keeping them separate to avoid contaminating or potentially destroying the field forms, photos, and tags.

Each bird transferred to a federal or state facility must be tagged with the following information:

- Species (if known)
- Date and location the specimen was salvaged

- Name and contact information of the person who salvaged the specimen
- Permit number under which the specimen was salvaged

Companies that maintain a Special Purpose Salvage Permit typically store collected carcasses in a designated freezer. All migratory birds salvaged must be transferred to a public scientific or educational institution designated on the permit within 6 months of acquisition and/or by 31 December of that calendar year. All salvaged eagles must be transferred to a designated federal or state facility; other species must be addressed as directed by the appropriate USFWS representative. Whenever an eagle carcass is discovered, regardless of condition, the USFWS must be contacted immediately for instructions before proceeding, unless the carcass presents an immediate threat to human health or safety (e.g., fire risk). The USFWS may request the carcass be transported and stored in a freezer until it can be collected by an appropriate agency representative for delivery to the National Eagle Repository in Denver, Colorado. The USFWS established the repository in the early 1970s to provide Native Americans with Golden and Bald Eagles, feathers, and other parts for religious purposes. By providing salvaged eagles, the pressure to take birds from the wild is reduced, thereby protecting eagle populations.

Reporting Requirements

Accurate records of salvage permit actions must be maintained on a calendar-year basis. Records must include the species and date salvaged, location, nearest city or town, county and state, and final disposition of the specimen. An annual report form from the Regional Migratory Bird Permit Office must be completed. Reports can be found at: http://www.fws.gov/migratorybirds/mbpermits.html. This report must be completed and submitted annually to the USFWS by 31 January of the year immediately following the salvage action(s). As a condition of the permit, the USFWS is authorized to enter the premises at any reasonable hour to inspect the stored carcasses, books, and records.

Tenure of Permits and Renewal

The tenure of a Special Purpose Salvage Permit is 3 years from the date of issuance, unless a shorter time is prescribed on the face of the permit. Permits may be renewed. The USFWS will provide a renewal letter or form and annual report form at least 60 days before expiration of the permit. If the renewal request is not submitted to the USFWS at least 30 days before expiration of the permit, the permit may expire before application approval and a new application submittal will be required.

Depredation Permit (MBTA)

Purpose

In addition to the Special Purpose Salvage Permit, there are a variety of stand-alone permits. The USFWS regulations set forth in 50 CFR 21.41 govern the issuance of Depredation Permits. Depredation is damage or loss caused by birds or other wildlife. A Depredation Permit authorizes certain management and control activities necessary to provide for human health and safety, protect personal property, or allow resolution of other injury to people or property. A Depredation Permit is intended to provide short-term relief from migratory bird depredation until long-term nonlethal measures can be implemented to reduce or eliminate the problem. Orphaned young and eggs must be turned over to a federally licensed wildlife rehabilitator or authorized agency personnel.

If an active migratory bird nest (not federally listed as threatened or endangered) needs to be removed, the preferred action is to relocate the nest after acquiring a Depredation Permit.

A Depredation Permit is not required to harass or scare migratory birds, provided (a) birds are not killed or injured and (b) birds sitting on active nest (nests with eggs or chicks present) are not disturbed to the point that it causes the eggs not to hatch or the chick to die or become injured. A Depredation Permit is required to remove or relocate active nests belonging to species protected by the MBTA. Note, these actions do not pertain to T/E or eagle species, which require other federal permits.

A Depredation Permit is not required to destroy inactive bird nests, provided the nest is not kept and is properly disposed of. The USFWS Nest Destruction Memorandum (Appendix G) provides additional guidance on nest destruction. A Depredation Permit is required to destroy an active bird nest (with eggs or chicks present).

Removing an active nest should be used as a last resort to manage problem nests. When possible, a non-eagle, non-T/E migratory bird nest that may become a human health or safety concern should be removed (destroyed) outside of the active nesting season, per the USFWS Nest Destruction Memorandum (Appendix G). Although the most effective long-term solution to many nest issues consists of relocating intact nests (preferably during the non-breeding season) or removing inactive nests and creating alternate nesting structures, relocating inactive migratory bird nests requires a separate federal permit.

A Depredation Permit is issued only on a case-by-case basis, following a biological review by the U.S. Department of Agriculture (USDA) Wildlife Services and the USFWS to determine whether a permit is warranted for the situation. After the initial permit is obtained, it may be amended. Except in emergency situations, the Depredation Permit must be amended before each removal. The Depredation Permit will list the species and numbers of birds the permittee is authorized to take and the authorized methods.

Additional Authorization

Personnel must carry a copy of this permit when engaging in permitted activities. In order for the Depredation Permit to be valid, the permittee also must comply with relevant state, tribal, and local requirements. As noted, T/E and eagle species receive additional protection and both active and inactive nests are protected; therefore, a Depredation Permit is not the appropriate permit for eagles or federally listed species.

Collection and Storage Requirements

Carcasses must be turned over to the USDA for official purposes, donated to a public educational or scientific institution, or completely destroyed by burial or incineration. Alternative disposal methods may be requested with appropriate justification.

Reporting Requirements

The permittee must maintain records and file reports in accordance with the permit requirements. Recordkeeping must include the date and location of each nest removed, species, nest disposal location, name of the person who removed the nest, and permit number under which the action was conducted. As a condition of the Depredation Permit, the USFWS is authorized to enter the premises at any reasonable hour to inspect the stored carcasses, books, and records. An annual report listing actions taken must be submitted to the USFWS by the date specified in the permit even if no take activity occurred. The report form can be found at: http://www.fws.gov/forms/3-202-9.pdf.

Tenure of Permit and Renewal

A Depredation Permit typically is valid for up to 1 year, but may be restricted to less than 1 year, depending on the species involved and the nature of the damage being experienced. This permit may be renewed. The USFWS will provide a renewal letter or form and annual report form at least 60 days before expiration of the permit. If the renewal request is not submitted to the USFWS at least 30 days before expiration of the permit, the permit may expire before application approval and a new application submittal will be required.

Recovery Permit (ESA)

Purpose

The USFWS regulations set forth in 50 CFR 17.22 govern the issuance of Recovery Permits. A Recovery Permit is required to remove or relocate nests belonging to species protected by the federal Endangered Species Act (ESA). Removal or relocation of a federally listed T/E species' nest is a special case and requires close coordination with both federal and state agencies.

Additional Requirements

Application for this permit includes requirements to ensure compliance with the ESA and its implementing regulations. Coordination with the USFWS' Regional Endangered Species Permits Office and the local Ecological Services Office is necessary. Refer to the USFWS website for additional permit information: https://fwsepermits.servicenowservices.com/fws?id=fws_index.

If a T/E species nest needs to be removed or relocated, a special permit under the ESA is required: a Section 10(a)(1)(A) Recovery Permit - Scientific Purposes and Enhancement of Propagation or Survival Permit (Recovery Permit).

Eagle Nest Take Permit (BGEPA)

Purpose

If a Bald Eagle or Golden Eagle nest needs to be disturbed, relocated, or removed, an Eagle Nest Take Permit is required. The permittee must comply with any mitigation measures determined by the USFWS.

This summary is excerpted from the USFWS regulations set forth in 50 CFR 22.27, which govern the issuance of permits to authorize take of Bald and Golden Eagles. Take may be authorized where the take is compatible with the preservation of the Bald Eagle and Golden Eagle; is necessary to protect an interest in a particular locality; is associated with, but not the purpose of, the activity; and cannot be practicably avoided. Practicable is defined as available and capable of being done after taking into consideration existing technology, logistics, and cost in light of a mitigation measure's beneficial value to eagles and the activity's overall purpose, scope, and scale. The permit does not authorize intentional, lethal take of eagles.

The removal or relocation of an eagle nest is addressed on a case-by-case basis and requires close coordination with the USFWS. An Eagle Nest Take Permit may authorize the removal or relocation of: (1) an in-use or alternate nest where necessary to alleviate an existing safety emergency, or to prevent a rapidly developing safety emergency that is otherwise likely to result in bodily harm to humans or eagles while the nest is still in use by eagles for breeding purposes, (2) an alternate nest when the removal is necessary to ensure public health and safety, (3) an alternate nest, or an in-use nest prior to egg-laying, that is built on a human-engineered structure and creates, or is likely to create, a functional hazard that renders the structure inoperable for its intended use, or (4) an alternate nest, provided the take is necessary to protect an interest in a particular locality and the activity necessitating the take or the mitigation for the take will, with reasonable certainty, provide a net benefit to eagles.

An in-use is nest defined as a Bald or Golden Eagle nest characterized by the presence of one or more eggs, dependent young, or adult eagles on the nest in the past 10 days during the breeding season. An alternate nest is defined as one of potentially several nests within a nesting territory that is not an in-use nest at the current time. When there is no in-use nest, all nests in the territory are considered alternate nests.

Removal of an in-use nest may be authorized only in the case of a safety emergency (defined in (1) above) or prior to egg-laying if the in-use nest is built on a human-engineered structure and meets the provisions of (3) above. When an in-use nest is removed under this permit, any take of nestlings or eggs must be conducted by a USFWS-approved, qualified agent, and all nestlings and viable eggs must be immediately transported to foster/recipient nests or a rehabilitation facility permitted to care for eagles.

Additional Authorization

Where “practicable and biologically warranted,” the USFWS may require a nest to be relocated, or a substitute nest provided, in a suitable site within the same territory to provide a viable nesting option for eagles with that territory, unless such relocation would create a threat to safety.

Compensatory mitigation may be appropriate, depending on the biological value of the nest and the type of circumstances necessitating its removal. Compensatory mitigation scaled to project impacts will be required for any permit authorizing take that would exceed the applicable eagle management unit take limits, and may be required in the following circumstances: (1) when cumulative authorized take, including the proposed take, would exceed 5 percent of the local area population, (2) when available date indicate that cumulative unauthorized mortality would exceed 10 percent of the local area population, or (3) if the permitted activity does not provide a net benefit to eagles, the permittee must apply appropriate and practicable compensatory mitigation measures as specified in the permit to provide a net benefit to eagles scaled to the effects of the nest removal.

Personnel must carry a copy of this permit when engaging in permitted activities. In order for the permit to be valid, the permittee also must comply with relevant state, tribal, and local requirements.

Collection and Storage Requirements

Possession of the eagle nest for any purpose other than removal or relocation is prohibited. Nests taken under this permit may not be kept. A separate permit is required to possess an eagle nest and it can be issued only to public museums, public scientific societies, and public zoological parks.

Monitoring and Reporting Requirements

Permittees may be required to monitor the area and report whether eagles attempt to build or occupy another nest at another site in the vicinity for the duration specified in the permit. Permittees may also be required to harass eagles from the areas following the nest removal when the USFWS determines it is necessary to prevent eagles from re-nesting in the vicinity.

Records relating to activities conducted under this permit must be maintained. A report summary of the activities conducted under the permit must be submitted to the Regional Migratory Bird Permit Office within 30 days after the permitted take occurs. For permits authorizing take of multiple nests, each nest removal must be reported within 10 days after the take and an annual report must be submitted by 31 January of the following calendar year.

Duration of Permit and Renewal

The duration is indicated on the face of the permit and will not be longer than 5 years. A permit may be issued to cover multiple nest takes over a period of 5 years, provided the permittee complies with comprehensive measures developed in coordination with the USFWS to minimize the need to remove nests and specified as conditions of the permit.

Eagle Incidental Take Permit (BGEPA)

Purpose

This summary is excerpted from the USFWS regulations set forth in 50 CFR 22.26, which govern the issuance of permits to authorize take of Bald and Golden Eagle. Take may be authorized if the take is compatible with the preservation of the Bald Eagle and Golden Eagle; is necessary to protect an interest in a particular locality; is associated with, but not the purpose of, the activity; and cannot be practicably avoided. Practicable is defined as available and capable of being done after taking into consideration existing technology, logistics, and cost in light of a mitigation measure's beneficial value to eagles and the activity's overall purpose, scope, and scale. If an applicant cannot reduce or compensate for take to levels that are compatible with eagle preservation, that applicant will not qualify for a permit. Eagle is defined as a live Bald Eagle or egg, or a live Golden Eagle or egg.

If a disturbance or take of a Bald Eagle or Golden Eagle is needed to protect an interest, an Eagle Incidental Take Permit is required. The permittee must comply with any mitigation measures determined by the USFWS.

Interest in a particular locality accommodates a broad spectrum of public and private interests (such as utility infrastructure development and maintenance, road construction, operation of airports, commercial or residential construction, resource recovery, recreational use, etc.)". The take must be necessary to protect the interest, meaning the interest cannot be protected without taking eagles despite implementation of all practicable measures to avoid and minimize the impact to eagles.

Additional Requirements

The permittee must comply with all avoidance, minimization, or other mitigation measures determined by the USFWS to mitigate for the detrimental effects on eagles, including indirect and cumulative effects, of the permitted take.

Compensatory mitigation will be required for any permit authorizing take that would exceed the applicable eagle management unit take limits. Compensatory mitigation for this purpose must ensure that the preservation of the affected eagle species by reducing another ongoing form of mortality by an amount equal to or greater than the unavoidable mortality, or increasing the eagle population by an equal or greater amount.

Compensatory mitigation may be required when: (1) cumulative authorized take, including the proposed take, would exceed 5 percent of the local area population, or (2) available data indicate that cumulative unauthorized mortality would exceed 10 percent of the local area population.

Personnel must carry a copy of this permit when engaging in permitted activities. In order for the permit to be valid, the permittee must also comply with relevant state, tribal, and local requirements.

Collection and Storage Requirements

This permit does not authorize collection of live or dead eagles. Any eagle found injured or dead at the activity site, regardless of whether the injury or death occurred as a result of permittee activity, must be reported promptly to the USFWS.

Monitoring and Reporting Requirements

Depending on the magnitude of the potential impacts to eagles, permittees may be required to monitor for up to 3 years following completion of the activity for which the permit was issued. For ongoing activities and enduring site features that will likely continue to cause take, periodic monitoring will be required for a long as the data are needed to assess impacts to eagles. Records relating to activities conducted under this permit must be maintained. Unless the activity is covered by a management plan that contains separate adequate monitoring protocols, permittees must submit an annual report.

Duration of Permit and Renewal

The duration of a permit is based on the duration of the proposed activities, the period of time for which take will occur, the level of impacts to eagles, and the nature and extent of mitigation measures incorporated into the terms and conditions of the permit. The duration is indicated on the face of the permit. A permit for incidental take will not exceed 30 years.

Additional conditions apply for permits with durations longer than 5 years, i.e., single, long-term activities that have the potential to periodically take one or more eagles of the life of the project. These conditions include monitoring, adaptive management and/or compensatory mitigation terms, and permit review. The USFWS will evaluate long-term permits at no more than 5-year intervals by reassessing fatality rates, effectiveness of measure to reduce take, the appropriate level of compensatory mitigation, and eagle population status. For permits with terms longer than 5 years, an administration fee of $8,000 is assessed every 5 years for permit review.

Golden Eagle Take during Resource Development Permit (BGEPA)

Purpose

This summary is excerpted from the USFWS regulations set forth in 50 CFR 22.25, which govern the issuance of permits to take alternate Golden Eagle nests during a resource development or recovery operation. The permit may be authorized if the taking is compatible with the preservation of Golden Eagles. The permit does not apply to in-use nests.

The removal or relocation of an alternate Golden Eagle nest is addressed on a case-by-case basis and requires close coordination with the USFWS. Four permit application criteria apply to determining that take of a Golden Eagle nest is compatible with the preservation of Golden Eagles: (1) whether the applicant can reasonably conduct the resource development or recovery operation in a manner that avoids taking any Golden Eagle nest; (2) the total number of Golden Eagle nests proposed to be taken; (3) whether suitable Golden Eagle nesting and foraging habitat unaffected by the resource development or recovery operation is available to accommodate any Golden Eagles displaced by the resource development or recovery operation; (4) whether practicable mitigation measures compatible with the resource development or recovery operation are available to encourage reoccupation by Golden Eagles of the resource development or recovery site. Mitigation measures may include, but are not limited to, reclaiming disturbed land to enhance Golden Eagle nesting and foraging habitat, relocating in suitable habitat any Golden Eagle nest taken, or establishing one or more nest sites.

If an inactive Golden Eagle nest needs to be disturbed, relocated, or removed while engaged in a resource development or recovery operation, a Golden Eagle Nest Take Permit is required. The permittee must comply with any mitigation measures determined by the USFWS.

Additional Requirements

The permittee must comply with any mitigation and monitoring measures determined by USFWS to be “practicable and compatible” with the resource development or recovery operation.

Personnel and must carry a copy of this permit when engaging in permitted activities. In order for the permit to be valid, the permittee also must comply with relevant state, tribal, and local requirements.

Collection and Storage Requirements

Requirements are determined in collaboration with the USFWS at the time of application.

Monitoring and Reporting Requirements

The USFWS must be notified in writing at least 10 days, but not more than 30 days, before any Golden Eagle nest is taken. A report of activities conducted under the permit must be submitted to the USFWS within 10 days following expiration of the permit. The permittee may be required to monitor effects to eagles from the permitted activity and mitigation measures. Records relating to activities conducted under the permit must be maintained for at least 5 years after the permit's expiration date.

Duration of Permits and Renewal

The tenure of any permit to take Golden Eagle nests is 2 years from the date of issuance, unless a shorter time is prescribed on the face of the permit. Permits may be renewed.

Special Purpose-Miscellaneous Permit (MBTA)

Purpose

The USFWS regulations set forth in 50 CFR 21.27 establish the issuance of permits for special purpose activities related to migratory birds, their parts, nests, or eggs, that are otherwise outside the scope of the standard permits. A Special Purpose – Miscellaneous Permit is required to address migratory bird activities not covered by other existing permit types. Activities must benefit a bird resource, address important research, address human concerns for individual birds, or show other compelling justification.

Additional Requirements

Personnel must carry a copy of this permit when engaging in permitted activities. In order for the Special Purpose – Miscellaneous Permit to be valid, the permittee also must comply with relevant state, tribal, and local requirements.

Collection and Storage Requirements

Requirements are determined in collaboration with the USFWS at the time of application.

Reporting Requirements

Accurate records of permit actions must be maintained on a calendar-year basis. Records must include the number and species of migratory birds acquired and disposed of under the permit. An annual report form from the Regional Migratory Bird Permit Office must be completed. Reports can be found at: http://www.fws.gov/migratorybirds/mbpermits.html. This report must be completed and submitted annually to the USFWS by 31 January of the year immediately following the permit action(s). As a condition of the permit, the USFWS is authorized to enter the premises at any reasonable hour to inspect the stored carcasses, books, and records. Records relating to the activities conducted under the permit must be maintained for at least 5 years after the permit's expiration date.

Tenure of Permit and Renewal

The tenure of a Special Purpose-Miscellaneous Permit is 3 years from the date of issuance, unless a shorter time is prescribed on the face of the permit. Permits may be renewed.

Literature Cited

U.S. Fish and Wildlife Service (USFWS). 2014. Permit application forms, https://www.fws.gov/service/permits (last accessed 9 June 2025).

APPENDIX C

DOI SOLICITOR'S OPINION M-37050 (M-OPINION)

United States Department of the Interior

OFFICE OF THE SOLICITOR
Washington, D.C. 20240

IN REPLY REFER TO:

DEC 22 2017

M-37050

Memorandum

To: Secretary
Deputy Secretary
Assistant Secretary for Land and Minerals Management
Assistant Secretary for Fish and Wildlife and Parks

From: Principal Deputy Solicitor Exercising the Authority of the Solicitor Pursuant to Secretary's Order 3345

Subject: The Migratory Bird Treaty Act Does Not Prohibit Incidental Take

I. Introduction

This memorandum analyzes whether the Migratory Bird Treaty Act, 16 U.S.C. § 703 ("MBTA"), prohibits the accidental or "incidental" taking or killing of migratory birds. Unless permitted by regulation, the MBTA prohibits the "taking" and "killing" of migratory birds. "Incidental take" is take that results from an activity, but is not the purpose of that activity.

This issue was most recently addressed in Solicitor's Opinion M-37041 – *Incidental Take Prohibited Under the Migratory Bird Treaty Act*, issued January 10, 2017 (hereinafter "Opinion M-37041"), which concluded that "the MBTA's broad prohibition on taking and killing migratory birds by any means and in any manner includes incidental taking and killing."[1] Opinion M-37041 was suspended pending review on February 6, 2017.[2] In light of further analysis of the text, history, and purpose of the MBTA, as well as relevant case law, this memorandum permanently withdraws and replaces Opinion M-37041.

Interpreting the MBTA to apply to incidental or accidental actions hangs the sword of Damocles over a host of otherwise lawful and productive actions, threatening up to six months in jail and a $15,000 penalty for each and every bird injured or killed. As Justice Marshall warned, "the value of a sword of Damocles is that it hangs—not that it drops."[3] Indeed, the mere threat

[1] 2017 DEP SO LEXIS 6, *2.

[2] Memorandum from K. Jack Haugrud, Acting Secretary, to Acting Solicitor, Temporary Suspension of Certain Solicitor M-Opinions Pending Review, 2017 DEP SO LEXIS 8 (Feb. 6, 2017).

[3] *Arnett v. Kennedy*, 416 U.S 134, 231 (1974) (Marshall, J., dissenting).

of prosecution inhibits otherwise lawful conduct. For the reasons explained below, this Memorandum finds that, consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs.[4]

II. The Evolution of the Migratory Bird Treaty Act

a. The Historical Context of the Treaty

In the late 19th and early 20th centuries, bird hunting devastated migratory bird populations. According to the U.S. Fish and Wildlife Service ("FWS"), "[b]y the late 1800s, the hunting and shipment of birds for the commercial market (to embellish the platters of elegant restaurants) and the plume trade (to provide feathers to adorn lady's fancy hats) had taken their toll on many bird species."[5] The scope of commercial hunting at the turn of the century is hard to overstate. One author, describing hunters descending upon a single pigeon nesting ground, reported "[h]undreds of thousands, indeed millions, of dead birds were shipped out at a wholesale price of fifteen to twenty-five cents a dozen."[6] Director of the New York Zoological Society and former chief taxidermist at the Smithsonian William Hornaday estimated that "in a single nine-month period the London market had consumed feathers from nearly 130,000 egrets"[7] and that "[i]t was a common thing for a rookery of several hundred birds to be attacked by plume hunters, and in two or three days utterly destroyed."[8] Further, commercial hunting was not limited to traditional game birds—estimates indicated that 50 species of North American birds were hunted for their feathers in 1886.[9] Thus, largely as a result of commercial hunting, several species, such as the Labrador Ducks, Great Auks, Passenger Pigeons, Carolina Parakeets, and Heath Hens were extinct or nearly so by the end of the 19th century.[10]

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[4] This memorandum recognizes that this interpretation is contrary to the prior practice of this Department. As explained below, the past expansive assertion of federal authority under the MBTA rested upon a slim foundation—one that ultimately cannot carry its weight. Neither the plain language of the statute nor its legislative history support the notion that Congress intended to criminalize, with fines and potential jail time, otherwise lawful conduct that might incidentally result in the taking of one or more birds.

[5] U.S. Fish and Wildlife Service, Other Relevant Laws *available at* https://www.fws.gov/birds/policies-and-regulations/laws-legislations/other-relevant-laws.php (last updated Oct. 17, 2016).

[6] Andrew G. Ogden, *Dying for a Solution: Incidental Taking Under the Migratory Bird Treaty Act*, 38 WM. & MARY ENVLT. L. & POL'Y REV. 1, 5 n.12 (Fall 2013) (quoting PETER MATTHIESSEN, WILDLIFE IN AMERICA 159-60 (1987)).

[7] William Sounder, *How Two Women Ended the Deadly Feather Trade*, SMITHSONIAN MAGAZINE, Mar. 2013, *available at* http://www.smithsonianmag.com/science-nature/how-two-women-ended-the-deadly-feather-trade-23187277/?all.

[8] *Id.*

[9] *Id.*

[10] Jesse Greenspan, *The Evolution of the Migratory Bird Treaty Act*, AUDUBON, May 22, 2015, *available at* http://www.audubon.org/news/the-evolution-migratory-bird-treaty-act.

Congress adopted the "first federal law protecting wildlife"—the Lacey Act of 1900[11]—in part in response to the threat that commercial hunting posed to wild birds.[12] The Lacey Act sought to limit the damaging effects of commercial hunting by prohibiting game taken illegally from being transported across state lines.[13]

Unfortunately, "the [Lacey] Act was ineffective in stopping interstate shipments."[14] Thus, in 1913 Congress followed the Lacey Act with two legislative actions. First, Congress included language in an appropriations bill directly aimed at limiting the hunting of migratory birds.[15] Better known as the "Weeks-McLean Law,"[16] this language gave the Secretary of Agriculture authority to regulate hunting seasons nationwide for migratory birds:

> All wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons, and all other migratory game and insectivorous birds which in their northern and southern migrations pass through or do not remain permanently the entire year within the borders of any State or Territory, shall hereafter be deemed to be within the custody and protection of the Government of the United States, and shall not be destroyed or taken contrary to regulations hereinafter provided therefor.
>
> The Department of Agriculture is hereby authorized and directed to adopt suitable regulations . . . prescribing and fixing closed seasons . . . and it shall be unlawful to shoot or by any device kill or seize and capture migratory birds within the protection of the law during said closed season . . . .[17]

Second, the Senate adopted a resolution on July 7, 1913, requesting that the President "propose to the Governments of other countries the negotiation of a convention for the protection and preservation of birds."[18]

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[11] U.S. Fish and Wildlife Service, Lacey Act, *available at* https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/lacey-act.html (last visited Oct. 18, 2017). *See generally* 16 U.S.C. §§ 3371–3378; 18 U.S.C. §§ 42–43.

[12] *See* U.S. Fish and Wildlife Service, Other Relevant Laws *available at* https://www.fws.gov/birds/policies-and-regulations/laws-legislations/other-relevant-laws.php (last updated Oct. 17, 2016).

[13] *Id.*

[14] *Id.*

[15] Act of March 4, 1913, ch. 145, 37 Stat. 828, 847–48 (repealed 1918).

[16] U.S. Fish and Wildlife Service, Other Relevant Laws *available at* https://www.fws.gov/birds/policies-and-regulations/laws-legislations/other-relevant-laws.php (last updated Oct. 17, 2016).

[17] Act of March 4, 1913, ch. 145, 37 Stat. 828, 847–48 (repealed 1918).

[18] SENATE JOURNAL, 63rd Cong. 1st Sess. 108 (Apr. 7, 1913).

For its time, this was an expansive assertion of federal authority over activities previously viewed as the exclusive purview of the states. Less than 20 years earlier, the Supreme Court declared that states owned wild game within their territories.[19] As a result, the Weeks-McLean Law came under Constitutional challenge almost immediately. Little more than a year after its passage, the district court for the Eastern District of Arkansas in *United States v. Shauver* ruled that "[t]he court is unable to find any provision in the Constitution authorizing Congress, either expressly or by necessary implication, to protect or regulate the shooting of migratory wild game when in a state, and is therefore forced to the conclusion that the act is unconstitutional."[20] The district court for Kansas echoed the same less than a year later.[21] By 1917, the Weeks-McLean Law had been declared unconstitutional by two state supreme courts and three federal district courts, with an appeal pending before the Supreme Court of the United States.[22]

b. The Migratory Bird Treaty of 1916

In light of the Constitutional cloud hanging over Weeks-McLean Law, proponents of nationwide hunting regulations turned to a novel Constitutional theory: under the Treaty Power, the federal government acted with the authority of the United States in a way that Congress, acting on its own accord, could not, placing treaties and accompanying implementing legislation on a different Constitutional footing than traditional laws.[23] This theory was invoked by Senator Elihu Root in proposing the 1913 Senate resolution calling for a migratory bird treaty:

> [I]t may be that under the treaty-making power a situation can be created in which the Government of the United States will have constitutional authority to deal with this subject. At all events, that is worthy of careful consideration, and for that purpose I open it by the offer of this resolution.[24]

As described by the Solicitor's Office for the Department of Agriculture:

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[19] *Geer v. Connecticut*, 161 U.S. 519 (1896).

[20] *United States v. Shauver*, 214 F. 154, 160 (E.D. Ark. 1914).

[21] *United States v. McCullagh*, 221 F. 288 (D. Kan. 1915).

[22] *Protection of Migratory Birds: Hearing on H.R. 20080 Before the House Comm. on Foreign Affairs*, 64th Cong. 25 (1917) (statement of R.W. Williams, Solicitor's Office, Department of Agriculture) ("There were three Federal courts, two State supreme courts; the Maine and Kansas supreme courts have declared [the Weeks-McLean Law] unconstitutional. In the eastern district of Arkansas Judge Trieber declared it unconstitutional; in the district of Kansas Judge Pollock declared it unconstitutional; and in the district of Nebraska Judge Lewis, of Colorado, who was sitting in place of one of the regular judges, sustained a motion in arrest of judgment. . . . They all followed the first decision in the eastern district of Arkansas. . . . The government removed the Arkansas case—the Shauver case—to the Supreme Court direct.").

[23] *See generally Missouri v. Holland*, 252 U.S. 416 (1920) (using this reasoning to uphold the MBTA's constitutionality).

[24] 51 Cong. Rec. 8349 (1914).

> Text-writers assert this doctrine, that the President, and the Senate, exercising the treaty making power, have a right to negotiate a treaty, and Congress has the right to pass an act to fulfill that treaty, although Congress, acting without any such treaty, would not have the power to legislate upon that subject. That is what text-writers say.[25]

In this way, proponents of hunting restrictions contended that Congress could overcome the Constitutional concerns that had derailed the Weeks-McLean Law and pass legislation asserting federal authority over wild game founded upon an international treaty.[26]

Against this backdrop the United States and the United Kingdom—acting on behalf of Canada—entered into the "Convention between the United States and Great Britain for the protection of migratory birds."[27] With the stated intent of "saving from indiscriminate slaughter and of insuring the preservation of such migratory birds as are either useful to man or are harmless,"[28] the Convention specified groups of birds to be protected,[29] and obligated the parties to:

- Establish "close[d] seasons during which no hunting shall be done except for scientific or propagating purposes under permits issued by proper authorities" that would serve "as an effective means of preserving migratory game birds;"[30]

- Prohibit the "taking of nests or eggs of migratory game or insectivorous or nongame birds . . . except for scientific or propagating purposes;"[31]

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[25] *Protection of Migratory Birds: Hearing on H.R. 20080 Before the House Comm. on Foreign Affairs*, 64th Cong. 25 (1917) (statement of R.W. Williams, Solicitor's Office, Department of Agriculture).

[26] *See* William S. Haskell, *Treaty Precludes Further Question as to Constitutionality of Migratory Bird Law*, BULLETIN – THE AMERICAN GAME PROTECTIVE ASSOCIATION, Oct. 1, 1916, at 4 ("The Canadian treaty precludes further question as to the constitutionality of the federal migratory bird law. It therefore makes it unnecessary to bring the case now pending in the United States Supreme Court to argument."). Consistent with this new approach, when the *Shauver* case was called on the Supreme Court's docket in October 1916, "the Attorney General moved that the case be passed." Hearings Before the Committee on Foreign Affairs, House of Representatives, Sixty-Fourth Congress, Second Session, on H.R. 20080 (Statement of R.W. Williams, Esq., Solicitor's Office, Department of Agriculture) at 25 (Feb. 3, 1917).

[27] Convention between the United States and Great Britain for the Protection of Migratory Birds, 39 Stat. 1702 (Aug. 16, 1916) (ratified Dec. 7, 1916) (hereinafter "Migratory Bird Treaty").

[28] *Id.*, chapeau.

[29] *Id.*, art. I.

[30] *Id.*, art. II.

[31] *Id.*, art. V.

- Prohibit during a closed season the "shipment or export of migratory birds or their eggs" except for scientific or propagating purposes;[32]

- Establish a "continuous close[d] season" for a series of specific, enumerated birds for a period of ten years;[33]

- Establish a continuous closed season of five years, refuges, or other appropriate regulations for the protection of certain types of duck;[34] and

- Provide for the issuance of permits to kill the specified birds.[35]

Under Article VIII of the Convention, the parties agreed to "take, or propose to their respective appropriate law-making bodies, the necessary measures for insuring the execution" of the Convention.[36]

c. Implementing the Treaty

1. The Migratory Bird Treaty Act of 1918

In order to fulfill the United States' obligations under Article VIII, Congress in effect reenacted a stricter version of the 1913 Weeks-McLean Law by passing what came to be known as the "Migratory Bird Treaty Act."[37] As originally passed, the MBTA provided:

> That unless and except as permitted by regulations made as hereinafter provided, it shall be unlawful to hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time or in any manner, any migratory

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[32] *Id.*, art. VI.

[33] *Id.*, art. III.

[34] *Id.*, art. IV.

[35] *Id.*, art. VII.

[36] *Id.*, art. VIII.

[37] Migratory Bird Treaty Act, ch. 128, 40 Stat. 755 (1918) (codified as amended at 16 U.S.C. § 703–12). When asked to compare the terms of MBTA with those of the 1913 Weeks-McLean Law, Mr. E.W. Nelson, the Chief of the Bureau of Biological Survey at the Department of Agriculture, noted that the main difference was that the Weeks-McLean Law did not give the Biological Survey power to arrest violators. Hearings Before the Committee on Foreign Affairs, House of Representatives, Sixty-Fourth Congress, Second Session, on H.R. 20080 (Statement of Mr. E. W. Nelson, Chief Bureau of Biological Survey, Department of Agriculture, Washington, D.C.) at 5 (Feb. 3, 1917). He went on to note that "[t]he second paragraph, I think, is practically the same as exists in our federal law." *Id.* at 9.

> bird, included in the terms of the convention between the United States and Great Britain for the protection of migratory birds concluded August sixteenth, nineteen hundred and sixteen, or any part, nest, or egg of any such bird.[38]

Violation of MBTA was a misdemeanor criminal offense, punishable by a fine of no more than $500 and/or up to six months in jail.[39] This time, relying in part on the federal treaty power, the legislation survived constitutional scrutiny.[40]

2. The Migratory Bird Conservation Act

Subsequently, in 1929, Congress sought to "more effectively meet the obligations of the United States under the migratory bird treaty with Great Britain" by adopting the Migratory Bird Conservation Act.[41] The Migratory Bird Conservation Act created a commission to make recommendations to the Secretary of Agriculture, who was authorized to purchase or rent lands approved by the commission "for use as inviolate sanctuaries for migratory birds."[42] Thus, by the late 1920s, Congress had adopted two laws to implement the Migratory Bird Treaty: the MBTA, which protected birds from the specific acts described in that statute, and the Migratory Bird Conservation Act, which protected birds by establishing protected habitats.

d. Additional International Treaties and Implementing Legislation

In 1936, the United States entered into another international agreement to "protect the said migratory birds . . . in order that the species may not be exterminated," the "Convention between the United States of America and Mexico for the protection of migratory birds and game mammals."[43] As with the Migratory Bird Treaty, the Mexico Treaty focused primarily on hunting, calling for the establishment of "close[d] seasons, which will prohibit in certain periods of the year the taking of migratory birds,"[44] in addition to explicitly mandating the establishment of refuges, limiting hunting to a maximum of four months, prohibiting hunting from aircraft, establishing special protections for insectivorous birds and wild duck, enumerating a list of

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[38] MBTA § 2 (codified as amended at 16 U.S.C. § 703).

[39] *Id.* § 6 (codified as amended at 16 U.S.C. § 707).

[40] *See Missouri v. Holland*, 252 U.S. 416 (1920).

[41] Migratory Bird Conservation Act, ch, 257, 45 Stat. 1222 (1929) (codified as amended at 16 U.S.C. § 715–715s).

[42] *Id.* § 5 (codified as amended at 16 U.S.C. § 715d). The Migratory Bird Conservation Act has since been amended several times. *See* Wetlands Loan Extension Act of 1976, Pub. L. No. 94-215, 90 Stat. 189; Act of Oct. 30, 1978, Pub. L. No. 95-552, 92 Stat. 2071; Fish and Wildlife Improvement Act of 1978, Pub. L. 95-616, 92 Stat. 3110; Act of Dec. 2, 1983. Pub. L. No. 98-200, 97 Stat. 1378; "An Act to extend the Wetlands Loan Act," Act of Oct. 26, 1984, Pub. L. No. 98-2772, 98 Stat. 2774; Emergency Wetlands Resources Act of 1986, Pub. L. 99-645, 100 Stat. 3582.

[43] Convention between the United States of America and Mexico for the Protection of Migratory Birds and Game Mammals, chapeau, 50 Stat. 1311 (Feb. 7, 1936) (ratified Mar. 15, 1937) (hereinafter "Mexico Treaty").

[44] *Id.*, art. II(A).

specific migratory birds, and limiting the transport of migratory birds across the U.S.-Mexico border.[45]

In order to implement the Mexico Treaty, Congress adopted legislation amending the MBTA.[46] Among other changes, these amendments:

- Added the word "pursue" to the list of operative actions;

- Moved the phrase "by any means" to the beginning of the clause; and

- Moved the phrase "at any time or in any manner" to follow "by any means."[47]

The United States entered into two additional treaties concerning migratory birds. The first, in 1972 with Japan, prohibited the "taking of migratory birds or their eggs" and called for the establishment of refuges, provided for the exchange of research data, and set criteria for hunting seasons.[48] Implementing legislation extended restrictions on any part, nest, or egg of any bird to include "any product, whether or not manufactured, which consists, or is composed in whole or in part, of any such bird or any part, nest, or egg thereof."[49]

Second, in 1978 a U.S.-Soviet treaty prohibited the "taking of migratory birds, the collection of their nests and eggs and the disturbance of nesting colonies," limited the sale of migratory birds or products derived from them, placed limits on hunting, and called for the protection of habitats.[50] Implementing legislation did not amend Section 2 of the MBTA.[51]

The treaties with Canada and Mexico were amended in the mid-to-late 1990s. First, in 1995, the United States and Canada signed the Protocol Amending the 1916 Convention for the Protection of Migratory Birds.[52] According to the Secretary of State, the goal of this protocol

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[45] *Id.*, arts. II-IV. The Convention specifically prohibits killing of insectivorous birds unless they are damaging agricultural crops. *See id.*, art. II(E). The Mexico Treaty also limited the transport of other game mammals. *See id.*, art. V.

[46] Act of June 20, 1936, ch. 634, 49 Stat. 1555 ("Mexico Treaty Act").

[47] *Compare* MBTA, 40 Stat. 755, § 2 *with* Mexico Treaty Act, 49 Stat. 1555, § 3.

[48] Convention Between the Governments of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment, 25 U.S.T. 3329 (Sep. 19, 1974).

[49] Act of June 1, 1974, Pub. L. No. 93-300, 88 Stat. 190.

[50] Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment, 29 U.S.T. 4647 (Oct. 13, 1978).

[51] *See* Fish and Wildlife Improvement Act of 1978, Pub. L. No. 95-616, sec. 3(h), 92 Stat. 3110.

[52] Protocol Between the Government of the United States of America and the Government of Canada Amending the 1916 Convention Between the United Kingdom and the United States of America for the Protection of Migratory Birds in Canada and the United States, 1995 WL 877199 (signed Dec. 14, 1995) *reprinted in* S. Treaty Doc. No.

was to "bring the Convention into conformity with actual practice and Canadian law" concerning traditional subsistence hunting by aboriginal people of Canada and indigenous people in Alaska and "to permit the effective regulation for conservation purposes of the traditional hunt."[53]

Second, in 1997, the United States and Mexico signed a corresponding Protocol to "permit the full implementation" of the Canada Protocol.[54] The Mexico Protocol "conform[ed] the Canadian and Mexican migratory bird conventions in a manner that [] permit[ed] legal and regulated spring/summer subsistence hunt in Canada and the United States,"[55] and was necessary in order to allow the Department of the Interior to adopt regulations permitting spring/summer hunts in Alaska without violating the Mexico Treaty.[56]

The Canada and Mexico Protocols were considered interrelated, and were generally considered jointly by the United States Senate.[57] Thus, ratification of both agreements was

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104-28 at 1. This Protocol was intended to replace a similar protocol between the United States and Canada that was signed in 1979 but never ratified. *See* Letter of Transmittal from William J. Clinton, President of the United States, to the Senate of the United States (Aug. 2, 1996), *reprinted in* S. Treaty Doc. No. 104-28 at iii ("The Protocol would replace a protocol with a similar purpose, which was signed January 30, 1979, (Executive W, 96th Cong., 2nd Sess. (1980)), and which I, therefore, desire to withdraw from the Senate.").

[53] Letter of Submittal from Warren Christopher, Secretary of State, to William J. Clinton, President of the United States (May 20, 1996), *reprinted in* S. Treaty Doc. No. 104-28 at v ("The 1916 Convention for the Protection of Migratory Birds in Canada and the United States ('the Convention') presently does not permit hunting of the migratory species covered under the Convention from March 10 to September 1 except in extremely limited circumstances. Despite this prohibition, aboriginal people of Canada and indigenous people in Alaska have continued their traditional hunt of these birds in the spring and summer for subsistence and other related purposes. In the United States, the prohibition against this traditional hunt has not been actively enforced. In Canada, as a result of recent constitutional guarantees and judicial decisions, the Canadian Federal Government has recognized a right in aboriginal people to this traditional hunt, and the prohibition has not been enforced for this reason. The goals of the Protocol are to bring the Convention into conformity with actual practice and Canadian law, and to permit the effective regulation for conservation purposes of the traditional hunt.").

[54] Letter of Transmittal from William J. Clinton, President of the United States, to the Senate of the United States (Sept. 15, 1997), *reprinted in* S. Treaty Doc. No. 105-26 at iii; *see also* Protocol Between the Government of the United States of America and the Government of the United Mexican States Amending the Convention for the Protection of Migratory Birds and Game Mammals (signed May 5, 1997), *reprinted in* S. Treaty Doc. No. 105-26.

[55] Letter of Transmittal from William J. Clinton, President of the United States, to the Senate of the United States (Sept. 15, 1997), *reprinted in* S. Treaty Doc. No. 105-26 at iii.

[56] *See* Letter of Submittal from Madeleine Albright, Secretary of State, to William J. Clinton, President of the United States (Aug. 27, 1997), *reprinted in* S. Treaty Doc. No. 105-26 at vii ("The Mexico Protocol is needed in order for the United States to be able to implement the Canada Protocol. That Protocol, which similarly addresses the issue of the spring and summer hunt, is pending before the Senate. The spring/summer harvest provisions in the Canada Protocol as they apply to wild ducks cannot be implemented in the United States until the 1936 U.S.-Mexico Convention permits such a harvest of wild ducks. As a matter of U.S. domestic law, the Department of the Interior may not implement a provision of one convention that allows a hunt prohibited by the provision of another . . . .").

[57] *See, e.g.*, S. EXEC. REP. NO. 105-5 (1997), *available at* https://www.congress.gov/congressional-report/105th-congress/executive-report/5/1 (discussing the Canada Protocol and Mexico Protocol together in the same document).

advised by the Senate on October 23, 1997 and ratified by the President September 9, 1999.[58] In both cases, the Secretary of State advised that no additional statutory authority was required to implement the protocols,[59] and none was adopted.[60]

e. Additional Legislative Developments

Separately from implementation of the United States' treaty responsibilities, in 1960 Congress amended the MBTA to make the taking of any migratory bird with the intent to sell or barter such bird, to sell or barter any migratory bird, or to attempt to do the same a felony, punishable by a fine of up to $2,000 and/or imprisonment of up to two years.[61] Congress also provided for the forfeiture of all "guns, traps, nets and other equipment, vessels, vehicles, and other means of transportation used by any person" when violating the MBTA with the intent to offer for sale or barter any such migratory bird.[62]

Over the next several decades, Congress made several revisions to the MBTA in response to judicial decisions. In 1985, the Court of Appeals for the Sixth Circuit in an appeal of the dismissal of an MBTA indictment held that the felony provision adopted in 1960 was an unconstitutional violation of the defendant's due process rights.[63] As a result, Congress amended the felony provision, limiting it only to "knowing" violations.[64]

In 2002, the district court for the District of Columbia held that live-fire military training exercises that unintentionally killed migratory birds within the training area violated the

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[58] *See* CHRISTIAN L. WIKTOR, TREATIES SUBMITTED TO THE UNITED STATES SENATE: LEGISLATIVE HISTORY, 1989-2004 at 172–74, 226–27, *available at* https://books.google.com/books?id=0IUBb901Uq8C&pg=PA226&lpg=PA226&dq=ratification+of+protocol+migratory+bird+and+game+treaty+with+mexico&source=bl&ots=kwIMRSkB28&sig=PmNXa6WM4PzbI7mtMbk7F_C2e4c&hl=en&sa=X&ved=0ahUKEwjO5-bh6LnWAhWJ24MKHZyjB_MQ6AEIVTAJ#v=onepage&q=ratification%20of%20protocol%20migratory%20bird%20and%20game%20treaty%20with%20mexico&f=false.

[59] Letter of Submittal from Warren Christopher, Secretary of State, to William J. Clinton, President (May 20, 1996), *reprinted in* S. Treaty Doc. No. 104-28 at ix ("No additional statutory authority would be required to implement the Protocol."); Letter of Submittal from Madeline Albright, Secretary of State, to William J. Clinton, President of the United States at VI (Aug. 27, 1997), *reprinted in* S. Treaty Doc. No. 105-26 at vi ("No additional statutory authority is required to implement the Mexico Protocol.").

[60] *See* WIKTOR, *supra* note 58 ("No additional statutory authority was required to implement the protocol.").

[61] Act of Sept. 8, 1960, Pub. L. No. 86-732, 74 Stat. 866.

[62] *Id.*

[63] *United States v. Wulff*, 758 F.2d 1121 (6th Cir. 1985).

[64] Emergency Wetlands Resources Act of 1986, Pub. L. No. 99-645, sec. 501, 100 Stat. 3582, 3590–91. Congress also subsequently eliminated strict liability for baiting, limiting the MBTA's ban on taking migratory birds with the aid of bait to instances where "the person knows or reasonably should know that the area is baited." *See* Migratory Bird Treaty Reform Act of 1998, Pub. L. No. 105-312, sec. 102(2), 112 Stat. 2956. This Act also increased the maximum fine for misdemeanor violations from $500 to $15,000. *Id.* § 103.

MBTA.[65] Following the court's ruling, Congress adopted legislation, though it was not an amendment of the MBTA itself, excluding "the incidental taking of a migratory bird by a member of the Armed Forces during a military-readiness activity authorized by the Secretary of Defense or the Secretary of the military department concerned" from the MBTA's restrictions on killing or taking migratory birds.[66]

III. The Current State of the Law

a. The Migratory Bird Treaty Act

Section 2 of the MBTA provides:

> Unless and except as permitted by regulations made as hereinafter provided, *it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill*, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, *any migratory bird, any part, nest, or egg of any such bird*, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof, included in the terms of the conventions between the United States and Great Britain for the protection of migratory birds concluded August 16, 1916, the United States and the United Mexican States for the protection of migratory birds and game mammals concluded February 7, 1936, the United States and the Government of Japan for the protection of migratory birds and birds in danger of extinction, and their environment concluded March 4, 1972[,] and the convention between the United States and the Union of Soviet Socialist Republics for the conservation of migratory birds and their environments concluded November 19, 1976.[67]

U.S. Fish and Wildlife Service general wildlife regulations, promulgated to implement a number of statutes, including the MBTA, define the term "take" as: "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."[68] For purposes of the MBTA, this definition subsumes a number of actions in the statute under the umbrella of "take."

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[65] *Ctr. for Biological Diversity v. Pirie*, 191 F. Supp. 2d 161 (D.D.C. 2002), *vacated on other grounds sub nom. Ctr. for Biological Diversity v. England*, 2003 App. LEXIS 1110 (D.C. Cir. 2003).

[66] Bob Stump National Defense Authorization Act for Fiscal Year 2003, Pub. L. No. 107-314, Div. A, Title III, § 315, 116 Stat. 2509 (2002), *reprinted in* 16 U.S.C.A. § 703, Historical and Statutory Notes; *see also* 50 C.F.R. § 21.15 (authorizing take incidental to military-readiness activities).

[67] 16 U.S.C. § 703 (2017) (emphasis added); *see also* 50 C.F.R. § 10.13 (list of applicable migratory birds).

[68] 50 C.F.R. § 10.12.

The phrase "incidental take" does not appear in either the MBTA or regulations implementing the Act. The U.S. Fish and Wildlife Service Manual provision issued in response to the now-withdrawn Opinion M-37041 defines "incidental take" as "take of migratory birds that directly and foreseeably results from, but is not the purpose of, an activity."[69] The manual further defines the term "kill" to include "any action that directly and foreseeably causes the death of a migratory bird where the death of the migratory bird is not the purpose of the action."[70] Due to the overlap of these definitions as they pertain to take, as used herein, the term "incidental take" refers to both takings and/or killings that directly and foreseeably result from, but are not the purpose of, an activity.[71]

Violations of the MBTA are criminal offenses. In general, violations of the MBTA are misdemeanor offenses, punishable by imprisonment of no more than six months, a fine of no more than $15,000, or both.[72] However, a felony offense arises by knowingly (1) taking a migratory bird with the intent to sell, offer to sell, or barter the bird, or (2) selling, offering to sell, bartering, or offering to barter a migratory bird; a felony is punishable by imprisonment for no more than two years, a fine of no more than $2,000, or both.[73] Taking a bird with the aid of bait if the person knows or reasonably should know that the area is baited is punishable by a fine, up to one year in prison, or both.[74] "All guns, traps, nets and other equipment, vessels, vehicles, and other means of transportation" used when violating the MBTA with the "intent to offer for sale, or sell, or offer for barter, or barter such bird" are to be forfeited to the United States.[75]

Courts have held that misdemeanor violations of the MBTA are strict-liability offenses.[76] Accordingly, if an action falls within the scope of the MBTA's prohibitions, it is a criminal

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[69] U.S. FISH AND WILDLIFE SERVICE MANUAL, part 720, ch. 3, *Incidental Take Prohibited Under the Migratory Bird Treaty Act* (Jan. 11, 2017).

[70] *Id.*

[71] This interpretation covers a nearly limitless range of otherwise lawful conduct as well as actions that may be crimes under other environmental statutes.

[72] 16 U.S.C. § 707(a).

[73] *Id.* § 707(b).

[74] *Id.* § 707(c).

[75] *Id.* § 707(d).

[76] *See, e.g., United States v. CITGO Petroleum Corp.*, 801 F.3d 477, 488 (5th Cir. 2015) ("The act imposes strict liability on violators, punishable by a maximum $15,000 fine and six months imprisonment."); *United States v. Apollo Energies, Inc.*, 611 F.3d 679, 686 ("As a matter of statutory construction, the 'take' provision of the Act does not contain a scienter requirement."); *United States v. Boynton*, 63 F.3d 337, 343 (4th Cir. 1995) ("Since the inception of the Migratory Bird Treaty in the early part of this century, misdemeanor violations of the MBTA, including hunting in a baited area, have been interpreted by the majority of the courts as strict liability crimes, not requiring the government to prove any intent element."); *United States v. Engler*, 806 F.2d 425, 431 (3d Cir. 1986) ("Scienter is not an element of criminal liability under the Act's misdemeanor provisions."); *United States v. Catlett*, 747 F.2d 1102, 1104 (6th Cir. 1984) ("The majority view, and the view of this circuit, is that . . . the crime is a strict liability offense."). *But see United States v. Sylvester*, 848 F.2d 520, 522 (5th Cir. 1988) ("Unique among the

violation, regardless of whether the violator acted with intent. Felony violations, however, require knowledge.[77] As one court noted, "[l]ooking first at the language of the MBTA itself, it is clear that Congress intended to make the unlawful killing of even one bird an offense."[78] At times the Department of Justice has taken the position that the MBTA permits charges to be brought for each and every bird taken, notwithstanding whether multiple birds are killed via a single action or transaction.[79]

b. Judicial Decisions Regarding Incidental Take

This Opinion is not written on a blank legal slate. Beginning in the 1970s, federal prosecutors began filing criminal charges under the MBTA against persons, including oil, gas, timber, mining, and chemical companies, whose activities "incidentally" resulted in the death of migratory birds.[80] In response, courts have adopted different views on whether Section 2 of the MBTA prohibits incidental take, and, if so, to what extent. Courts of Appeals in the Second and Tenth Circuits, as well as district courts in at least the Ninth and District of Columbia Circuits, have held that the MBTA criminalizes some instances of incidental take, generally with some form of limiting construction. By contrast, Courts of Appeals in the Fifth, Eighth, and Ninth Circuits, as well as district courts in the Third and Seventh Circuits, have indicated that it does not.[81]

Circuits, we require a minimum level of scienter as a necessary element for an offense under the MBTA."). As noted above, there is language in *CITGO* suggesting that the Fifth Circuit now considers the MBTA to be a strict-liability statute.

[77] *See* 16 U.S.C. § 707(b); *see also United States v. Wulff*, 758 F.2d 1121 (6th Cir. 1985).

[78] *United States v. Corbin Farm Serv.*, 444 F. Supp. 510, 529 (E.D. Cal. 1978), *aff'd*, 578 F.2d 259 (9th Cir. 1978).

[79] Robert S. Anderson & Jill Birchell, *Prosecuting Industrial Takings of Protected Avian Wildlife*, U.S. ATT'YS' BULL. July 2011, at 65, 68 ("Prosecutors and agents are often left to decide how many separate charges should be filed—one per bird, one per species, one per incident, one per site? Virtually all of these parsings have been used in past cases. *See, e.g.*, *United States v. Apollo Energies*, 611 F.3d 679, 683 (10th Cir. 2010) (one count per inspection that discovered dead birds); *United States v. Corbin Farm Services*, 578 F.2d 259, 260 (9th Cir. 1978) (one count per transaction that resulted in bird deaths); *United States v. FMC Corp.*, 572 F.2d 902, 903 (2d Cir. 1978) (one count per species per day); *United States v. Rogers*, 367 F.2d 998, 999 (8th Cir. 1966) (one count per day); *United States v. Fleet Management, Ltd.*, No. 3:08-CR-00160 (N.D. Cal. 2010) (one count per discharge); *United States v. Exxon Corp.*, No. A90-015 CR (D. Alaska Feb. 27, 1990); *United States v. Equity Corp.*, Cr. No. 75-51 (D. Utah Dec. 8, 1975) (one count per bird). Most of these cases are resolved by plea agreement, without litigation regarding the unit of prosecution."). *But see Corbin Farm Serv.*, 444 F. Supp. at 527–31 (E.D. Cal. 1978) (dismissing nine out of ten counts against the defendants on multiplicity grounds), *aff'd*, 578 F.2d 529 (9th Cir. 1978).

[80] Jesse Greenspan, *The Evolution of the Migratory Bird Treaty Act*, AUDUBON, May 22, 2015, *available at* http://www.audubon.org/news/the-evolution-migratory-bird-treaty-act; *see also United States v. FMC Corp.*, 572 F. 2d 902 (2d Cir. 1978); *Corbin Farm Serv.*, 444 F. Supp. 510.

[81] The Court of Appeals for the Ninth Circuit distinguished without explicitly overturning an earlier district court decision concerning incidental take.

i. Courts Extending the MBTA to Include Incidental Take

Cases that have applied the MBTA to the incidental taking of migratory birds generally rely upon a combination of two courts of appeals and two district court cases, beginning with *United States v. FMC Corporation.* In *United States v. FMC Corporation*, the Second Circuit upheld a conviction of a corporation stemming from the death of a number of birds after coming into contact with water tainted by that corporation's manufacture of pesticides.[82] The court found that "[i]mposing strict liability on FMC in this case does not dictate that every death of a bird will result in imposing strict criminal liability on some party."[83] The court further stated that the application of criminal liability to all instances of incidental take "would offend reason and common sense."[84] Nevertheless, analogizing FMC's criminal liability under the MBTA to the imposition of strict liability for the manufacture of dangerous products in civil tort law,[85] the court reasoned that FMC violated the MBTA because it "engaged in an activity involving the manufacture of a highly toxic chemical; and FMC failed to prevent this chemical from escaping into the pond and killing birds."[86]

At about the same time, the Eastern District of California reached a similar result by applying the MBTA to the deaths of birds resulting from pesticides.[87] According to the court, "[w]hen dealing with pesticides, the public is put on notice that it should exercise care to prevent injury to the environment and to other persons."[88] The court went on to adopt a *de facto* negligence standard, noting "[i]f defendants acted with reasonable care or if they were powerless to prevent the violation, then a very different question would be presented."[89]

In *United States v. Moon Lake Electric Association, Inc.*, the federal district court for Colorado held that the MBTA extended beyond conduct associated with hunting and poaching to criminalize the deaths of birds resulting from contact with Moon Lake's power lines.[90] In doing so, the court acknowledged that "[w]hile prosecutors necessarily enjoy much discretion, proper construction of a criminal statute cannot depend upon the good will of those who must enforce it."[91] The court went on to identify "an important and inherent limiting feature of the MBTA's

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[82] 572 F.2d 902 (2d Cir. 1978).

[83] *Id.* at 908.

[84] *Id.* at 905.

[85] *Id.* at 907.

[86] *Id.* at 908.

[87] *Corbin Farm Serv.* 444 F. Supp. 510.

[88] *Id.* at 536.

[89] *Id.*

[90] 45 F. Supp. 2d 1070, (D. Colo. 1999).

[91] *Moon Lake*, 45 F. Supp. 2d at 1084.

misdemeanor provision: to obtain a guilty verdict under § 707(a), the government must prove proximate causation," where proximate cause "is generally defined as 'that which, in a natural and continuous sequence, unbroken by any efficient intervening cause, produces the injury and without which the accident could not have happened, if the injury be one which might be *reasonably anticipated or foreseen as a natural consequence of the wrongful act.*'"[92]

The Tenth Circuit in *United States v. Apollo Energies, Inc.* followed a similar proximate-cause analysis in upholding a conviction under the MBTA for birds that were killed after becoming lodged in oil-drilling equipment.[93] According to the court, "[c]entral to all of the Supreme Court's cases on the due process constraints on criminal statutes is foreseeability – whether it is framed as a constitutional constraint on causation and mental state or whether it is framed as a presumption in statutory construction."[94] In context, the court clarified that "[w]hat is relevant . . . is what knowledge the defendants had or should have had of birds potentially dying in their heater-treaters."[95] Thus, for the court in *Apollo Energies*, incidental take is within the scope of the MBTA when defendants have or should have knowledge that their conduct may kill or injure migratory birds, and it does so.

ii. Courts Limiting the MBTA to Exclude Incidental Take

Courts holding that the MBTA does not extend to incidental take generally trace their roots to the Ninth Circuit's ruling in *Seattle Audubon Society v. Evans.* The court in *Seattle Audubon* held that the MBTA did not criminalize the death of birds caused by habitat destruction.[96] According to the court, the regulatory definition of "take" "describes the physical conduct of the sort engaged in by hunters and poachers, conduct which was undoubtedly a concern at the time of the statute's enactment in 1918."[97] The court went on to compare "take" under the MBTA, and its applicable regulatory definition, with the broader statutory definition of "take" under the Endangered Species Act, which includes "harm":

[92] *Id.* (quoting BLACK'S LAW DICTIONARY 1225 (6th ed. 1990)) (emphasis in original).

[93] 611 F.3d 679 (10th Cir. 2010). Prior to the court's ruling in *Apollo Energies*, at least one district court in the Tenth Circuit ruled that the MBTA did not apply to incidental take. In *United States v. Ray Westall Operating, Inc.*, 2009 U.S. Dist. LEXIS 130674 (D.N.M. 2009), the district court for the District of New Mexico held that the death of migratory birds resulting from contact with a pit containing overflow discharge from an oil-production site was not a criminal act under the MBTA. According to the court, "[t]here is no language in the MBTA expressly extending the prohibition against killing migratory birds to acts or omissions that are not directed at migratory birds but which may indirectly kill migratory birds." *Id.* at *17–18. Rather, the court found "that it is highly unlikely that Congress intended to impose criminal liability on every person that indirectly causes the death of a migratory bird" and concluded "that Congress intended to prohibit only conduct directed towards birds and did not intend to criminalize negligent acts or omissions that are not directed at birds, but which incidentally and proximately cause bird deaths." *Id.* at *19.

[94] *Apollo Energies*, 611 F.3d at 690 (citations omitted).

[95] *Id.* at 690 n.5.

[96] 952 F.2d 297, 303 (9th Cir. 1991).

[97] *Id.* at 302.

> We are not free to give words a different meaning than that which Congress and the Agencies charged with implementing congressional directives have historically given them . . . . Habitat destruction causes "harm" to the [birds] under the [Endangered Species Act] but does not "take" them within the meaning of the MBTA.[98]

The court further distinguished actions leading "indirectly" to the death of birds, such as habitat destruction, from actions that lead directly to the death of birds, such as exposing birds to a highly toxic pesticide, leaving open whether the law reaches the later conduct.[99]

Building upon *Seattle Audubon*, the district court in *Mahler v. United States Forest Service* held that the cutting of trees by the U.S. Forest Service that could destroy migratory bird nesting areas did not violate the MBTA,[100] ruling "[t]he MBTA was designed to forestall hunting of migratory birds and the sale of their parts" and "declin[ing] [the] invitation to extend the statute well beyond its language and the Congressional purpose behind its enactment."[101] In response to plaintiff's motion to alter or amend judgment, the court reaffirmed that the MBTA did not reach the Forest Service's activity, holding "[p]roperly interpreted, the MBTA applies to activities that are intended to harm birds or to exploit harm to birds, such as hunting and trapping, and trafficking in bird and bird parts. The MBTA does not apply to other activities that result in unintended deaths of migratory birds."[102]

The Eighth Circuit in *Newton County Wildlife Association v. United States Forest Service* likewise rejected a claim that the destruction of forests containing migratory birds violated the MBTA.[103] Citing to *Seattle Audubon* and *Mahler*, among other cases, the *Newton County* court held:

> [I]t would stretch this 1918 statute far beyond the bounds of reason to construe it as an absolute criminal prohibition on conduct, such as timber harvesting, that *indirectly* results in the death of migratory birds. Thus, we agree with the Ninth Circuit that the ambiguous terms "take" and "kill" in 16 U.S.C. § 703 mean "physical conduct of the sort engaged in by hunters and poachers . . . ."[104]

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[98] *Id.* at 303.

[99] *Id.* at 303 ("Courts have held that the Migratory Bird Treaty Act reaches as far as direct, though unintended, bird poisoning from toxic substances. . . . The reasoning of those cases is inapposite here. These cases do not suggest that habitat destruction, leading indirectly to bird deaths, amounts to the 'taking' of migratory birds within the meaning of the Migratory Bird Treaty Act.").

[100] 927 F. Supp. 1559 (S.D. Ind. 1996).

[101] *Id.*

[102] *Mahler v. United States Forest Service*, 927 F. Supp. 1559, 1579 (S.D. Ind. 1996).

[103] 113 F. 3d 110 (8th Cir. 1997).

[104] *Id.* at 115 (quoting *Seattle Audubon*, 952 F.2d at 302) (emphasis in original). Contemporaneously, *Newton County* was echoed by the district court for the Western District of Pennsylvania in *Curry v. United States Forest*

Following *Newton County* as "controlling precedent," the court in *United States v. Brigham Oil & Gas, L.P.* held that the MBTA did not impose criminal liability on an oil company for the deaths of several migratory birds after coming into contact with a "reserve pit."[105] In doing so, the *Brigham Oil* court concluded "as a matter of law, that lawful commercial activity which may indirectly cause the death of migratory birds does not constitute a federal crime."[106] In addition to relying on the *Newton County* decision, the court in *Brigham* examined the text of the MBTA, concluding that the text "refers to a purposeful attempt to possess wildlife through capture, not incidental or accidental taking through lawful commercial activity."[107] The court also noted that "to extend the Migratory Bird Treaty Act to reach other activities that indirectly result in the deaths of covered birds would yield absurd results,"[108] potentially criminalizing "driving, construction, airplane flights, farming, electricity and wind turbines . . . and many other everyday lawful activities."[109]

Most recently, the Fifth Circuit in *United States v. CITGO Petroleum Corporation* examined "the statute's text, its common law origin, a comparison with other statutes, and [a] rejection of the argument that strict liability can change the nature of the necessary illegal act" and "agree[d] with the Eighth and Ninth circuits that a 'taking' is limited to deliberate acts done directly and intentionally to migratory birds."[110] The court further noted that "[t]he scope of liability under the government's preferred interpretation is hard to overstate," and "would enable the government to prosecute at will and even capriciously (but for the minimal protection of prosecutorial discretion) for harsh penalties."[111] *CITGO* is the most recent decision on this topic and triggered the Department's further evaluation of the question.[112]

Service, which ruled in the alternative that "the loss of migratory birds as a result of timber sales . . . do not constitute a 'taking' or 'killing' within the meaning of the MBTA." 988 F. Supp. 541, 549 (W.D. Penn. 1997).

[105] 840 F. Supp. 2d 1202 (D.N.D. 2012). A "reserve pit" is defined under state law as "an excavated area used to contain drill cuttings accumulated during oil and gas drilling operations and mud-laden oil and gas drilling fluids used to confine oil, gas, or water to its native strata during the drilling of an oil and gas well" and is subject to state regulation. *Id.* at 1204 (quoting N.D.C.C. § 38-08-02).

[106] *Id.* at 1214.

[107] *Id.* at 1209.

[108] *Id.* at 1212.

[109] *Id.* at 1213.

[110] 801 F.3d 477, 488–89 (5th Cir. 2015).

[111] *Id.* at 493–94.

[112] Some courts have suggested that the Eighth and Ninth Circuit decisions are limited to merely cases involving habitat destruction, rather than the direct taking or killing of birds, which could be viewed as "indirect take." *See Apollo Energies*, 611 F.3d at 686 (distinguishing the Eighth Circuit decision in *Newton Country* on the grounds that it involved logging that modified bird habitat in some way); *Moon Lake*, 45 F. Supp. 2d at 1075–76 (suggesting that the Ninth Circuit's ruling in *Seattle Audubon* may be limited to habitat modification or destruction). This limited interpretation seeks to cabin the Eighth and Ninth Circuit opinions to the narrow facts at issue in those cases, consistent with the government's own position that habitat destruction was not criminalized under the MBTA, while

IV. Analysis of Incidental Take Under the MBTA

Based upon the text and purpose of the MBTA, as well as sound principles of constitutional avoidance, this memorandum concludes that the MBTA's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same only criminalize affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs.

a. The Relevant Text of the MBTA is Limited to Affirmative Actions that Have as their Purpose the Taking or Killing of Migratory Birds

The Supreme Court has counseled "[t]he starting point in statutory interpretation is 'the language [of the statute] itself.'"[113] Thus, consistent with the ancient maxim *a verbis legis non est recedendum* ("do not depart from the words of the law"), the text of the law is the necessary starting point to determine the scope of conduct prohibited by the MBTA.[114] As described below, the relevant text indicates that the MBTA only criminalizes purposeful and affirmative actions intended to reduce migratory birds to human control.

The relevant portion of the MBTA reads "it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill . . . any migratory bird, [or] any part, nest, or egg of any such bird."[115] Pursuant to the canon of *noscitur a sociis* ("it is known by its associates"), when any words "are associated in a context suggesting that the words have something in common, they should be assigned a permissible meaning that makes them similar."[116] Section 2 of the MBTA groups together five verbs—pursue, hunt, take,

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disregarding the broad language and logic of the legal interpretations compelling the disposition of each case. *See, e.g.*, *Newton County*, 113 F.3d at 115 ("[W]e agree with the Ninth Circuit that the ambiguous terms 'take' and 'kill' in 16 U.S.C. § 703 mean 'physical conduct of the sort engaged in by hunters and poachers, conduct which was undoubtedly a concern at the time of the statute's enactment in 1918.'" (citing to *Seattle Audubon*, 952 F.2d at 302)). The disposition of those cases led logically to the Fifth Circuit's decision in 2015 holding that the MBTA reaches only affirmative and purposeful acts. *CITGO*, 801 F.3d at 488–89 ("[W]e agree with the Eighth and Ninth circuits that a 'taking' is limited to deliberate acts done directly and intentionally to migratory birds."). The Fifth Circuit went on to interpret this limitation to preclude the application of the MBTA to the death of birds as a result of contact with uncovered equalization tanks. *Id.* at 493–94; *see also Brigham Oil*, 840 F. Supp. 2d at 1209, 1211 (noting that "[t]he Eighth Circuit found that the ambiguous terms 'take' and 'kill' mean 'physical conduct of the sort engaged in by hunters and poachers, conduct which was undoubtedly a concern at the time of the statute's enactment in 1918'" and was "controlling precedent" in case involving uncovered oil reserve pits).

[113] *United States v. James*, 478 U.S. 597, 604 (1986) (quoting *Blue Chip Stamps v. Manor Drug Stores*, 421 U.S. 723, 756 (1975) (Powell, H., concurring); *see also* Felix Frankfurter, *Some Reflections on the Reading of Statutes*, 47 COLUM L. REV. 527, 535 (1947) ("Though we may not end with the words in construing a disputed statute, one certainly begins there.").

[114] *See* ANTONIN SCALIA & BRYAN A. GARNER, READING THE LAW: THE INTERPRETATION OF LEGAL TEXTS 56 (2012) (quoting DIGEST 32.69 pr. (Marcellus)).

[115] 16 U.S.C. § 703(a) (2017) (emphasis added); *see also* 50 C.F.R. § 10.13 (list of applicable migratory birds).

[116] SCALIA & GARNER, *supra* note 114, at 195; *see also Third Nat'l Bank v. Impac, Ltd.*, 432 U.S. 312, 321 (1977) ("As always, '[t]he meaning of particular phrases must be determined in context' . . . ." (quoting *SEC v. Nat'l Sec.*,

capture, and kill. Accordingly, the canon of *noscitur a sociis* counsels in favor of reading each verb to have a related meaning.[117]

Of these five verbs, three—pursue, hunt, and capture—unambiguously require an affirmative and purposeful action. To wit, according to the first entry for each word in the 1934 edition of Webster's New International Dictionary of the English Language:

- Pursue means "[t]o follow with a view to overtake; to follow eagerly, or with haste; to chase."[118]
- Hunt means "[t]o follow or search for (game or prey) for the purpose, and with the means of capturing or killing;"[119]
- Capture means "[t]o take captive; to seize or take possession of by force, surprise, or stratagem; to overcome and hold; to secure by the exercise of effort, skill, or ingenuity against competition or opposition;"[120]

Thus, one does not passively or accidentally pursue, hunt, or capture. Rather, each requires a deliberate action specifically directed at achieving a purposeful goal.

By contrast, the verbs "kill" and "take" may refer to active or passive conduct, depending on the context.[121] When read together with the other active verbs in Section 2 of the MBTA,

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Inc., 393 U.S. 453, 466 (1969)); *Babbitt v. Sweet Home Chapter of Cmtys. For a Greater Or.*, 515 U.S. 687, 720–21 (1995) (Scalia, J., dissenting) (referring to a similar list in the Endangered Species Act: "I would call it *noscitur a sociis*, but the principle is much the same: The fact that 'several items in a list share an attribute counsels in favor of interpreting the other items as possessing that attribute as well.'" (quoting *Beecham v. United States*, 511 U.S. 368, 371 (1994))).

[117] *See* SCALIA & GARNER, *supra* note 114, at 195 ("The canon especially holds that 'words grouped in a list should be given related meanings.'" (quoting *Third Nat'l Bank*, 432 U.S. at 322)).

[118] WEBSTER'S SECOND NEW INTERNATIONAL DICTIONARY at 2018-19 (1934). The 1934 edition is referenced because it is close in time to the adoption of the relevant language, and may provide greater insight into the commonly understood meaning of the terms at the time the MBTA was enacted. *See South Carolina v. United States*, 199 U.S. 437, 448 (1905) (The meaning of written instruments "does not alter. That which it meant when adopted it means now."). *See generally District of Columbia v. Heller*, 128 S. Ct. 2783, 2791-95 (2008) (examining 18th century dictionary definitions to assess the meaning of the phrase "keep and bear Arms" in the Second Amendment); *Molzof v. United States*, 502 U.S. 301, 307 (1992) (examining legal dictionaries in existence when the operative statute was drafted and enacted to interpret its meaning). *See also generally* SCALIA & GARNER, *supra* note 114, at 415–24 (2012) (describing principles for the use of dictionaries in statutory interpretation, noting that dictionaries are often lagging indicators of contemporary meaning); *id.* at 419 (identifying WEBSTER'S SECOND NEW INTERNATIONAL DICTIONARY (1934) as one of the "most useful and authoritative" sources "[a]mong contemporaneous-usage dictionaries—those that reflect meanings current at a given time").

[119] WEBSTER'S SECOND NEW INTERNATIONAL DICTIONARY at 1215 (1934).

[120] *Id.* at 400.

[121] *See id.* at 1362 ("kill" may mean the more active "to deprive of life; to put to death; to slay" or serve as "the general term for depriving of life"); *id.* at 2569 ("take" has many definitions, including the more passive "[t]o lay or

however, the proper meaning is evident. The operative verbs ("pursue, hunt, take, capture, kill") "are all affirmative acts . . . which are directed immediately and intentionally against a particular animal—not acts or omissions that indirectly and accidentally cause injury to a population of animals."[122] This conclusion is also supported by the U.S. Fish and Wildlife Service's implementing regulations, which define "take" to mean "to pursue, hunt, shoot, wound, kill, trap, capture, or collect" or attempt to do the same.[123] The component actions of "take" involve direct and purposeful actions to reduce animals to human control.[124] As such, they "reinforce[] the dictionary definition, and confirm[] that 'take' does not refer to accidental activity or the unintended results of other conduct."[125] This interpretation does not render the words "take" and "kill" redundant since each has its own discrete definition; indeed, one can hunt or pursue an animal without either killing it or taking it under the definitions relevant at the time the MBTA was enacted.[126]

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get hold of with arms, hands or fingers" or "[t]o get possession or control of" or the more active "[t]o catch, seize, or attack through the effect of a sudden force or influence").

[122] *Sweet Home*, 515 U.S. at 719–20 (Scalia, J., dissenting); *see also CITGO*, 801 F.3d at 489 n.10 ("Even if 'kill' does have independent meaning [from 'take'], the Supreme Court, interpreting a similar list in the [Endangered Species Act], concluded that the terms pursue, hunt, shoot, wound, kill, trap, capture, and collect, generally refer to deliberate actions. *Sweet Home*, 515 U.S. at 698 n.11, 115 S. Ct. at 2413. Accordingly, there is reason to think that the MBTA's prohibition on 'killing' is similarly limited to deliberate acts that effect bird deaths."); *Newton County*, 113 F.3d at 115 ("MBTA's plain language prohibits conduct directed at migratory birds . . . . [T]he ambiguous terms 'take' and 'kill' in 16 U.S.C. § 703 mean 'physical conduct of the sort engaged in by hunters and poachers . . . .'" (quoting *Seattle Audubon*, 952 F.2d at 302)); *Bingham Oil & Gas*, 840 F. Supp. 2d at 1208 ("In the context of the Act, 'take' refers to conduct directed at birds, such as hunting and poaching, and not acts or omissions having merely the incidental or unintended effect of causing bird deaths.").

[123] 50 C.F.R. § 10.12.

[124] In this same regard, the U.S. Fish and Wildlife Service's *Federal Register* notice adopting the current definition of "take" includes "Subpart C – Taking," which consists of four regulations addressing:

- Hunting methods;
- Shooting hours;
- Daily limit; and
- Wanton waste of migratory game birds (requiring hunters to make a reasonable effort to include crippled game birds in their daily bag limit).

Migratory Bird Hunting: Miscellaneous Amendments, 38 Fed. Reg. 22015, 22022 (Aug. 15, 1973). Notably, these regulations make no mention of incidental take, even though they were adopted the same year the government brought the known first criminal case alleging incidental take violated the MBTA. *See id.*; Meredith B. Lilley & Jeremy Firestone, *Wind Power, Wildlife, and the Migratory Bird Treaty: A Way Forward*, 38 ENVTL. L. 1167, 1181 (2008) ("In the early 1970s, United States v. Union Texas Petroleum [No, 73-CR-127 (D. Colo. Jul. 11, 1973)] marked the first case dealing with the issue of incidental take.").

[125] *Brigham Oil & Gas*, 840 F. Supp. 2d at 1209.

[126] The regulations governing exceptions to the prohibition contemplate permits for an array of activities that are affirmative and purposeful actions directed at protected birds, such as permits allowing for control of injurious birds,

Furthermore, the notion that "take" refers to an affirmative action directed immediately and purposefully against a particular animal is supported by the use of the word "take" in the common law. As the Supreme Court has instructed, "absent contrary indications, Congress intends to adopt the common law definition of statutory terms."[127] As Justice Scalia noted, "the term ['take'] is as old as the law itself."[128] For example, the Digest of Justinian places "take" squarely in the context of acquiring dominion over wild animals, stating:

> [A]ll the animals which can be taken upon the earth, in the sea, or in the air, that is to say, wild animals, belong to those who take them. . . . Because that which belongs to nobody is acquired by the natural law by the person who first possesses it. We do not distinguish the acquisition of these wild beasts and birds by whether one has captured them on his own property [or] on the property of another; but he who wishes to enter into the property of another to hunt can be readily prevented if the owner knows his purpose to do so.[129]

Likewise, Blackstone's Commentaries provide:

> A man may lastly have a qualified property in animals feroe naturoe, propter privilegium, that is, he may have the privilege of hunting, taking and killing them in exclusion of other persons. Here he has a transient property in these animals usually called game so long as they continue within his liberty, and may restrain any stranger from taking them therein; but the instant they depart into another liberty, this qualified property ceases.[130]

Thus, under common law "[t]o 'take,' when applied to wild animals, means to reduce those animals, by killing or capturing, to human control."[131] When used as part of a regulatory plan,

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scientific collecting permits, and rehabilitation permits—all activities well within the scope of Section 2. 50 C.F.R. part 21.

[127] *United States v. Shabani*, 513 U.S. 10, 13 (1994). The fact that Congress in other statutes later expanded "take" beyond its common-law meaning confirms that Congress intended to adopt the common-law definition for the MBTA. *See, e.g.*, 16 U.S.C. § 1532(19) (defining "take" under the Endangered Species Act (ESA) to include the terms "harass" and "harm"); 16 U.S.C. § 1362(13) (defining "take" under the Marine Mammal Protection Act (MMPA) to include the term "harass"); *see also Sweet Home*, 515 U.S. at 701 n.15 (suggesting that the definition of "take" in the ESA is broader than the definition of "take" at common law); *Seattle Audubon*, 952 F.2d at 303 (holding "that the differences in the proscribed conduct under ESA and the MBTA are 'distinct and purposeful,'" and that prohibitions under the ESA are broader than those under the MBTA).

[128] *Sweet Home*, 515 U.S. at 717 (Scalia, J., dissenting).

[129] *Geer v. Connecticut*, 161 U.S. 519, 523 (1896) (quoting DIGEST, Book 41, Tit. 1, De Adquir. Rer. Dom.).

[130] *Id.* at 526–27 (1896) (quoting 2 BLACKSTONE COMMENTARY 410).

[131] *Sweet Home*, 515 U.S. at 717 (Scalia, J., dissenting); *see also CITGO*, 801 F.3d at 489 ("Justice Scalia's discussion of 'take' as used in the Endangered Species Act is not challenged here by the government, nor was it criticized by the majority in *Sweet Home*, because Congress gave 'take' a broader meaning for that statute.").

such as that in Section 2 of the MBTA, "[t]he taking prohibition is only part of the regulatory plan . . . which covers all stages of the process by which protected wildlife is reduced to man's dominion and made the object of profit," and, as such, is "a term of art deeply embedded in the statutory and common law concerning wildlife" that "describes a class of acts (not omissions) done directly and intentionally (not indirectly and by accident) to particular animals (not populations of animals)."[132]

A number of courts, as well as the prior M-Opinion, have focused on the MBTA's direction that a prohibited act can occur "at any time, by any means, in any manner" to support the conclusion that the statute prohibits any activity that results in the death of a bird, which would necessarily include incidental take. However, this language does not change the nature of those prohibited acts and simply clarifies that activities directed at migratory birds, such as hunting and poaching, are prohibited whenever and wherever they occur and whatever manner is applied, be it a shotgun, a bow, or some other creative approach to deliberately taking birds.[133]

b. Interpreting Strict Liability as Dispositive Conflates *Mens Rea* and *Actus Rea*

In reaching a contrary conclusion, Opinion M-37041 assumed that because Section 703 is a strict-liability provision, meaning that no *mens rea* or criminal intent is required for a violation to have taken place, *any* act that takes or kills a bird must be covered as long as the act results in the death of a bird. This assumption conflates two separate questions: (1) the definitions of the prohibited acts—arrived at using traditional tools of statutory construction; and (2) the mental state, or lack thereof, required to establish a violation. The relevant acts prohibited by the MBTA are purposeful and voluntary affirmative acts directed at reducing an animal to human control, such as when a hunter shoots a protected bird causing its death. In this example, strict liability would arise even though the hunter did not know that the bird he took was protected under the MBTA or if the hunter shot protected birds when meaning to shoot game birds under a permit. The key remains that the actor was engaged in an activity the object of which was to render an animal subject to human control.[134]

By contrast, liability does not attach to actions the plain object of which does not include rendering an animal subject to human control. Classic examples of such actions include: driving

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[132] *Sweet Home*, 515 U.S. at 718 (Scalia, J., dissenting). We note that this language makes clear that the sort of "human control" referred to by Justice Scalia includes the act of intentionally killing even in the absence of further intent to reduce the particular animal to human *possession*. Thus, intentional killing is itself a form of "human control."

[133] *See generally CITGO*, 801 F.3d at 490 ("The addition of adverbial phrases connoting 'means' and 'manner,' however, does not serve to transform the nature of the activities themselves. For instance, the manner and means of hunting may differ from bowhunting to rifles, shotguns, and air rifles, but hunting is still a deliberately conducted activity. Likewise, rendering all-inclusive the manner and means of 'taking' migratory birds does not change what 'take' means, it merely modifies the mode of take.").

[134] *See* WAYNE R. LAFAVE, CRIMINAL LAW 5.2(e) (5th ed. 2010) ("[W]here the definition of a crime requires some forbidden act by the defendant, his bodily movement, to qualify as an act, must be voluntary. To some extent, then, *all crimes of affirmative action require something in the way of a mental element*—at least an intention to make the bodily movement that constitutes the act which the crime requires.") (emphasis added) (citations omitted). Thus, even strict-liability crimes may involve some element of intent.

a car, allowing a pet cat to roam outdoors, or erecting a windowed building. All of these actions could directly and foreseeably result in the deaths of protected birds, and all would be violations of the MBTA under the now-withdrawn M-Opinion, yet none of these actions have as their object rendering any animal subject to human control. Because no "take" has occurred within the meaning of the MBTA, the strict-liability provisions of the Act are not triggered. A comparison with other strict-liability crimes underscores this point. For example, selling alcohol to minors is generally a strict-liability crime—no *mens rea* is required to establish a violation and a crime is committed even if the seller did not know that the buyer was underage. This is true despite the fact that the act itself, the selling of alcohol, is an affirmative and purposeful act that requires a voluntary intentional act.

The prior M-Opinion posited that amendments to the MBTA that imposed mental statue requirements for certain specific offenses were only necessary if no mental state is otherwise required. Again, this mixes separate questions—the definition of the prohibited acts and the *mens rea*, if any. The conclusion that the taking and killing of migratory birds is a strict-liability crime does not answer the separate question of what acts are criminalized under the statute.

The Fifth Circuit explained in *CITGO*:

> [W]e disagree that because misdemeanor MBTA violations are strict liability crimes, a "take" includes acts (or omissions) that indirectly or accidentally kill migratory birds. These and like decisions confuse the *mens rea* and the *actus rea* requirements. Strict liability crimes dispense with the first requirement; the government need not prove the defendant had any criminal intent. But a defendant must still commit the act to be liable. Further, criminal law requires that the defendant commit the act voluntarily. WAYNE R. LAFAVE, CRIMINAL LAW § 5.2(e) (5th ed. 2010). "To some extent, then, all crimes of affirmative action require something in the way of a mental element—at least an intention to make the bodily movement that constitutes that act which the crime requires." *Id.* Here, that act is "to take" which, even without a *mens rea*, is not something that is done unknowingly or involuntarily. Accordingly, requiring defendants, as an element of an MBTA misdemeanor crime, to take an affirmative action to cause migratory bird deaths is consistent with the imposition of strict liability. *See, e.g., United States v. Morgan*, 311 F.3d 611, 616 (5th Cir. 2002).
>
> There is no doubt that a hunter who shoots a migratory bird without a permit in the mistaken belief that it is not a migratory bird may be strictly liable for a "taking" under the MBTA because he engaged in an intentional and deliberate act toward the bird. *Cf. Sweet Home*, 515 U.S. at 722, 115 S. Ct. at 2425 (Scalia, J., dissenting) (hunter's mistaken shooting of an elk is a "knowing" act that renders him strictly liable under the ESA); *United States v. Kapp*, 419 F.3d 666, 673 (7th Cir. 2005) (holding Kapp liable under the ESA over objection that the exotic cats he killed were unprotected hybrids). A person whose car accidentally collided with the bird, however, has committed no act "taking" the bird for which he could be held strictly liable. Nor do the owners of electrical lines "take" migratory birds who run into them. These distinctions are inherent in

> the nature of the word "taking" and reveal the strict liability argument as a non-sequitur.[135]

The *Mahler* court further described the interplay between activities that are "intended" to harm birds and the strict liability standard of the MBTA:

> [A comment in the legislative history] in favor of strict liability does not show any intention on the part of Congress to extend the scope of the MBTA beyond hunting, trapping, poaching, and trading in birds and bird parts to reach any and all human activity that might cause the death of a migratory bird. Those who engage in such activity and who accidentally kill a protected migratory bird or who violate the limits on their permits may be charged with misdemeanors without proof of intent to kill a *protected* bird or intent to violate the terms of a permit. That does not mean, however, that Congress intended for "strict liability" to apply to all forms of human activity, such as cutting a tree, mowing a hayfield, or flying a plane. The 1986 amendment and corresponding legislative history reveal only an intention to close a loophole that might prevent felony prosecutions for commercial trafficking in migratory birds and their parts.
>
> Thus, there appears to be no explicit basis in the language or the development of the MBTA for concluding that it was intended to be applied to any and all human activity that causes even unintentional deaths of migratory birds.[136]

The use of the words "affirmative" and "purposeful" serve to limit the range of actions prohibited under the MBTA to activities akin to hunting and trapping and exclude more attenuated conduct, such as lawful commercial activity that unintentionally and indirectly results in the death of migratory birds.

c. The Legislative History Is Limited to Discussion of Affirmative Actions that Have as their Purpose the Taking or Killing of Migratory Birds

i. The Original Purpose of the MBTA was to Regulate Overhunting

Even if the text of the statute were ambiguous, the history of the MBTA and the debate surrounding its adoption illustrate that the Act was part of Congress's efforts to regulate the hunting of migratory birds in direct response to the extreme over-hunting, largely for commercial purposes, that had occurred over the years.[137] Testimony concerning the MBTA given by the Solicitor's Office for the Department of Agriculture underscores this focus:

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[135] 801 F.3d at 492–93 (footnotes omitted).

[136] *Mahler*, 927 F. Supp. at 1581 (referencing S. REP. NO. 99-445, at 16 (1986), *reprinted* in 1986 U.S.C.C.A.N. 6113, 6128).

[137] *See Moon Lake*, 45 F. Supp. 2d at 1080 ("the MBTA's legislative history indicates that Congress intended to regulate recreational and commercial hunting"); *Mahler*, 927 F. Supp. at 1574 ("The MBTA was designed to forestall hunting of migratory birds and the sale of their parts.").

> We people down here hunt [migratory birds]. The Canadians reasonably want some assurances from the United States that if they let those birds rear their young up there and come down here, we will preserve a sufficient supply to permit them to go back there.[138]

Likewise, the Chief of the Department of Agriculture's Bureau of Biological Survey noted that he "ha[s] always had the idea that [passenger pigeons] were destroyed by overhunting, being killed for food and for sport."[139]

Statements from individual Congressmen evince a similar focus on hunting. Senator Smith, "who introduced and championed the Act . . . in the Senate,"[140] explained:

> Nobody is trying to do anything here except to keep pothunters from killing game out of season, ruining the eggs of nesting birds, and ruining the country by it. Enough birds will keep every insect off of every tree in America, and if you will quit shooting them they will do it.[141]

Likewise, during hearings of the House Foreign Affairs Committee, Congressman Miller, a "vigorous fighter, who distinguished himself in the debate" over the MBTA,[142] put the MBTA squarely and exclusively in the context of hunting:

> I want to assure you . . . that I am heartily in sympathy with this legislation. I want it to go through, because I am up there every fall, and I know what the trouble is. The trouble is in shooting the ducks in Louisiana, Arkansas, and Texas in the summer time, and also killing them when they are nesting up in Canada.[143]

Outside interest groups also expressed a more specific view of the MBTA. For example, the American Game Preservation Association described the 1916 Migratory Bird Treaty as "an important part of federal law" that:

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[138] *Protection of Migratory Birds: Hearing on H.R. 20080 Before the House Comm. on Foreign Affairs*, 64th Cong. 22–23 (1917) (statement of R.W. Williams, Solicitor's Office, Department of Agriculture).

[139] *Protection of Migratory Birds: Hearing on H.R. 20080 Before the House Comm. on Foreign Affairs*, 64th Cong. 11 (1917) (statement of E. W. Nelson, Chief Bureau of Biological Survey, Department of Agriculture).

[140] *Leaders in Recent Successful Fight for the Migratory Bird Treaty Act*, BULLETIN – THE AMERICAN GAME PROTECTIVE ASSOCIATION, July 1918, at 5.

[141] 55 CONG. REC. 4816 (statement of Sen. Smith) (1917).

[142] *Leaders in Recent Successful Fight for the Migratory Bird Treaty Act*, BULLETIN – THE AMERICAN GAME PROTECTIVE ASSOCIATION, July 1918, at 5.

[143] *Protection of Migratory Birds: Hearing on H.R. 20080 Before the House Comm. on Foreign Affairs*, 64th Cong. 7 (1917) (statement of Rep. Miller).

[P]rovides in effect four principal things:

1. That no bird important to agriculture because of insect-destroying proclivities shall be shot at any time.
2. That no open season on any species of game birds shall extend for a longer period than three and one-half months.
3. That both countries shall so restrict open seasons on game birds as to prevent their being taken during the breeding season.
4. That there shall be no shipment from one country to the other of birds which are taken contrary to law.[144]

Upon passage of the MBTA, the American Game Preservation Association noted that "[t]he Enabling Act closely follows the provisions of the treaty."[145] Thus, since, as described by the American Game Preservation Association, the Migratory Bird Treaty only regulated hunting and the shipment of birds from one country to another and the MBTA "closely follow[ed]" the treaty, it follows that the MBTA itself was also limited to regulating hunting and the shipment of birds.

In seeking to take a broader view of congressional purpose, the *Moon Lake* court looked to other contemporary statements that cited the destruction of habitat, along with improvements in firearms, as a cause of the decline in migratory bird populations. The court even suggested that these statements, which "anticipated application of the MBTA to children who act 'through inadvertence' or 'through accident,'" supported a broader reading of the legislative history.[146] Upon closer examination, these statements are consistent with a limited reading of the MBTA.

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[144] *Success Crowns the Canadian Treaty Campaign*, BULLETIN – THE AMERICAN GAME PROTECTIVE ASSOCIATION, Oct. 1, 1916, at 1.

[145] William Haskell, *Invincible Legislation*, BULLETIN – THE AMERICAN GAME PROTECTIVE ASSOCIATION, July 1918, at 4.

[146] *Moon Lake*, 45 F. Supp. 2d at 1080–81. The court also noted that "the MBTA protects many species that are not considered game birds" and that "[m]any Congressmen also suggested that the true purpose of the MBTA was a desire to maintain a steady supply of game animals for the upper classes." *Id.* at 1081–82. These arguments are also unavailing.

The extension of the MBTA to birds that are not considered "game" birds does not suggest a broader reading of the MBTA. Plume birds are often not game birds. *See* KRISTINA ROZAN, DETAILED DISCUSSION ON THE MIGRATORY BIRD TREATY ACT, Animal Legal & Historical Ctr., Mich. St. Univ. Coll. of Law (2014), https://www.animallaw.info/article/detailed-discussion-migratory-bird-treaty-act. ("The MBTA was passed in 1918 to combat over-hunting and poaching that was decimating bird populations. At that time, the market for birds was dominated by the enormous demand not for food but for feathers by the millinery industry to adorn women's hats."). *See generally* Ogden, *supra* note 6, at 5–6 (discussing the plume trade). Given that one of the major purposes of the MBTA was to limit the danger to migratory birds posed by the commercial plume hunting industry, it would make no sense for Congress to have limited the MBTA to just game birds.

The court also cited to floor statements indicating that "[m]any Congressmen also suggested that the true purpose of the MBTA was a desire to maintain a steady supply of game animals for the upper classes." *Moon Lake*, 45 F. Supp. 2d at 1082. This argument was primarily advanced by opponents of the bill, and does not have clear implications one way or the other for the scope of conduct within the ambit of the MBTA.

One such contemporary statement cited by the court is a letter from Secretary of State Robert Lansing to the President attributing the decrease in migratory bird populations to two general issues:

- Habitat destruction, described generally as "the extension of agriculture, and particularly the draining on a large scale of swamps and meadows;"[147] and

- Hunting, described in terms of "improved firearms and a vast increase in the number of sportsmen."[148]

These statements were referenced by Representative Baker during the House floor debate over the MBTA, implying that the MBTA was intended to address both issues.[149] However, Congress addressed hunting and habitat destruction in the context of the Migratory Bird Treaty through two separate acts:

- First, in 1918, Congress adopted the MBTA to address the direct and intentionally killing of migratory birds;

- Second, in 1929, Congress adopted the Migratory Bird Conservation Act to "more effectively" implement the Migratory Bird Treaty by protecting certain migratory bird habitats.[150]

The Migratory Bird Conservation Act provided the authority to purchase or rent land for the conservation of migratory birds, including for the establishment of inviolate "sanctuaries" wherein migratory bird habitats would be protected from persons "cut[ting], burn[ing], or destroy[ing] any timber, grass, or other natural growth."[151] If the MBTA was originally understood to protect migratory bird habitats from incidental destruction, enactment of the Migratory Bird Conservation Act nine years later would have been largely superfluous. Instead, the MBTA and the Migratory Bird Conservation Act are complimentary: "Together, the Treaty Act in regulating hunting and possession and the Conservation Act by establishing sanctuaries and preserving natural waterfowl habitat help implement our national commitment to the protection of migratory birds."[152]

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[147] *Moon Lake*, 45 F. Supp. 2d at 1080–81 (quoting H. REP. NO. 65-243, at 2 (1918) (letter from Secretary of State Robert Lansing to the President)).

[148] *Id.* at 1081 (quoting H. REP. NO. 65-243, at 2 (1918) (letter from Secretary of State Robert Lansing to the President)).

[149] *Id.*

[150] Migratory Bird Conservation Act, ch, 257, 45 Stat. 1222 (1929) (codified as amended at 16 U.S.C. §§ 715–715s).

[151] *Id.* § 10, 45 Stat. at 1224. Congress also enacted the Neotropical Migratory Bird Conservation Act of 2000 to specifically provide funding for nongame migratory bird conservation. *See* 16 U.S.C. §§ 6101–6109.

[152] *United States v. North Dakota*, 650 F.2d 911, 913–14 (8th Cir. 1981), *aff'd on other grounds*, 460 U.S. 300 (1983).

Some courts have attempted to interpret a number of floor statements as supporting the notion that Congress intended the MBTA to regulate more than just hunting and poaching, but those statements reflect an intention to prohibit affirmative and purposeful acts directed at birds—whether accomplished through hunting or some other means intended to directly kill birds. For example, some Members "anticipated application of the MBTA to children who act 'through inadvertence' or 'through accident:'"

> What are you going to do in a case like this: A barefoot boy, as barefoot boys sometimes do, largely through inadvertence and without meaning anything wrong, happens to throw a stone at and strikes and injures a robin's nest and breaks one of the eggs, whereupon he is hauled before a court for violation of a solemn treaty entered into between the United States of America and the Provinces of Canada.[153]

"[I]nadvertence" in this statement refers to the boy's *mens rea*. As the rest of the sentence clarifies, the hypothetical boy acted "without *meaning* anything wrong," not that he acted unintentionally or accidentally in damaging the robin's nest. This is reinforced by the rest of the hypothetical, which posits that the boy threw "a stone *at* and strikes and injures a robin's nest." The underlying act is purposeful and affirmatively directed specifically at the robin's nest.[154] In other statements various members of Congress expressed concern about "sportsmen," people "killing" birds, "shooting" of game birds or "destruction" of insectivorous birds, and whether the purpose of the MBTA was to favor a steady supply of "game animals for the upper classes."[155] One Member of Congress even offered a statement that explains why the statute is not redundant in its use of the various terms to explain what activities are regulated: "[T]hey cannot hunt ducks in Indiana in the fall, because they cannot kill them. I have never been able to see why you cannot hunt, whether you kill or not. There is no embargo on hunting, at least down in South Carolina . . . .'"[156] That Congress was animated regarding potential restrictions on hunting and

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[153] *Moon Lake*, 45 F. Supp. 2d at 1081 (quoting 56 CONG. REC. 7455 (1918) (statement of Rep. Mondell)).

[154] A fuller examination of the context shows that these concerns were dismissed as absurd hyperbole:

> I can not see why we should take two whole days in summoning bogies from the depths, in seeing fantastic dreams of the liberties of the Republic sacrificed because of the fact that we are enacting a migratory-bird law. Gentlemen conjure up the idea that a bureaucracy will be created, and that every innocent boy who goes out to play upon the streets and breaks a bird's egg through accident is to be haled 500 miles away and punished as if he were committing an offense of the highest degree, and with all the rigors of the criminal law. Gentlemen, to imagine such things as that and to spend time in talking about them here would be bad enough if it were done in sport. It is worse when it is seriously suggested.

56 CONG. REC. 7456 (1918) (statement of Rep. Dempsey). Far from "anticipating the application of the MBTA to children who act 'through inadvertence' or 'through accident,'" Representative Dempsey was dismissing such applications as "fantastic dreams" that need not be "seriously suggested."

[155] *Moon Lake*, 45 F. Supp. 2d at 1080–81.

[156] *Id.* at 1081 (quoting 56 Cong. Rec. 7446 (1918) (statement of Rep. Stevenson)).

its impact on individual hunters is evident from even the statements relied upon as support for the conclusion that the statute reaches incidental take.

Finally, in 1918, federal regulation of the hunting of wild birds was a highly controversial and legally fraught subject. Taken together with the history of the Act, these factors make it highly unlikely that the MBTA was intended to criminalize a broad array of conduct that might incidentally take or kill birds. For example, on the floor of the Senate, Senator Reed proclaimed:

> I am opposed not only now in reference to this bill [the MBTA], but I am opposed as a general proposition to conferring power of that kind upon an agent of the Government. . . .
>
> . . . .
>
> . . . Section 3 proposes to turn these powers over to the Secretary of Agriculture . . . to make it a crime for a man to shoot game on his own farm or to make it perfectly legal to shoot it on his own farm . . . .
>
> When a Secretary of Agriculture does a thing of that kind I have no hesitancy in saying that he is doing a thing that is utterly indefensible, and that the Secretary of Agriculture who does it ought to be driven from office. . . .[157]

Federal regulation of hunting was also legally tenuous. As discussed in section II(a), whether the federal government had any authority to regulate the killing or taking of any wild animal was, at best, an open question in 1918. Just over 20 years earlier, the Supreme Court in *Geer* ruled that the states exercised the power of ownership over wild game in trust, implicitly precluding federal regulation.[158] When Congress did attempt to assert a degree of federal jurisdiction over wild game with the 1913 Weeks-McLean Law, it was met with mixed results in the courts, leaving the question pending before the Supreme Court at the time of the MBTA's enactment. It was not until *Missouri v. Holland* in 1920 that the Court, relying on authority derived from the Migratory Bird Treaty, definitively acknowledged the federal government's ability to regulate the taking of wild birds.[159]

Given the legal uncertainty and political controversy surrounding federal regulation of intentional hunting, it is highly unlikely that Congress intended to confer authority upon the executive branch to regulate all manner of economic activity that had an accidental or unintended impact on migratory birds.

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[157] 55 CONG. REC. 4813 (1917) (statement of Sen. Reed).

[158] *Geer v. Connecticut*, 161 U.S. 519 (1896).

[159] 252 U.S. 416 (1920). We note that the reason behind this decision has remained controversial. *See, e.g.*, *Bond v. United States*, 134 S. Ct. 2077, 2109 (2014) (Thomas, J., concurring) (noting that the court in *Holland* "upheld a statute implementing [the Migratory Bird] treaty based on an improperly broad view of the Necessary and Proper Clause").

ii. The Original Meaning of the MBTA Has Not Changed

Subsequent legislative history further supports a limited interpretation of the MBTA. General canons of statutory construct direct that "[w]ords must be given the meaning they had when the text was adopted."[160] The meaning of written instruments "does not alter. That which it meant when adopted it means now."[161]

The operative language in Section 2 of the MBTA has changed little since its adoption in 1918. The current iteration of the relevant language—making it unlawful for persons "at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess" specific migratory birds—was adopted in 1935 as part of the Mexico Treaty Act and has remained unchanged since then.[162] There is no indication that the Mexico Treaty Act was intended to broaden the scope of the MBTA beyond deliberate and purposeful actions, nor was it used to do so at the time.

It was not until more than fifty years after the initial adoption of the MBTA and twenty-five years after the Mexico Treaty Act that federal prosecutors began applying the MBTA to incidental actions.[163] This newfound federal authority was not accompanied by any corresponding legislative change. The only contemporaneous changes to Section 2 of the MBTA were technical updates recognizing the adoption of a treaty with Japan.[164]

Opinion M-37041 posits that broad language in the later conventions aspiring to preservation of bird populations, protection of their environments, and protection from pollution lends credence to the conclusion that the MBTA prohibits incidental take. However, the historical record is bereft of any discussion of specific protective mechanisms beyond regulation of hunting and preservation of habitat.[165] Furthermore, no changes were made to the section of

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[160] SCALIA & GARNER, *supra* note 114 at 78. Scalia and Garner note a caveat: "Proper application of the fixed-meaning canon requires recognition of the fact that some statutory terms refer to defined legal qualifications whose definitions are, and are understood to be, subject to change." *Id.* at 89. In the MBTA, the term "migratory bird" is an example of a legal qualification whose definition is understood to be subject to change. The terms "pursue," "hunt," "capture," "kill," and "take" are not.

[161] *South Carolina v. United States*, 199 U.S. 437, 448 (1905).

[162] *Compare* Mexico Treaty Act, 49 Stat. 1555, § 3 *with* 16 U.S.C. § 703(a).

[163] *See* Lilley & Firestone, *supra* note 124, at 1181 ("In the early 1970s, United States v. Union Texas Petroleum [No, 73-CR-127 (D. Colo. Jul. 11, 1973)] marked the first case dealing with the issue of incidental take.").

[164] *See* Act of June 1, 1974, Pub. L. No. 93-300, 88 Stat. 190. Implementing legislation for the treaty with the Soviet Union did not amend Section 2. *See* Fish and Wildlife Improvement Act of 1978, Pub. L. No. 95-616, sec. 3(h), 92 Stat. 3110.

[165] In 2008, Canada stated in a diplomatic note to the United States that the parties agreed that regulation of incidental take is consistent with the Canada Convention. *See* Note No. 0005 from Canadian Embassy to United States Department of State at 2 (July 2, 2008). The United States did not respond. The fact that Canada may view regulation of incidental take as consistent with the Canada Convention says nothing about the legal definition of the terms in the MBTA under United States law.

the MBTA at issue here following the later conventions except that the Act was modified to include references to these later agreements. Certainly many other federal laws may require consideration of potential impacts to birds and their habitat in a way that furthers the goals of the Conventions' broad statements.[166] Given the overwhelming evidence that the purpose of the Treaty and Act was to control over-hunting, these references do not bear the weight of the conclusion reached by the prior Opinion.

Thus, the only legislative enactment concerning incidental activity under the MBTA is the 2003 appropriations bill that explicitly exempted military-readiness activities from liability under the MBTA for incidental takings.[167] There is nothing in this legislation that authorizes the government to pursue incidental takings charges in other contexts. Rather, some have "argue[d] that Congress expanded the definition of 'take' by negative implication" since "[t]he exemption did not extend to the 'operation of industrial facilities,' even though the government had previously prosecuted activities that indirectly affect birds."[168]

This argument is contrary to the Court's admonition that "Congress . . . does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions—it does not, one might say, hide elephants in mouseholes."[169] As explained above, the MBTA as originally enacted did not reach incidental take. Thus, Congress would have to affirmatively act to expand the reach of the MBTA.

As the Fifth Circuit explained, "[a] single carve-out from the law cannot mean that the entire coverage of the MBTA was implicitly and hugely expanded."[170] Rather, it appears Congress was acting in a limited fashion to preempt a specific and immediate impediment to military-readiness activities. "Whether Congress deliberately avoided more broadly changing the MBTA or simply chose to address a discrete problem, the most that can be said is that Congress did no more than the plain text of the amendment means."[171] It did not hide the

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[166] *See, e.g.*, *Mahler*, 927 F. Supp. at 1581 ("Many other statutes enacted in the intervening years also counsel against reading the MBTA to prohibit any and all migratory bird deaths resulting from logging activities in national forests. As is apparent from the record in this case, the Forest Service must comply with a myriad of statutory and regulatory requirements to authorize even the very modest type of salvage logging operation of a few acres of dead and dying trees at issue in this case. Those laws require the Forest Service to manage national forests so as to balance many competing goals, including timber production, biodiversity, protection of endangered and threatened species, human recreation, aesthetic concerns, and may others.").

[167] *See* Bob Stump National Defense Authorization Act for Fiscal Year 2003, Pub. L. No. 107-314, Div. A, Title III, § 315, 116 Stat. 2509 (2002), *reprinted in* 16 U.S.C.A. § 703, Historical and Statutory Notes.

[168] *CITGO*, 801 F.3d at 490-91.

[169] *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 468 (2001).

[170] *CITGO*, 801 F.3d at 491.

[171] *Id.*

elephant of incidental takings in the mouse hole of the negative implications of a narrow appropriations provision.[172]

d. The MBTA Should be Interpreted Narrowly to Avoid Constitutional Doubt

The Supreme Court has recognized that "[a] fundamental principle in our legal system is that laws which regulate persons or entities must give fair notice of conduct that is forbidden or required."[173] "No one may be required at peril of life, liberty or property to speculate as to the meaning of penal statutes."[174] Accordingly, a "statute which either forbids or requires the doing of an act in terms so vague that men of common intelligence must necessarily guess at its meaning and differ as to its application, violates the first essential of due process of law."[175] Thus, "[a] conviction or punishment fails to comply with due process if the statute or regulation

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[172] Some commentators have argued that a 2001 Executive Order issued by President Clinton, entitled "Responsibilities of Federal Agencies to Protect Migratory Birds," altered the definition of "take" to include incidental take. *See, e.g.*, Lilley & Firestone, *supra* note 124, at 1186 ("President Clinton's issuance of Executive Order 13186, in tandem with existing FWS regulations, solidified the MBTA's reach over incidental take. The Order clarifies the 'take' definition as including both 'intentional' and 'unintentional' take, thereby eliminating confusion over whether the MBTA, in fact, governs incidental take." (footnotes omitted)). This interpretation misreads the scope of the Executive Order. Executive Order 13186 is limited to the management of the federal government. Thus, to the extent it defined "take" to include incidental take, it was "for purposes of this order," which was "intended only improve the internal management of the executive branch." Exec. Order No. 13186, 66 Fed. Reg. 3853, §§ 2, 5(b) (Jan. 17, 2001). It did not, and, without further legislative or regulatory action, could not, change the underlying law or regulations. *See id.* § 5(b). Thus, the only responsibility Executive Order 13186 directly places on federal agencies concerning incidental take is to:

> [I]dentify where unintentional take reasonably attributable to agency actions is having, or is likely to have, a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. With respect to those actions so identified, the agency shall develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the [Fish and Wildlife] Service. These principles, standards, and practices shall be regularly evaluated and revised to ensure that they are effective in lessening the detrimental effect of agency actions on migratory bird populations. The agency also shall inventory and monitor bird habitat and populations within the agency's capabilities and authorities to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts.

Id. § 3(e)(9). In addition, the Executive Order implicitly addresses incidental take by directing each agency to "provide training and information to appropriate employees on methods and means of avoiding or minimizing the take of migratory birds," *id.* § 3(e)(12), given the Executive Order's broad definition of "take," which includes both intentional and unintentional take, *id.* § 2(a). The Executive Order does not redefine "take" for purposes of assigning criminal liability under the MBTA.

[173] *FCC v. Fox Television Stations, Inc.*, 567 U.S. 239, 253 (2012).

[174] *Lanzetta v. New Jersey*, 306 U.S. 451, 453 (1939); *see also Dunn v. United States*, 442 U.S. 100, 112 (1979) ("[F]undamental principles of due process . . . mandate that no individual be forced to speculate, at peril of indictment, whether his conduct is prohibited."). Unlike in the strict liability context, it matters not for due process that the MBTA is often a misdemeanor statute. "[A] violation of due process cannot be cured by light punishment." *United States v. Rollins*, 706 F. Supp. 742, 745 (D. Idaho 1989).

[175] *Fox Television*, 567 U.S. at 253 (quoting *Connally v. General Constr. Co.*, 269 U.S. 385, 391 (1926)).

under which it is obtained 'fails to provide a person of ordinary intelligence fair notice of what is prohibited, or is so standardless that it authorizes or encourages seriously discriminatory enforcement.'"[176]

Assuming, *arguendo*, that the MBTA is ambiguous, the interpretation that limits its application to affirmative and purposeful conduct is necessary to avoid grave constitutional infirmities. As the Court has advised, "where an otherwise acceptable construction of a statute would raise serious constitutional problems, the Court will construe the statute to avoid such problems unless such construction is plainly contrary to the intent of Congress."[177] Here, an attempt to impose liability for acts that are neither affirmatively nor directly aimed at migratory birds raises just such constitutional concerns.

Further, if the MBTA is ambiguous, a narrower construction of the MBTA is consistent with the rule of lenity. The rule of lenity requires the resolution of any ambiguity in a statute defining a crime in a defendant's favor.[178] The rule comes into play in "those situations in which a reasonable doubt persists about a statute's intended scope even *after* resort to 'the language and structure, legislative history, and motivating policies' of the statute."[179]

i. The Scope of Incidental Taking Liability Under the MBTA is Virtually Unlimited

The "scope of liability" under an interpretation of the MBTA that extends criminal liability to all persons who inadvertently or accidentally kill or take migratory birds incidental to another activity is "hard to overstate"[180] and "offers unlimited potential for criminal prosecutions."[181] "The list of birds now protected as 'migratory birds' under the MBTA is a long one, including many of the most numerous and least endangered species one can imagine."[182]

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[176] *Id.* (quoting *United States v. Williams*, 553 U.S. 285, 304 (2008)).

[177] *Edward J. DeBartolo Corp. v. Fla. Gulf Coast Bldg. & Constr. Trades Council*, 485 U.S. 568, 575 (1988); *see also* TREVOR W. MORRISON, THE CANON OF CONSTITUTIONAL AVOIDANCE AND EXECUTIVE BRANCH LEGAL INTERPRETATION IN THE WAR ON TERROR 1, (2006), *available at* https://www.acslaw.org/sites/default/files/Morrison_-_Constitutional_Avoidance.pdf (noting "the validity of the avoidance canon is typically taken as 'settled,' its accepted status in the courts treated as sufficient to justify its use in the executive branch as well." (footnote omitted) (citing 20 Op. Off. Legal Counsel 253, 265 (1996) (referring to the courts' use of the avoidance canon and stating that "[t]he practice of the executive branch is and should be the same."))).

[178] *See* SCALIA & GARNER, *supra* note 114, at 296 (2012).

[179] *Moskal v. United States*, 498 U.S. 103, 108 (1990) (emphasis in original) (quoting *Bifulco v. United States*, 447 U.S. 381, 387 (1980)).

[180] *CITGO*, 801 F.3d at 493.

[181] *Brigham Oil*, 840 F. Supp. 2d at 1213.

[182] *Mahler*, 927 F. Supp. at 1576.

Currently, over 1000 species of birds—"nearly every bird species in North America"[183]—are protected by the MBTA.[184] According to the U.S. Fish and Wildlife Service, the top "human-caused threats to birds" are:

- Cats, which kill an estimated 2.4 billion birds per year;
- Collisions with building glass, which kills an estimated 303.5 million birds per year;
- Collisions with vehicles, which kill an estimated 200 million birds per year;
- Poisons, which kill an estimated an estimated 72 million birds per year;
- Collisions with electrical lines, which kill an estimated 25 million birds per year;
- Collisions with communications towers, which kill an estimated 6.5 million birds per year;
- Electrocutions, which kill an estimated 5.4 million birds per year;
- Oil pits, which kill an estimated 750 thousand birds per year; and
- Collisions with wind turbines, which kill and estimated 174 thousand birds per year.[185]

Interpreting the MBTA to apply strict criminal liability to any instance where a migratory bird is killed as a result of these "human-caused threats" would be a clear and understandable rule.[186] It would also turn every American who owns a cat, drives a car, or owns a home—that is to say,

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[183] Anderson & Birchell, *supra* note 79, at 67 ("The MBTA protects nearly every bird species in North America, including waterfowl, songbirds, shorebirds, and raptors . . . .").

[184] *See* 50 C.F.R. § 10.13 (list of protected migratory birds) *see also* Migratory Bird Permits; Programmatic Environmental Impact Statement, 80 Fed. Reg. 30032, 30033 (May 26, 2015) ("Of the 1,027 currently protected species, approximately 8% are either listed (in whole or in part) as threatened or endangered under the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*) and 25% are designated (in whole or in part) as Birds of Conservation Concern (BCC)".).

[185] U.S. Fish and Wildlife Service, Threats to Birds: Migratory Birds Mortality—Questions and Answers, *available at* https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php (last updated May 25, 2016). While reliable numbers are difficult to determine, other forms of alternative energy, such as solar farms, also kill migratory birds. *See* Sammy Roth, *How Many Birds are Killed by Solar Farms*, THE DESERT SUN, Aug. 17, 2016, *available at* http://www.desertsun.com/story/tech/science/energy/2016/08/17/how-many-birds-killed-solar-farms/88868372/ (last updated Aug. 18, 2016). For example, Thomas Dietsch of the Migratory Bird Division of the Fish and Wildlife Service noted 3,545 reported bird deaths at seven Southern California solar farms from 2012 to April 2016. *See* Thomas Dietsch, Update on Solar-Avian Interactions in Southern California at 9 (May 10, 2016), *in* Multiagency Avian-Solar Collaborative Working Group: Stakeholder Workshop, *available at* http://blmsolar.anl.gov/program/avian-solar/docs/Avian-Solar_CWG_May_2016_Workshop_Slides.pdf.

[186] *See Apollo Energies*, 611 F.3d at 689 (concluding that under an incidental take interpretation, "[t]he actions criminalized by the MBTA may be legion, but they are not vague.").

the vast majority of Americans[187]—into a potential criminal.[188] Such an interpretation would lead to absurd results, which are to be avoided.[189]

These absurd results are not ameliorated by limiting the definition of "incidental take" to "direct and foreseeable" harm as some courts have suggested.[190] The court in *Moon Lake* identified an "important and inherent limiting feature of the MBTA's misdemeanor provision: to obtain a guilty verdict . . . , the government must prove proximate causation."[191] Quoting Black's Law Dictionary, the court defines proximate cause as "that which, in a natural and continuous sequence, unbroken by any efficient intervening cause, produces the injury and without which the accident could not have happened, if the injury be one which might be *reasonably anticipated or foreseen as a natural consequence of the wrongful act*."[192] The Tenth Circuit in *Apollo Energies* took a similar approach, holding "the MBTA requires a defendant to proximately cause the statute's violation for the statute to pass constitutional muster" and quoting from Black's Law Dictionary to define "proximate cause."[193]

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[187] *See, e.g.*, Robin Chase, Does Everyone in America Own a Car?, U.S. Department of State, *available at* https://photos.state.gov/libraries/cambodia/30486/Publications/everyone_in_america_own_a_car.pdf ("It is true that 95 percent of American households own a car, and most Americans get to work by car (85 percent).").

[188] As at least one court has noted, this would also place a greater duty on to protect the lives of migratory birds than are currently exists for people. *See Mahler*, 927 F. Supp. 1577-78 ("[T]he criminal law ordinarily requires proof of at least negligence before a person can be held criminally liable for causing the death of another human being. [The plaintiff's] approach to the MBTA would impose criminal liability on a person for the death of a bird under circumstances where no criminal liability would be imposed for even the death of another *person*." (emphasis in original)).

[189] *See Griffin v. Oceanic Contractors*, 458 U.S. 564, 575 (1982) ("interpretations of a statute which would produce absurd results are to be avoided if alternative interpretations consistent with the legislative purpose are available"); *see also K Mart Corp. v. Cartier*, 486 U.S. 281, 324 n.2 (1988) (Scalia, J. concurring in part and dissenting in part) ("it is a venerable principle that a law will not be interpreted to produce absurd results"). Several courts that have interpreted the MBTA to include incidental takings have recognized that its literal application would be inappropriate. *See FMC*, 572 F.2d at 905 ("Certainly construction that would bring every killing within the statute such as deaths caused by automobiles, airplanes, plate glass modern office buildings or picture windows in residential dwellings into which birds fly, would offend reason and common sense."); *Corbin Farm Serv.*, 444 F. Supp. at 535 ("Obviously, prosecution would not be justified in the hypothetical presented by the defendant; the hypothetical car driver . . . .").

[190] *See* U.S. FISH AND WILDLIFE SERVICE MANUAL, part 720, ch. 3, *Incidental Take Prohibited Under the Migratory Bird Treaty Act* (Jan. 11, 2017).

[191] *Moon Lake*, 45 F. Supp. 2d at 1085.

[192] *Id.* (quoting BLACK'S LAW DICTIONARY 1225 (6th ed. 1990)) (emphasis in original). Based on this reasoning, and with no analysis, the court asserted "[b]ecause the death of a protected bird is generally not a probable consequence of driving an automobile, piloting an airplane, maintaining an office building, or living in a residential dwelling with a picture window, such activities would not normally result in liability . . . even if such activities would cause the death of protected birds." *Id.* This passage subtly shifts the standard from merely "reasonably anticipated or foreseen as a natural consequence" to a "probable consequence."

[193] *Apollo Energies*, 611 F.3d at 690.

Contrary to the suggestion of the courts in *Moon Lake* and *Apollo Energies* that principles of proximate causation can be read into the statute to define and limit the scope of incidental take, the death of birds as a result of activities such as driving, flying, or maintaining buildings with large windows is a "direct," "reasonably anticipated," and "probable" consequence of those actions. As discussed above, collisions with buildings and cars are the second and third most common human-caused threat to birds, killing an estimated 303.5 million and 200 million birds per year, respectively. It is eminently foreseeable and probable that cars and windows will kill birds.[194] Further, when cars kill birds, it is by virtue of a machine under the direct control of an individual physically striking a bird. An activity could hardly be any more "direct" and not be the intended purpose of the action. Thus, limiting incidental take to direct and foreseeable results does little to prevent absurd outcomes.

ii. Prosecutorial Discretion is Insufficient to Cure an Otherwise Vague Law

To avoid these absurd results, the government has historically relied on prosecutorial discretion.[195] Yet, the Supreme Court has declared "[i]t will not do to say that a prosecutor's sense of fairness and the Constitution would prevent a successful . . . prosecution for some of the activities seemingly embraced within the sweeping statutory definitions."[196] For broad statutes that may be applied to seemingly minor or absurd situations, "[i]t is no answer to say that the statute would not be applied in such a case."[197] Although "[p]rosecutors necessarily enjoy much discretion and generally use it wisely," they are still human; "the liberty of our citizens cannot rest at the whim of an individual who could have a grudge or, perhaps, just exercise bad judgement."[198]

Recognizing the challenge posed by relying upon prosecutorial discretion, the *FMC* court sought to avoid absurd results by limiting its holding to "extrahazardous activities."[199] The term

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[194] And it is at least as foreseeable as the electrical lines at issue in *Moon Lake*. Electrocutions kill approximately 5.4 million birds per year—vehicles kill approximately 56 times more birds, while windows only kill approximately 37 times more. In *Moon Lake*, "[t]he government allege[d] that Moon Lake has failed to install inexpensive equipment on 2,450 power poles, causing the death or injury of 38 birds of prey during the 29 month period commencing January 1996 and concluding June 1998." *Moon Lake*, 45 F. Supp. 2d at 1071. This equates to approximately 1.3 dead or injured birds per month, spread over 2,450 power poles.

[195] *See* Ogden, *supra* note 6, at 29 ("Historically, the limiting mechanism on the prosecution of incidental taking under the MBTA by non-federal persons has been the exercise of prosecutorial discretion by the FWS.") *See generally FMC*, 572 F.2d at 905 (situations "such as deaths caused by automobiles, airplanes, plate glass modern office buildings or picture windows in residential dwellings . . . properly can be left to the sound discretion of prosecutors and the courts").

[196] *Baggett v. Bullitt*, 377 U.S. 360, 373 (1964); *see also Mahler*, 927 F. Supp. 1582 ("Such trust in prosecutorial discretion is not really an answer to the issue of statutory construction" in interpreting the MBTA.).

[197] *Keyishian v. Bd. of Regents*, 385 U.S. 589, 599 (1967).

[198] *United States v. Wells*, 519 U.S. 482, 512 n.15 (1997) (Stevens, J. dissenting).

[199] *FMC*, 572 F.2d at 907. The court in *Corbin Farm* adopted a similar rationale. 444 F. Supp. at 536 ("When dealing with pesticides, the public is put on notice that it should exercise care to prevent injury to the environment

"extrahazardous activities" is not found anywhere in the statute, and is not defined by either the court or the Fish and Wildlife Service.[200] Thus, it is unclear what activities are "extrahazardous." In *FMC*, the concept was applied to the manufacture of "toxic chemicals," *i.e.*, pesticides. But the court was silent as to how far this rule extends, even in the relatively narrow context of pesticides.[201] What other activities outside the production of pesticides may be "extrahazardous?" The U.S. Fish and Wildlife Service reported that poisons alone kill an estimated 72 million birds per year. Are all of these deaths potential crimes under the MBTA? Even with this judicial gloss, ordinary people must necessarily guess at what is prohibited on pain of incarceration. This type of uncertainty is not permitted under the Supreme Court's due process jurisprudence.[202]

While the MBTA does contemplate the issuance of permits authorizing the taking of wildlife, it requires such permits to be issued by "regulation."[203] No permit scheme is generally available to permit incidental take, so most potential violators have no mechanism to ensure that

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and to other persons; a requirement of reasonable care under the circumstances of this case does not offend the Constitution.").

[200] *See Mahler*, 927 F. Supp. at 1583 n.9 (noting that the *FMC* court's "limiting principle . . . of strict liability for hazardous commercial activity . . . . ha[s] no apparent basis in the statute itself or in the prior history of the MBTA's application since its enactment."). *See generally United States v. Rollins*, 706 F. Supp. 742, 744–45 (D. Idaho 1989) ("The statute itself does not state that poisoning of migratory birds by pesticide constitutes a criminal violation. Such specificity would not have been difficult to draft into the statute."). Congress could have written the MBTA to explicitly apply to "extrahazardous activities." It did not. Relying on the judiciary to recast the MBTA in this manner is contrary to the longstanding guidance of the Supreme Court:

> It would certainly be dangerous if the legislature could set a net large enough to catch all possible offenders, and leave it to the courts to step inside and say who could be rightfully detained, and who should be set at large. This would, to some extent, substitute the judicial for the legislative department of the government.

United States v. Reese, 92 U.S. 214, 221 (1876).

[201] The court in *Corbin Farm* held that use of pesticides resulting in the deaths of migratory birds could constitute violations the MBTA. 444 F. Supp. at 532–36 (E.D. Cal. 1978). *But see Rollins*, 706 F. Supp. at 744–45 (holding that the MBTA was unconstitutionally vague as applied to a farmer who used due care in applying pesticides that subsequently killed migratory birds).

[202] *See Rollins*, 706 F. Supp. at 745 (dismissing charges against a farmer who applied pesticides to his fields that killed a flock of geese, reasoning "[f]armers have a right to know what conduct of theirs is criminal, especially where that conduct consists of common farming practices carried on for many years in the community. While statutes do not have to be drafted with 'mathematical certainty,' *Boyce Motor Lines, Inc. v. United States*, 342 U.S. 337, 340, 96 L. Ed. 367, 72 S. Ct. 329 (1952), they must be drafted with a 'reasonable degree of certainty.' *Id.* at 340. The MBTA fails this test. . . . Under the facts of this case, the MBTA does not give 'fair notice as to what constitutes illegal conduct' so that [the farmer] could 'conform his conduct to the requirements of the law.' *United States v. Dahlstrom*, 713 F.2d 1423, 1427 (9th Cir. 1983).").

[203] 16 U.S.C. § 703(a) ("Unless and except as permitted *by regulations* made as hereinafter provided . . . ." (emphasis added)). FWS published a notice of intent to develop a programmatic environmental impact statement that analyzed alternatives for developing an incidental take permit regulation under the MBTA in 2015. 80 Fed. Reg. 30,032 (May 26, 2015). Neither the statement nor regulations were issued.

their actions comply with the law.[204] There are "voluntary" Fish and Wildlife Service guidelines issued for different industries that recommend best practices to avoid incidental take of protected birds; however, these guidelines do little to cure infirmities in the law. First, as a preliminary matter, the degree to which such guidelines are truly "voluntary" when non-compliance is accompanied by a credible threat of prosecution is, at best, debatable.[205] Second, Fish and Wildlife Service's MBTA Guidelines rarely go through the formal Administrative Procedure Act processes to be considered "regulations," and are not issued under the permitting authority of Section 3 of the MBTA.[206] Unlike other statutes, the MBTA is an all-or-nothing proposition. In the absence of a permit issued pursuant to Department regulation it is not clear that there is any authority to require minimizing or mitigating actions that balance the environmental harm from the taking of migratory birds with the other societal goals, such as the production of wind or solar energy.[207] Accordingly, the guidelines do not provide enforceable legal protections for

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[204] Anderson & Birchell, *supra* note 79, at 69 ("FWS has not, to date, perceived authority to issue permits for 'non-purposeful' takings that are incidental to conducting a lawful activity such as operating energy or mining facilities. Thus, each incidental taking of a bird protected only by the MBTA is a potential criminal violation of the Act."). For example, *compare* 16 U.S.C. § 703(a) *with* 30 U.S.C. § 225 (2017) ("All leases of lands containing oil or gas, made or issued under the provisions of this Act, shall be subject to the condition that the lessee will, in conducting his explorations and mining operations, *use all reasonable precautions* to prevent waste of oil or gas developed in the land, or the entrance of water through wells drilled by him to the oil sands or oil-bearing strata, to the destruction or injury of the oil deposits." (emphasis added)); 43 U.S.C. § 1732(b) ("In managing the public lands the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands."); 54 U.S.C. § 306107 (2017) ("Prior to the approval of any Federal undertaking that may directly and adversely affect any National Historic Landmark, the head of the responsible Federal agency shall *to the maximum extent possible* undertake such planning and actions as may be necessary to minimize harm to the landmark." (emphasis added)).

[205] *See* Anderson & Birchell, *supra* note 79, at 75 ("The *Apollo* decision supports the government's approach to industrial avian takings that has developed over the past two decades: provide notice to industry of the risks posed by facilities and equipment, encourage compliance through remediation, adaptive management and, where possible, permitting, and *reserve for prosecution those cases in which companies ignore, deny, or refuse to comply with a [Best Management Practices] approach to avian protection in conducting their business*." (emphasis added)); Ogden, *supra* note 6, at 29 ("[D]iscretion has been used in conjunction with efforts to obtain the voluntary cooperation of certain parties and industries whose activities have caused, or have the potential to cause, incidental taking by consulting with the agency and taking steps to mitigate such taking. Indeed, prosecutorial discretion is the primary incentive for such cooperation, as reflected in various non-regulatory 'guidelines' that FWS has created as applicable to specific industries or activities . . . .").

[206] *See* Migratory Bird Permits; Programmatic Environmental Impact Statement, 80 Fed. Reg. 30,032 (May 26, 2015) (seeking comment on the prospect of establishing a regulatory program to permit certain incidental takings). *See generally* Ogden, *supra* note 6, at 29 (characterizing Fish and Wildlife guidelines as "non-regulatory"). *But see* 50 C.F.R. § 21.15 (authorizing take incidental to military-readiness activities).

[207] Anderson & Birchell, *supra* note 79, at 69 ("FWS has not, to date, perceived authority to issue permits for 'non-purposeful' takings that are incidental to conducting a lawful activity such as operating energy or mining facilities. Thus, each incidental taking of a bird protected only by the MBTA is a potential criminal violation of the Act."). For example, *compare* 16 U.S.C. § 703(a) *with* 30 U.S.C. § 225 (2017) ("All leases of lands containing oil or gas, made or issued under the provisions of this Act, shall be subject to the condition that the lessee will, in conducting his explorations and mining operations, *use all reasonable precautions* to prevent waste of oil or gas developed in the land, or the entrance of water through wells drilled by him to the oil sands or oil-bearing strata, to the destruction or injury of the oil deposits." (emphasis added)); 43 U.S.C. § 1732(b) ("In managing the public lands the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands."); 54 U.S.C. § 306107 (2017) ("Prior to the approval of any Federal undertaking that may directly and

people and businesses who abide by their terms. To wit, the guidelines themselves disclaim that "it is not possible to absolve individuals or companies" from liability under the MBTA.[208] Rather, the guidelines make explicitly clear that, while the Fish and Wildlife Service and the Department of Justice will take compliance into consideration in exercising their prosecutorial discretion, they retain the ability to prosecute individuals and companies, even if they fully comply with the terms therein.[209]

This is the epitome of vague law. Under this approach, it is literally impossible for individuals and companies to know what is required of them under the law when otherwise lawful activities necessarily result in some accidental bird deaths. Even if they comply with everything requested of them by the Fish and Wildlife Service, they may still be prosecuted, and

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adversely affect any National Historic Landmark, the head of the responsible Federal agency shall *to the maximum extent possible* undertake such planning and actions as may be necessary to minimize harm to the landmark." (emphasis added)).

[208] Even if incidental takings were authorized by a regulatory permit process, the 2015 proposal would not have met the due process standards described above. For example, the Fish and Wildlife Service's notice of proposed rule states: "We note that should we develop a permit system authorizing and limiting incidental take, we would not expect every person or business that may incidentally take migratory birds to obtain a permit, nor would we intend to expand our judicious use of our enforcement authority under the MBTA." Migratory Bird Permits; Programmatic Environmental Impact Statement, 80 Fed. Reg. 30,032, 30,034 (May 26, 2015). The notice further provides "our permit program, if implemented, will focus on industries and activities that involve significant avian mortality and for which reasonable and effective measures to avoid or minimize take exist." *Id.* Under this scheme, it seems that favored industries and persons would likely be exempted from enforcement by negative implication and the "judicious" use of prosecutorial discretion, while others might be subject to stringent mitigation regimes and prosecutions. Further, individuals outside of those specific regulated industries would be in the same position they are today, left to rely on the discretion of the Fish and Wildlife Service and Department of Justice to avoid prosecution. Even if some of these issues could be addressed, crafting any sort of permit program within Constitutional confines would be a challenge given the sheer breadth of actions that result in incidental takings of birds covered by the MBTA.

[209] *See, e.g.*, U.S. FISH AND WILDLIFE SERVICE, LAND-BASED WIND ENERGY GUIDELINES 6 (Mar. 23, 2012) ("The Service urges voluntary adherence to the Guidelines and communication with the Service when planning and operating a facility. While it is not possible to absolve individuals or companies from MBTA or BGEPA liability, the Office of Law Enforcement focuses its resources on investigating and prosecuting those who take migratory birds without identifying and implementing reasonable and effective measures to avoid the take. The Service will regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA. The Chief of Law Enforcement or more senior official of the Service will make any decision whether to refer for prosecution any alleged take of such species, and will take such adherence and communication fully into account when exercising discretion with respect to such potential referral." (footnote omitted)); Memorandum from Jamie Rappaport Clark, Director, Fish and Wildlife Service, to Regional Directors, Regions 1-7, Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers 2 (Sept. 14, 2000), *available at* https://www.fws.gov/habitatconservation/com_tow_guidelines.pdf ("While it is not possible under the Act to absolve individuals or companies from liability if they follow these recommended guidelines, the Division of Law Enforcement and Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals or companies who have made good faith efforts to avoid the take of migratory birds.").

still found guilty of criminal conduct.[210] The absence of clear, public, and binding standards effectively authorizes or encourages discriminatory enforcement, particularly against disfavored industries or persons.[211] In sum, due process "requires legislatures to set reasonably clear guidelines for law enforcement officials and triers of fact in order to prevent 'arbitrary and discriminatory enforcement.'"[212] Current governmental practice suggests that the application of the MBTA to incidental activities fails to satisfy this requirement. As the Supreme Court has recognized, "[w]ell-intentioned prosecutors and judicial safeguards do not neutralize the vice of a vague law."[213]

Reading the MBTA to capture incidental takings casts an astoundingly large net that potentially transforms the vast majority of average Americans into criminals. Rather than relying on clear standards that are known in advance, prosecutors are asserting authority to bring cases where individuals and companies are not taking the precautions that the government and the court deem "reasonable."[214] This approach effectively substitutes the judgement of the court

[210] *See generally* Anderson & Birchell, *supra* note 79, at 70 ("At trial, the jury [in *FMC*] was instructed not to consider the company's [Avian Protection Plan] efforts as a defense: 'Therefore, under the law, good will and good intention and measures taken to prevent the killing of the birds are not a defense.'" (quoting *FMC*, 572 F.2d at 904)).

[211] As some commentators have noted, "the lack of prosecutions of wind energy developers or operators creates a strong inference that prosecutorial discretion is being exercised unevenly to favor wind energy over other activities such as the oil and gas industry." Ogden, *supra* note 6, at 37; *see also* Alexander K. Obrecht, *Migrating Towards an Incidental Take Permit Program: Overhauling the Migratory Bird Treaty Act to Comport with Modern Industrial Operations*, 54 NAT. RESOURCES J. 107, 120 (2014) ("To date, the FWS has focused its prosecutions of MBTA violations on a handful of industries: wastewater storage, oil and gas, electricity transmission, and pesticide application." (footnotes omitted)). *See generally* Benjamin Means, Note, *Prohibiting Conduct, Not Consequences: The Limited Reach of the Migratory Bird Treaty Act*, 97 MICH. L. REV. 832, 836 (1998) (expressing concern that "prosecutorial discretion is less than ideal," particularly in a "pro-environment climate where, 'each year the Department of Justice announces "record levels" of fines imposed, persons indicted, and jail time served for infractions of environmental regulations." (quoting Timothy Lynch, *Polluting Our Principles: Environmental Prosecutions and the Bill of Rights*, 15 TEMPLE ENVTL. L. & TECH. J. 161, 161 (1996)); Gregory A. Zafris, Comment, *Limiting Prosecutorial Discretion Under the Oregon Environmental Crimes Act: A New Solution to an Old Problem*, 24 ENVTL. L. 1673, 1674 (1994) ("The breadth and complexity of environmental law further combine with its unique political nature to increase the chance that prosecutors will abuse their discretion if left completely unchecked."); Timothy Lynch, *Polluting Our Principles: Environmental Prosecutions and the Bill of Rights*, 15 TEMPLE ENVTL. L. & TECH. J. 161, 168, 170 (1996) (noting that "[o]wners and executives of small businesses are particularly vulnerable to prosecution when the law is unclear" and that some prosecutors "might allow public opinion and potential media coverage to affect their charging decisions"). Since Ogden's article was published in 2013, there have been at least two prosecutions of wind-energy companies. *See* E. Lynn Grayson, *Another Criminal Convention Under the Migratory Bird Treaty Act for Wind Farms*, LexisNexis Legal Newsroom (Mar. 3, 2015), *available at* https://www.lexisnexis.com/legalnewsroom/criminal/b/criminal-law-blog/archive/2015/03/03/another-criminal-conviction-under-the-migratory-bird-treaty-act-for-wind-farms.aspx.

[212] *Smith v. Goguen*, 415 U.S. 566, 572–73 (1974).

[213] *Baggett v. Bullitt*, 377 U.S. at 373.

[214] *See Apollo Energies*, 611 F.3d at 691 (upholding the conviction of Apollo Energies because "the record shows [Apollo] had notice of the heater-treater problem for nearly a year-and-a-half before the bird death resulting in its conviction. Indeed, Apollo admitted at trial that it failed to cover some of the heater-treaters' exhaust pipes *as Fish and Wildlife had suggested* after the December 2005 inspection. In effect, Apollo knew its equipment was a bird trap that could kill.").

for that of the Congress, which made the MBTA a strict-liability offense and did not provide for mitigation measures. Such an approach presents precisely the sort of recipe for arbitrary and discriminatory enforcement that the Supreme Court has cautioned against.

V. Conclusion

The text, history, and purpose of the MBTA demonstrate that it is a law limited in relevant part to affirmative and purposeful actions, such as hunting and poaching, that reduce migratory birds and their nests and eggs, by killing or capturing, to human control. Even assuming that the text could be subject to multiple interpretations, courts and agencies are to avoid interpreting ambiguous laws in ways that raise grave Constitutional doubts if alternative interpretations are available. Interpreting the MBTA to criminalize incidental takings raises serious due process concerns and is contrary to the fundamental principle that ambiguity in criminal statutes must be resolved in favor of defendants. Based upon the text, history, and purpose of the MBTA, and consistent with decisions in the Courts of Appeals for the Fifth, Eighth, and Ninth circuits, there is an alternative interpretation that avoids these concerns. Thus, based on the foregoing, we conclude that the MBTA's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same applies only applies only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control.

Daniel H. Jorjani

APPENDIX D

USFWS GUIDANCE MEMORANDUM – GUIDANCE ON M-OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington, D.C. 20240

In Reply Refer To:
FWS/AMB/067711

APR 11 2018

Memorandum

To: Service Directorate

From: Principal Deputy Director

Subject: Guidance on the recent M-Opinion affecting the Migratory Bird Treaty Act

To ensure consistency with the recently issued M Opinion, the U.S.Fish and Wildlife Service (FWS) is modifying some policies and practices within its programs. This memorandum provides guidance to clarify what constitutes prohibited take, what actions must be taken when conducting lawful intentional take (e.g., obtain a permit via 50 C.F.R. Part 21), and what changes to prior practice should be made in light of the M-Opinion.

The M-Opinion concludes that the take of birds resulting from an activity is not prohibited by the MBTA when the underlying purpose of that activity is not to take birds. We interpret the M-Opinion to mean that the MBTA's prohibitions on take apply when the *purpose* of an action is to take migratory birds, their eggs, or their nests. Conversely, the take of birds, eggs or nests occurring as the result of an activity, the purpose of which is not to take birds, eggs or nests, is not prohibited by the MBTA.

The mission of the Service is to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. Migratory bird conservation remains an integral part of our mission. Further:

1. The Endangered Species Act (16 U.S.C. 35 § 1531 et seq.; ESA) and Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668c; Eagle Act), as well as some State laws and regulations are not affected by the M-Opinion.

2. The National Environmental Policy Act (NEPA, 42 U.S.C. § 4321 et seq.) provides a process under which federal agencies must evaluate the impacts of their actions on the human environment [including the natural and physical environment and relationship of people with that environment (40 C.F.R. § 1508.14)] and provide transparency to the American public. Birds are part of the human environment, and should be included in relevant environmental review processes as directed by NEPA.

The Service will continue to work with any partner that is interested in voluntarily reducing impacts to migratory birds and their habitats. We will continue to develop best management practices to protect migratory birds and their habitats in partnership with any industry, federal, state, and tribal entity as interest dictates, and in the course of project review, will continue to provide recommendations through our advisory role under other authorities, including NEPA and the Fish and Wildlife Coordination Act (16 U.S.C. §§ 661-667e). The Service will clearly communicate relevant authorities under which we make our recommendations. The Service will ensure that our comments, recommendations, or requirements are not based on, nor imply, authority under the MBTA to regulate incidental take of migratory birds. Furthermore, the Service will not withhold a permit, request, or require mitigation based upon incidental take concerns under the MBTA. Attached is a set of questions and answers that serve to clarify the effect of the M-Opinion.

If you have additional questions, please contact the Migratory Bird Program, 202-208-1050.

Attachment

ATTACHMENT

FREQUENTLY ASKED QUESTIONS REGARDING IMPLEMENTATION OF THE M-OPINION

1. **Clarity on the distinction between *intent* to take a bird versus *knowing* a bird will be taken. Does the underlying legality of an activity that takes birds affect that distinction and does *reducing a bird to possession* have any bearing on the situation? The following examples are real situations the Service may face under the new M-Opinion:**

    a. **A State Department of Transportation wants to paint a bridge. Prior to painting the bridge, all Barn Swallow nests are pressure washed off the bridge, which would result in destruction of eggs and death of nestlings. Is the intentional removal of nests prior to painting the bridge intentional take and does it require a permit prior to the action?**

    Answer: Yes. The intentional removal of active barn swallow nests, killing eggs and nestlings, is an affirmative act that has the taking of active nests and contents as its purpose. Because this example stipulates that the removal of nests prior to painting was purposeful, a permit would be required to legally authorize this activity. If the intent was to simply paint the bridge and the nests were accidentally destroyed incidental to that process, that destruction would not violate the MBTA.

    b. **A homeowner knows that Chimney Swifts are nesting in their chimney. If the homeowner lights a fire and destroys the nests, is this considered intentional take or incidental take under the M-Opinion?**

    Answer: Possibly either, but more information is needed to determine whether the homeowner lit the fire to intentionally destroy swift nests or simply lit the fire to heat the house. The difference between this activity and the previous example is the subjective purpose of the activity. The intentional destruction of chimney swift nests by lighting a fire would constitute an intentional act, the purpose of which is to destroy nests. Whether lighting the fire violates the MBTA in that scenario would also depend on whether nests are active and contain eggs, young, or adult birds that could not escape quickly enough. A permit would be required to legally authorize this activity if the purpose is to destroy nests and they are active. A permit would not be needed if the homeowner lit the fire for the purpose of heating the house regardless of whether they were aware of swift nests in the chimney. Note that although knowledge of the presence of a nest or nests before lighting a fire would not be enough by itself to constitute a violation of the Act, it could be used as evidence to show the homeowner did in fact light the fire with the purpose of destroying the nests.

c. **Is removing a structure (e.g., dilapidated barn) with known nesting owls in the barn, which will die with the destruction of the barn, a violation of MBTA? How does knowledge or reasonable foreseeability that that an activity will kill birds affect whether that action violates the MBTA?**

Answer: This would not be a violation of the MBTA. Removing or destroying the structure would rarely if ever be an act that has killing owl nestlings as its purpose. Again, the purpose of the activity determines whether this is an MBTA violation. Unless the purpose of removing the structure was in fact to kill the owls, their deaths would be incidental to the activity of removing the barn. The landowner's knowledge, or whether it was reasonably foreseeable, that destroying the barn would kill the owls is not relevant. All that is relevant is that the landowner undertook an action that did not have the killing of barn owls as its purpose.

This same analysis would apply to other structures, such as bridges.

d. **A rancher shoots Black Vultures on his property without obtaining a depredation permit (50 C.F.R. § 21.41 – Depredation Permits). The rancher leaves the dead birds without subsequently collecting (possessing) them. Does the desire to, or failure to reduce a bird to possession affect whether that action violates the MBTA?**

Answer: Shooting Black Vultures without a permit violates the MBTA because it is an affirmative action that has killing birds as its purpose. The traditional definition of the term "take" includes reducing wildlife to human control, as noted in the M-Opinion. However, purposeful killing does not necessarily require any desire or affirmative action to gain possession of the birds. Shooting and killing migratory birds renders them subject to human control whether or not the shooter physically takes possession of the bodies. In fact, this issue was expressly addressed in footnote 132 of the M-Opinion: "We note that this language makes clear that the sort of 'human control' referred to by Justice Scalia includes the act of intentionally killing even in the absence of further intent to reduce the particular animal to human possession. Thus, intentional killing is itself a form of 'human control'." Note that shooting at and missing a black vulture would also be a violation (attempt), which obviously could not result in reducing the bird to possession.

2. **How does the legality of an activity affect the determination of whether it is an MBTA violation or not? For example, if an illegal activity kills birds, but that was not the intent of the activity (e.g., using a banned pesticide, or without following application labels in violation of Federal Insecticide Fungicide Rodenticide Act (FIFRA)) is this still considered an incidental taking that is not a violation of the MBTA?**

Answer: The legality of an activity does not affect the determination of whether it results in an MBTA violation. Thus, if the landowner in the example used the pesticide with specific intent to kill birds, it would violate the MBTA. However, if the landowner used a pesticide to purposely kill something other than migratory birds, it would not be a violation if birds die as a result because the purpose of the act was not taking of birds. If the landowner used a pesticide with the general intent of killing wildlife, and the pesticide killed protected bird species, that could be a violation of the MBTA but liability would likely turn on the facts of the specific case. Note, applying a pesticide illegally in a way that ends up killing birds when they are not the intended target may not be an MBTA violation, but the fact that birds died may still provide additional evidence for prosecuting the FIFRA violation.

3. **How does the M-Opinion affect existing statutory amendments to the MBTA that specifically address incidental take, such as P.L. 107-314, Sec. 315 and subsequent regulation (50 C.F.R. § 21.15 – Authorization of take incidental to military readiness activities) or P.L. 114-94, Sec. 1439 (the FAST Act)?**

   Answer: The M-Opinion does not affect the military-readiness rule at 50 C.F.R. § 21.15, which was the result of Congress's direction to the Secretary of the Interior to prescribe regulations authorizing incidental take of migratory birds during military-readiness activities. Thus, the Secretary could only withdraw the rule if directed to do so through subsequent legislation. As the M-Opinion explains, "Congress was acting in a limited fashion to preempt a specific and immediate impediment to military-readiness activities." M-Opinion, p. 31. FWS and the Department of Defense (DOD) should continue to follow the requirements of the military-readiness rule. Nonetheless, incidental take of migratory birds by DOD does not violate the MBTA, regardless of whether DOD is complying with the terms of the military-readiness rule.

   The FAST Act authorizes take of nesting swallows that interfere with bridge construction in certain circumstances. In most circumstances, such take would be considered purposeful and thus prohibited by the MBTA. Accordingly, the M-Opinion should not affect authorization of the take of active swallow nests. To the extent the FAST Act was intended to authorize incidental take, the terms of that statute should still be complied with for the same reasons discussed above for the military-readiness rule legislation.

4. **What effect does the M-Opinion have on current settlement agreement negotiations to address incidental take of migratory birds or court-mandated permits resulting from past settlement agreements?**

   Answer: Current settlement agreement negotiations should not address incidental take of migratory birds for purposes of enforcing the MBTA, but may still include measures necessary to comply with other relevant statutes when appropriate (for example statutes implemented by the Natural Resource Damage Assessment and Restoration program (NRDAR, as explained below). The Department is currently reviewing the Service's position on current negotiations to address incidental take of bald and golden eagles under the Eagle Act. These species are also covered under the MBTA. The Service has brought seven enforcement actions against companies for incidental take of eagles since 2015, which included both MBTA and Eagle Act charges. Only one of these remains unresolved; the other six were resolved through settlement agreements. The Service will no longer pursue MBTA charges against projects that cause eagle deaths, but the M-Opinion does not affect the Service's ability to bring Eagle Act claims in these cases.

We are not aware of any court-authorized settlement agreements that mandate obtaining a permit to cover future incidental take of migratory birds under the MBTA. Since 2013, the Department of Justice has brought two prosecutions for take of eagles and species protected only by the MBTA. These prosecutions were resolved at the request of defendants based on MBTA violations only, although the conduct could also have been charged under the Eagle Act with regard to the eagle deaths. These plea agreements provided that companies must implement plans aimed at preventing bird deaths at eight commercial wind projects and apply for eagle permits to cover incidental take of eagles under the Eagle Act. The Service Chief of Law Enforcement's Directive applying to civil administrative enforcement of avian take at wind projects includes a limited option for settlements to resolve violations of the MBTA. However, that option is no longer operable after issuance of the M-Opinion. We are currently determining whether the M-Opinion will require the Service to revisit past settlement agreements that require ongoing implementation of best management practices to avoid or reduce incidental take of migratory birds by wind-energy facilities and other industrial activities.

5. How does the M-Opinion affect the Natural Resources Damage Assessment program (i.e., specifically related to oil spills)?

Answer: The M-Opinion does not directly affect the NRDAR program because statutory authorities that provide the basis for the program do not include the MBTA. Pursuant to Comprehensive Environmental Response Compensation and Liability Act, Oil Pollution Act, and Clean Water Act, the Department is authorized to assess injury to natural resources caused by releases of hazardous substances and discharges of oil to compensate the public for lost natural resources and their services. The Department's assessment of natural resource injuries under the NRDAR program include any injury to migratory birds, which in many cases could otherwise be classified as incidental take.

In practice, however, the M-Opinion will have an effect on future claims seeking fines or penalties for violations of the MBTA from companies responsible for oil spills and hazardous releases. In addition to pursuing damage claims under the NRDAR program, the Department has pursued MBTA claims against companies responsible for oil spills that incidentally killed or injured migratory birds. That avenue is no longer available.

6. How does the M-Opinion affect consultations or habitat conservation plans under sections 7 and 10 of the ESA?

Answer: When processing Habitat Conservation Plans under Section 10 or consulting on Section 7 of the ESA, incidental take coverage should only include listed species listed under the ESA. As concluded in the M-Opinion, incidental take of migratory birds is not prohibited so no restrictions, minimization measures, or mitigation should be part of an incidental take permit or an incidental take statement for purposes of the MBTA (rather than the ESA). An applicant or federal government action agency can take voluntary measures related to migratory birds but it must be made clear that no such actions are required by the MBTA.

7. **How does the M-Opinion affect technical assistance under the Avian and Bat Conservation Plans?**

   Answer: Technical assistance can still be given in development of Avian and Bat Conservation Plans. However, any suggestions or guidance related to migratory birds must be relayed as completely voluntary actions. Part of the technical assistance should include the statement that incidental take of migratory birds is not prohibited by the MBTA.

APPENDIX E

AGENCY AND
AVIAN REHABILITATOR CONTACT LIST

U.S. FISH AND WILDLIFE SERVICE (REGION 6)

Migratory Bird Permit Office P.O. Box 25406 DFC (60154) Denver, CO 80225-0486 Phone: 303-236-8171 Fax: 303-236-8017 E-mail: permitsR6MB@fws.gov https://www.fws.gov/service/permits	Office of Law Enforcement U.S. Fish and Wildlife Service P.O. Box 25486 DFC Denver, CO 80225 Phone: 303-236-7540 Fax: 303-236-7901
Colorado Ecological Services Field Office P.O. Box 25486 - DFC Denver, CO 80225 Phone: 303-236-4773 Fax: 303-236-4005 https://www.fws.gov/office/mountain-prairie-region-headquarters	Resident Agent in Charge (CO, KS, UT) 9297 South Wadsworth Blvd Littleton, CO 80128 Office: 720-981-2777
Colorado Ecological Services Field Office 445 West Gunnison Avenue, Suite 240 Grand Junction, Colorado 81501 Phone: 970-243-2778 Fax: 970-245-6933 https://www.fws.gov/office/colorado-ecological-services-field-office	

COLORADO PARKS AND WILDLIFE

Colorado Parks and Wildlife
Headquarters
1313 Sherman Street, 6th Floor
Denver, CO 80203
Phone: 303-297-1192
https://cpw.state.co.us/

Approval must be obtained from the local District Wildlife Manager (DWM) prior to removing or relocating a bird nest. Since DWM information is dynamic, call the nearest Colorado Parks and Wildlife regional office to obtain the appropriate DWM contact information.

Northwest Region	(970) 255-6100	Grand Junction Office 711 Independent Avenue	Grand Junction	81505
	(970) 878-6090	Meeker Office P.O. Box 1181 73485 Hwy 64	Meeker	81641
	(970) 947-2920	Glenwood Springs Office 0088 Wildlife Way	Glenwood Springs	81601
	(970) 725-6200	Hot Sulphur Springs Office 346 Grand County Road 362	Hot Sulphur Springs	80451
	(970) 870-2197	Steamboat Springs Office P.O. Box 775777 925 Weiss Drive	Steamboat Springs	80487
Southwest Region	(970) 247-0855	Durango Office 151 East 16th Street	Durango	81301
	(970) 247-0855	Administrative Office 415 Turner Drive	Durango	81303
	(970) 641-7060	Gunnison Office 300 West New York Avenue	Gunnison	81230
	(719) 587-6900	Monte Vista Office 0722 South Road 1 East	Monte Vista	81144
	(970) 252-6000	Montrose Office 2300 South Townsend Avenue	Montrose	81401

LICENSED AVIAN REHABILITATORS

All licensed Colorado avian rehabilitators also hold a valid federal migratory bird rehabilitation permit.

See:https://cpw.state.co.us/wildlife-rehabilitation-licenses

COLORADO WILDLIFE REHABILITATION LICENSE HOLDERS - PUBLIC LIST

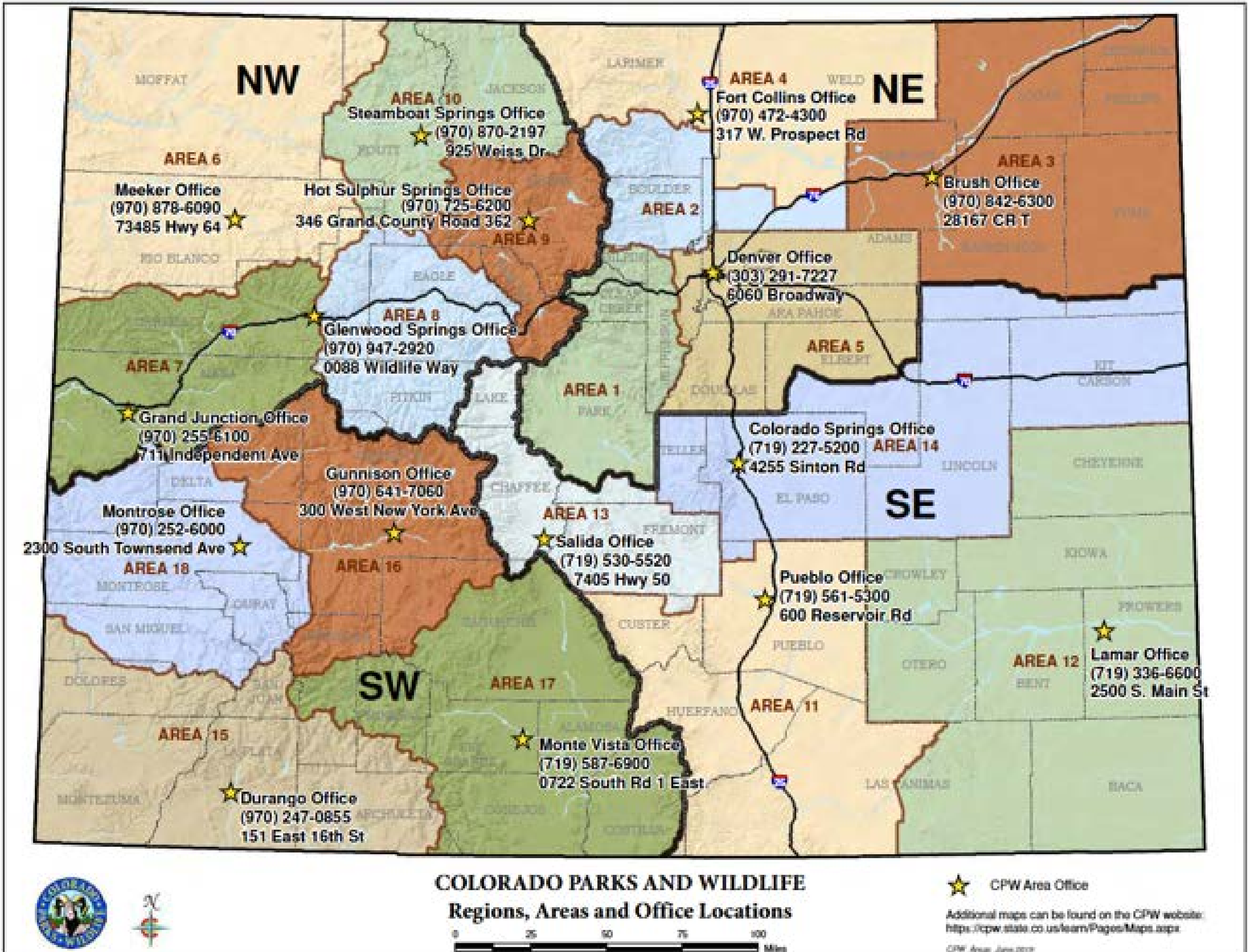
Region	Area	Licensee	Organization	Address	Phone	Email	Website	Small Mammal	Midsize Mammal	Large Mammal	Bats	Skunks	Raptors	Waterfowl	Passerines	Reptiles	Speciality / Limitations
NE	2	Donna Hengoli	Colorado Native Bird Care & Conservation		303.618.0387		coloradonativebird.org	X			X				X		
NE	2		Greenwood Wildlife Rehabilitation Center	PO Box 18987, Boulder, CO 80308	303.823.8455		greenwoodwildlife.org	X	X					X	X		
NE	2	Lea Peshock	Woodland Wildlife Consulting	Boulder, CO 80301			woodlandwildlifeconsulting.com	X	X					X	X		Authorized for coyote
NE	2	Genevieve Barnett			404.375.9007						X						
NE	2		Colorado Reptile Humane Society		303.776.2070	info@corhs.org	corhs.org									X	
NE	2		Colorado Reptile Humane Society		303.776.2070	info@corhs.org	corhs.org									X	
NE	4	Gail Kratz	Rocky Mountain Raptor Program	2519 S Shields St, #1k-119, Fort Collins, CO 80526	970.484.7756	gail@rmrp.org	rmrp.org						X				
NE	4	Carrie Lacon	Rocky Mountain Raptor Program	2519 S Shields St, #1k-119, Fort Collins, CO 80526	970.484.7756	carrie@rmrp.org	rmrp.org						X				
NE	4	Michela Dunbar	Northern Colorado Wildlife Center	2637 Midpoint Dr, Suite E, Fort Collins, 80525	970.283.7822	info@nocowildlife.org	nocowildlife.org	X	X		X				X	X	
NE	5	Emily Davenport	Rocky Mountain Wildlife Alliance		720.831.8130	connect@rmwalliance.org	rmwalliance.org	X	X				X	X	X	X	Authorized for coyote
NE	5	Keith Gunn Jr	Sunflower Ranch Wildlife Rehabilitation Center	15446 Powhaton Rd, Brighton, CO 80603	720.871.9483	sfrwildlife@gmail.com	sfrwildliferehab.com	X	X								
NE	5	Sarah Heckathorn		Larkspur, CO	719.440.4476			X	X							X	Authorized for coyote
NW	7	Krys Moquin	Animals 2by2 Education Foundation	PO Box 852, Silt, CO 81652	970.876.5723	2by2zoo@gmail.com		X	X				X		X	X	
NW	7	Paul Bingham	Pauline S Schneegas Wildlife Foundation	5945 CR 346, Silt, CO 81652	970.876.5676	psswildlifefoundation@gmail.com	psswf.org	X	X	X			X	X	X	X	
NW	7	Nanci Limbach	Pauline S Schneegas Wildlife Foundation	5945 CR 346, Silt, CO 81652	970.896.6895	psswildlifefoundation@gmail.com	psswf.org	X	X	X			X	X	X	X	
NW	7	Erin Romero	Pauline S Schneegas Wildlife Foundation	5945 CR 346, Silt, CO 81652	970.896.6895	psswildlifefoundation@gmail.com	psswf.org	X	X	X	X		X	X	X	X	
NW	10		Born Free Wildlife Rehabilitation	PO Box 772096, Steamboat Springs, CO 80477		bornfreerehab@yahoo.com	bornfreerehab.org	X	X	X			X	X	X		No large predators
NW	10	Deborah McLachlan	North Park Wildlife Rehabilitation	6119 CR 22, Walden, CO 80480	970.217.5372	northparkwildliferehab@gmail.com	22west.net	X	X	X			X		X		All cervidae rehab must be approved by CPW prior to animal intake.
NW	10	Patrick Drakulich	North Park Wildlife Rehabilitation	6119 CR 22, Walden, CO 80480	970.217.5372	northparkwildliferehab@gmail.com	22west.net	X	X	X			X		X		All cervidae rehab must be approved by CPW prior to animal intake.
NW	10	Michael Drakulich	North Park Wildlife Rehabilitation	6119 CR 22, Walden, CO 80480	970.217.5372	northparkwildliferehab@gmail.com	22west.net	X	X	X					X		All cervidae rehab must be approved by CPW prior to animal intake.
SE	11		DHC Wildlife dba The Squirrel Girls	1176 S Papago Dr, Pueblo West, CO 81007	719.251.5463		dhcwildlife.com	X	X								
SE	11		Second Chance Wildlife Rehabilitation	Pueblo, CO	719.543.1946						X			X	X		
SE	14	Angela Davis	Catamount Wildlife Rehab	Florissant, CO	303.994.8196			X	X						X		
SE	14	Bill Main	Sewild Colorado		719.217.9614	tingler90903@yahoo.com		X	X		X						
SE	14	Aurora McGee			719.392.7122	auroramcgee3@gmail.com		X							X		
SW	16	Brenda Miller	Roubideau Rim Wildlife Rescue	Olathe, CO	970.209.5946	rrwildliferehab@gmail.com	rrwildlife.weebly.com	X	X		X		X	X	X	X	

For information about living with wildlife, and common topics, please visit: https://cpw.state.co.us/learn/Pages/LivingwithWildlife.aspx *(Revised 07/12/2024)*

Page 2 contains a map of CPW Regions and Areas

COLORADO WILDLIFE REHABILITATION LICENSE HOLDERS - 2019 Public List

Region	Area	Licensee	Organization	Mailing Address	City	Zip	Primary Phone	Secondary Phone	Facility Address	Email	Website	Small Mammal	Medium Mammal	Large Mammal	Bats	Skunks	Raptors	Waterfowl	Passerines	Herptiles	Speciality / Limitations
NE	2	Reilly, Tara	Greenwood Wildlife Rehabilitation Center									X	X					X	X		
NE	2	Schaefer, Rhonda	Greenwood Wildlife Rehabilitation Center				303.823.8455					X	X								
NE	2	Thoenelt-Winter, Ingrid	Greenwood Wildlife Rehabilitation Center					303.823.8455										X			
NE	4	Avila, Carin	Rocky Mountain Raptor Program	2519 S Shields St #115	Fort Collins	80526	970.484.7756	970.222.0322		carin@rmrp.org	rmrp.org						X				
NE	4		Rocky Mountain Raptor Program	2519 S Shields St #115	Fort Collins	80526	970.484.7756	970.222.0322	B, Fort Collins, 80524	gail@rmrp.org	rmrp.org						X				
NE	4	Laxson, Carrie	Rocky Mountain Raptor Program				970.484.7756		B, Fort Collins, 80524	carrie@rmrp.org	rmrp.org						X				
NE	4	Reed, Lynsey	Rocky Mountain Raptor Program	2519 S Shields St #115	Fort Collins	80526	970.484.7756		B, Fort Collins, 80524		rmrp.org						X				
NE	4	Tincher, Michael	Rocky Mountain Raptor Program	2519 S Shields St #115	Fort Collins	80526	970.484.7756	970.222.0322	B, Fort Collins, 80524	mike@rmrp.org	rmrp.org						X				
NE	4	Winta, Liza	Rocky Mountain Raptor Program	2519 S Shields St #115			970.484.7756										X				
NE	5	Schaefer, Denise	Colorado BatCrew					866.909.2287		denise.batcrew@gmail.com	coloradobatcrew.com				X						
NE	5	Boles, Sandra	Snoozcars Wildlife Center		Brighton	80603				sandrasracoons@gmail.com		X	X								No coyote, no prairie dog
NE	5	Gunn, Keith	Wildlife Rehabilitation Center	15445 Powhaton Rd	Brighton	80603	303.641.0301		15445 Powhaton Rd, Brighton, 80603	keithgunn18@yahoo.com	sfrwildliferehab.com		X								
NE	5	Monaco, Carol	Wild Once More Rehabilitation Center	PO Box 791	Brighton	80601				info@wildoncemore.org		X	X								No coyote
NE	5	Sandoval, Morgan	Wildbird Rescue & Rehab																X		
NE	5	Zahir, Nabilla	Wildbird Rescue & Rehab																X		
NE	5	Heckathorn, Sarah			Larkspur	80118	719.481.4499			sheckathorn@hotmail.com		X	X							X	
NE	5	Kravchin, Nicki								njkrav6@gmail.com		X									
NE	5	Meyer, Kathy			Larkspur	80118	303.726.7897					X									Cottontail rabbit, jackrabbit only
NW	6			54785 Hwy 318	Maybell	81640	970.620.2084		54785 Hwy 318, Maybell, 81640			X	X	X						X	
NW	7	Hoguin, Krys	Animals Two by Two Educational Foundation	PO Box 382	Silt		970.876.5723		4666 1/2 311 Rd, New Castle, 81647	2by2zoo@rof.net		X	X	X					X	X	Large mammal rehab limited to non-mobile deer, elk, bear


NW
NE
SE
SW
AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
AREA 6
AREA 7
AREA 8
AREA 9
AREA 10
AREA 11
AREA 12
AREA 13
AREA 14
AREA 15
AREA 16
AREA 17
AREA 18
Fort Collins Office
(970) 472-4300
317 W. Prospect Rd
Steamboat Springs Office
(970) 870-2197
925 Weiss Dr.
Meeker Office
(970) 878-6090
73485 Hwy 64
Hot Sulphur Springs Office
(970) 725-6200
346 Grand County Road 362
Brush Office
(970) 842-6300
28167 CR T
Denver Office
(303) 291-7227
6060 Broadway
Glenwood Springs Office
(970) 947-2920
0088 Wildlife Way
Grand Junction Office
(970) 255-6100
711 Independent Ave
Colorado Springs Office
(719) 227-5200
4255 Sinton Rd
Gunnison Office
(970) 641-7060
300 West New York Ave
Montrose Office
(970) 252-6000
2300 South Townsend Ave
Salida Office
(719) 530-5520
7405 Hwy 50
Pueblo Office
(719) 561-5300
600 Reservoir Rd
Lamar Office
(719) 336-6600
2500 S. Main St
Monte Vista Office
(719) 587-6900
0722 South Rd 1 East
Durango Office
(970) 247-0855
151 East 16th St
MOFFAT
JACKSON
LARIMER
WELD
ROUTT
RIO BLANCO
BOULDER
ADAMS
EAGLE
ARAPAHOE
ELBERT
DOUGLAS
PITKIN
LAKE
PARK
KIT CARSON
TELLER
LINCOLN
CHEYENNE
DELTA
CHAFFEE
EL PASO
FREMONT
KIOWA
MONTROSE
OURAY
CROWLEY
PROWERS
SAN MIGUEL
CUSTER
PUEBLO
OTERO
BENT
DOLORES
HUERFANO
ALAMOSA
LAS ANIMAS
BACA
MONTEZUMA
ARCHULETA
CONEJOS
COSTILLA
COLORADO PARKS AND WILDLIFE
Regions, Areas and Office Locations
0 25 50 75 100
Miles
CPW Area Office
Additional maps can be found on the CPW website:
https://cpw.state.co.us/learn/Pages/Maps.aspx

APPENDIX F

USFWS NEST MEMORANDUM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

In Reply Refer To:
FWS/DMBM/AMB/068029

JUN 1 4 2018

Memorandum

To: Regional Directors

From: Assistant Director, Migratory Birds

Subject: Destruction and Relocation of Migratory Bird Nest Contents

The purpose of this memorandum is to clarify the application of the Migratory Bird Treaty Act (50 C.F.R. §§ 703-712; MBTA) to the destruction and relocation of migratory bird[1] nests and provide guidance for advising the public regarding this issue. This Memo replaces Migratory Bird Permit Memorandum MBPM-2 on Nest Destruction (Apr 15, 2003). This memo does not supersede or apply to other Federal, State, or Tribal laws and regulations, including the Endangered Species Act (16 U.S.C. §§ 1531; ESA) and the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d; Eagle Act).

BACKGROUND:

The MBTA protects migratory birds, including migratory bird nests, eggs, and chicks. The prohibitions of the MBTA include *possession, transport, import, export, purchase, sale, barter,* and *take*. The regulatory definition of take, as defined by 50 C.F.R. § 10.12, means to *pursue, shoot, wound, kill, trap, capture,* or *collect,* or *attempt thereof.* This memo clarifies the Service's interpretation of how these prohibitions apply to migratory bird nests, eggs, and chicks.

The MBTA does not prohibit the destruction of an inactive[2] migratory bird nest, provided that no possession occurs during the destruction and no permit or other regulatory authorization is required (see Policy #1 below). Additionally, the Service should make every effort to inform the public of how to minimize the risk of killing migratory bird species whose nesting behaviors make it difficult to determine occupancy status or continuing nest dependency (e.g., cavity and burrow nesting species).

[1] A list of species protected by the MBTA can be found at 50 C.F.R § 10.13

[2] An active nest is one that contains viable eggs and/or chicks. A nest becomes active when the first egg is laid and remains active until fledged young are no longer dependent on the nest. Nests that are empty, contain non-viable eggs, or are being built but do not yet have an egg in them are considered inactive.

On December 22 2017, the Department of Interior released M-Opinion 37050 (Opinion) regarding whether incidental take (the taking of migratory birds that results from an activity, but is not the purpose of the activity) is prohibited under the MBTA. The Opinion concludes that "the MBTA's prohibition on pursuing, hunting, taking, capturing, killing, or attempting to do the same applies only to direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control" (M-Opinion, pg. 41). The Opinion clarifies that the MBTA does not prohibit the incidental or unintentional take of migratory birds and/or their active nest contents.

Therefore, an individual or entity may destroy an active nest while conducting any activity where the intent of the action is not to kill migratory birds or destroy their nests or contents. However, because the MBTA specifically protects migratory bird nests, eggs, chicks, and adults from possession and transport without a permit, individuals and entities cannot, in most cases, take reasonable protective actions (such as removing eggs and chicks prior to nest destruction or relocating nests) without first obtaining authorization to do so.

Currently, there are two mechanisms explained in Policy #2 and Policy #3 below for the temporary possession and transport of healthy, unaffected birds for the purpose of removing them from imminent danger (i.e., immediate threat of mortality). Policy #2 explains in more detail the Service's Good Samaritan provision included in the Rehabilitation regulation (50 C.F.R. § 21.31(a)). Policy #3 outlines the permitting mechanism under the Special Purpose regulation (50 C.F.R. § 21.27) for active nest situations that fall outside the Good Samaritan provision.

POLICY:

1. Inactive Nest Destruction

A permit or other regulatory authorization is not required under the MBTA to destroy an inactive migratory bird nest[3], provided no possession occurs during or after the destruction. The MBTA does not authorize the Service to issue permits in situations where the prohibitions of the Act do not apply, such as the destruction of inactive nests.

The public should be made aware that, due to the biological and behavioral characteristics of some migratory bird species, destruction of their nests entails an elevated risk of unknowingly killing them. For example, it is difficult to detect whether or not the nest of a cavity-nesting species, such as a burrowing owl or a bank swallow, is active. Before destroying this type of nest, we recommend consulting with an expert (e.g., USDA-Wildlife Services, Wildlife Professionals, Environmental Consultants, or Rehabilitation experts) who can help determine nest activity.

Inactive nests may be protected by federal statutes other than the MBTA, such as nests of bird species federally listed as threatened or endangered under the ESA as well as nests of bald eagles and golden

[3] An inactive nest is one that is empty, contains non-viable eggs, or is being built but does not yet have an egg in the nest.

eagles, which are protected under the Eagle Act. State, Tribal, and local laws may also protect inactive bird nests. The Service should make every effort to ensure awareness regarding these possible additional protections and should inform the public of factors that will help minimize the likelihood that bird deaths would occur should nests be destroyed (i.e., when active nesting season normally occurs).

2. Good Samaritan Provision

For active nests, an individual or entity whose activity unintentionally or incidentally destroys an active nest, or is likely to do so, may collect the eggs or chicks and temporarily possess them for the purposes of transport to a federally-permitted rehabilitator under the Good Samaritan authorization in the rehabilitation regulation (50 C.F.R. § 21.31(a)). This Good Samaritan provision states: *"Any person who finds a sick, injured, or orphaned migratory bird may, without a permit, take possession of the bird in order to immediately transport it to a permitted rehabilitator"* (50 C.F.R. § 21.31(a)). The Service interprets the definition of "finds" to include encountering birds that become sick, injured, or orphaned while conducting activities where the intention is not to kill migratory birds or destroy their nests. "Finds" also applies when a planned activity is likely to cause or is about to cause destruction of an active nest resulting in the death, injury, or orphaning of eggs or chicks because, if nest destruction is imminent, any egg or chick in that nest can be considered orphaned. The Good Samaritan provision applies to the landowner of where the action is taking place and anyone designated to act on their behalf (e.g., wildlife professionals, pest-control contractors, rehabilitators, etc.). The Good Samaritan provision does not apply to regularly re-occurring actions where a single entity purposefully removes nests (e.g., a company that needs to purposefully remove nests from electrical distribution poles). For these situations a permit is recommended (see #3 below).

If the landowner is not comfortable with collecting the eggs or chicks, they may designate someone else to conduct the work on their behalf. After the eggs or chicks are collected, a federally-permitted rehabilitator may accept them as orphaned birds, consistent with their rehabilitation permit. All requirements and conditions of a rehabilitation permit apply. Rehabilitators have discretion as to what they will and will not accept and to determine the fate of any eggs or chicks accepted, including euthanasia. If a rehabilitator is unavailable or will not accept the eggs or chicks, the landowner (or the person acting on their behalf) may take the eggs or chicks to a licensed veterinarian who may temporarily possess, transfer, or euthanize the eggs or chicks without a permit (50 C.F.R. § 21.12(c)).

The Service can provide contact information for federally-permitted rehabilitators. The Service does not maintain or provide information on contractors, such as wildlife professionals, contractors, or pest control companies. Finally, the Service will provide information for voluntary reporting of active nest destruction in our Injury and Mortality Reporting System.

3. Special Purpose Permits

Permits are required to relocate a nest rather than destroy it, as possession of any nest is prohibited under the MBTA without prior authorization. Permits may also be appropriate for entities with ongoing projects that regularly need to intentionally remove or destroy nests. In these cases, permits can authorize possession of nests for various purposes, including active and inactive nest relocation, collection of nest contents for humane disposal, a combination thereof, or other compelling justifications. The Service can issue Special Purpose permits (50 C.F.R. § 21.27) to individuals or entities in these situations. In the case of utilities, authorization to destroy or relocate active and inactive nests is covered by applying for a specific type of special purpose permit: Special Purpose – Utility (https://www.fws.gov/forms/3-200-81.pdf).

Biologically, the success of nest relocation varies widely based on a number of factors, such as the distance moved, the presence of chicks, the nesting substrate, and the tolerance of the species and individual birds. Service biologists can provide technical assistance as to whether or not nest relocation is likely to succeed. Nest relocation should only be recommended for consideration when likely to result in success or when there are no other viable alternatives to achieve a conservation outcome. Relocation permit conditions will include short-term monitoring requirements by the person doing the nest relocation to ensure adults return to attend to the nest and an alternative protocol in the event nest abandonment occurs (such as collection and transport to a rehabilitator or veterinarian for euthanasia).

4. Other Permits and Authorizations

Other situations where there is purposeful take of active nests may fall under different permit types or regulatory authorizations. The Service will advise when a different permit or authorization may be appropriate.

APPENDIX G

DEVICE AND MATERIALS MANUFACTURER CONTACT LIST

BARRIERS

Barrier Plates

Manufacturer	Phone	Website
Cantega Technologies, Inc./Greenjacket	780-448-9700	www.cantega.com
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
Midsun Group, Inc.	860-378-0100	www.midsungroup.com
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Insulator Isolation Barriers

Manufacturer	Phone	Website
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com

Isolating Discs or Creepage Extenders

Manufacturer	Phone	Website
Cantega Technologies, Inc.	780-448-9700	www.cantega.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Transformer Animal Contact Barriers

Manufacturer	Phone	Website	Type
3M	512-984-3394	www.3m.com	Active
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com	Active and Passive
Utility Solutions, Inc.	828-323-8914	www.utilitysolutionsinc.com	Passive

DIELECTRIC COVERS

Surge Arrester Caps

Manufacturer	Phone	Website
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
Cooper Power Systems	877-277-4636	www.cooperindustries.com
Kaddas Enterprises, Inc.	888-658-5003	www.kaddas.com
Wildlife Outage Protectors (Insulboot)	1-800-262-2111	www.wildlifeoutageprotectors.com
McLean Power Systems	803-628-4307	www.macleanpower.com
Midsun Group, Inc.	860-378-0100	www.midsungroup.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Bushing Covers

Manufacturer	Phone	Website	Type
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com	Snap-on
Central Moloney, Inc.	870-247-5320	www.centralmoloneyinc.com	Snap-on or Wheel-type
Cooper Power Systems	877-277-4636	www.cooperindustries.com	Snap-on or Wheel-type
Custom Utilites, Inc.	847-640-4704	www.customutility.com	Snap-on
H.J. Arnett Industries, LLC	800-684-9844	www.hjarnett.com	Snap-on
Hendrix Wire and Cable, Inc.	603-732-8430	www.hendrix-wc.com	Snap-on
Homac	904-677-9110	www.tnb.com/pub/en/node/196	Snap-on
Howard Industries, Inc.	601-422-1412	www.howard-ind.com	Snap-on or Wheel-type
Hubbell Power Systems, Inc.	573-682-5521	www.hubbellpowersystems.com	Snap-on
Wildlife Outage Protectors (Insulboot)	1-800-262-2111	www.wildlifeoutageprotectors.com	Snap-on
Kaddas Enterprises, Inc.	888-658-5003	www.kaddas.com	Snap-on
MacLean Power Systems	803-628-4307	www.macleanpower.com	Snap-on

Manufacturer	Phone	Website	Type
Midsun Group, Inc.	860-378-0100	www.midsungroup.com	Snap-on
Phoenix Manufacturing Ltd.	905-878-2818	www.phnxmfg.com	Snap-on
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com	Snap-on
Preformed Line Products	440-461-5200	www.preformed.com	Snap-on
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com	Snap-on
Salisbury by Honeywell	603-210-9827	www.salisburybyhoneywell.com	Snap-on
TE Connectivity Ltd.	336-689-7348	www.te.com	Snap-on
Therm-A-Guard	888-388-4348	www.thermaguard.com	Snap-on
Warco, Inc.	636-433-2212	www.warcoinc.com	Snap-on

Conductor Covers

Manufacturer	Phone	Website	≥ 34.5kV?	Flexible?	Extends Beyond Top Insulator Shed?	Accomodates Hot Line Clamps?
Cantega Technologies, Inc.	780-448-9700	www.cantega.com	Yes	Yes		
Eco Electrical Systems	775-853-8623	www.ecoelectrical.com		Yes		
Hendrix Wire and Cable, Inc.	603-732-8430	www.hendrix-wc.com	Yes			
Hubbell Power Systems, Inc.	573-682-5521	www.hubbellpowersystems.com				
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com	Yes			
Midsun Group, Inc.	860-378-0100	www.midsungroup.com		Yes		
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com		Yes		
Preformed Line Products	440-461-5200	www.preformed.com		Partial		
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com				
TE Connectivity Ltd.	336-689-7348	www.te.com	Yes	Yes	Yes	Yes
Wildlife Outage Protectors (Insulboot)	800-262-2111	www.wildlifeoutageprotectors.com				

Cutout Covers

Manufacturer	Phone	Website
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
Eco Electrical Systems	775-853-8623	www.ecoelectrical.com
Hendrix Wire and Cable, Inc.	603-732-8430	www.hendrix-wc.com
Wildlife Outage Protectors (Insulboot)	1-800-262-2111	www.wildlifeoutageprotectors.com
Kaddas Enterprises, Inc.	888-658-5003	www.kaddas.com
Midsun Group, Inc.	860-378-0100	www.midsungroup.com
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Deadend Covers

Manufacturer	Phone	Website
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
Eco Electrical Systems	775-853-8623	www.ecoelectrical.com
Kaddas Enterprises, Inc.	888-658-5003	www.kaddas.com
Preformed Line Products	440-461-5200	www.preformed.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Horizontal Regulator Covers

Manufacturer	Phone	Website
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
TE Connectivity Ltd.	336-689-7348	www.te.com

Pin Insulating Covers

Manufacturer	Phone	Website
Eco Electrical Systems	1-775-853-8623	www.ecoelectrical.com
Hendrix Wire and Cable, Inc.	1-603-732-8430	www.hendrix-wc.com
Wildlife Outage Protectors (Insulboot)	1-800-262-2111	www.wildlifeoutageprotectors.com
Kaddas Enterprises, Inc.	1-888-658-5003	www.kaddas.com
Power Line Sentry, LLC	1-970-599-1050	www.powerlinesentry.com
TE Connectivity Ltd.	1-336-689-7348	www.te.com

Pothead Covers

Manufacturer	Phone	Website
Hendrix Wire and Cable, Inc.	603-732-8430	www.hendrix-wc.com
Hubbell Power Systems, Inc.	573-682-5521	www.hubbellpowersystems.com
Kaddas Enterprises, Inc.	888-658-5003	www.kaddas.com
Salisbury by Honeywell	603-210-9827	www.salisburybyhoneywell.com

FECES SHIELDS AND BARRIERS

Manufacturer	Phone	Website
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com
Power Line Sentry	970-599-1050	www.powerlinesentry.com
TE Connectivity Ltd.	336-689-7348	www.te.com
Zena Design	970-663-3980	www.zenadesign.com

JUMPER INSULATION

Manufacturer	Phone	Website	≥ 34.5kV?
3M	512-984-3394	www.3m.com	
Cantega Technologies, Inc./ Reliaguard	949-305-3311	www.reliaguard.com	
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com	
Midsun Group, Inc.	801-378-0100	www.midsungroup.com	
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com	Yes
Preformed Line Products	440-461-5200	www.performed.com	
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com	Yes
Salisbury by Honeywell	630-210-9827	www.salisburybyhoneywell.com	
TE Connectivity Ltd.	888-264-1722	www.te.com	Yes
Virginia Plastics Utilities	540-888-6617	www.vaplastics.com	
Warco, Inc.	636-433-2212	www.warcoinc.com	Yes

NEST MANAGEMENT

Nesting Platforms

Manufacturer	Phone	Website	Type
Aluma-Form, Inc.	901-362-0100	www.alumaform.com	
Geotek Inc	800-533-1680	www.geotekinc.com	
James Heck	N/A	heckjames@hotmail.com	Nail-free
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com	
Zena Design	970-663-3980	www.zenadesign.com	
SyGo, Inc.	559-323-8314	www.sygoinc.com	
Zena Design	970-663-3980	www.zenadesign.com	
Aluma-Form, Inc.	901-362-0100	www.alumaform.com	

Stick Deflectors

Manufacturer	Phone	Website
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com
Power Supply Company, LLC	423-624-7330	www.offsprey.com
Utility Solutions, Inc.	828-323-8914	www.utilitysolutionsinc.com

Other Deterrent

Manufacturer	Phone	Website	Type
H.J. Arnett Industries, LLC	800-684-9844	www.hjarnett.com	Spikeball

PERCH MANAGEMENT

Perch Discouragers

Manufacturer	Phone	Website
Birdzoff	866-247-3963	www.birdzoff.com
Hendrix Wire and Cable, Inc.	603-673-2040	www.hendrix-wc.com
Hughes Brothers, Inc.	402-643-2991	www.hughesbros.com
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com
Preformed Line Products	440-461-5200	www.preformed.com
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com
Zena Design	970-663-3980	www.zenadesign.com

Alternative Perches

Manufacturer	Phone	Website
Aluma-Form, Inc.	901-362-0100	www.alumaform.com
Hughes Brothers, Inc.	402-543-2991	www.hughesbros.com
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com

SUBSTATION PROTECTION

Dielectric Covers

Manufacturer	Phone	Website	Type
3M	512-984-3394	www.3m.com	
Cantega Technologies, Inc.	780-448-9700	www.cantega.com	
Central Moloney, Inc.	870-543-6602	www.centralmoloneyinc.com	
CSL Silicones, Inc.	519-836-9044	www.cslsilicones.com	
Dow Corning Corp.	989-496-7875	www.xiameter.com	
Wildlife Outage Protectors (Insulboot)	800-262-2111	www.wildlifeoutageprotectors.com	
Kaddas Enterprises, Inc.	801-972-5400	www.kaddas.com/	
Midsun Group, Inc.	860-378-0100	www.midsungroup.com	
Phoenix Manufacturing Ltd.	905-878-2818	www.phnxmfg.com	
TE Connectivity Ltd.	336-689-7348	www.te.com	Thermal scan friendly
Therm-A-Guard	888-388-4348	www.thermaguard.com	Thermal scan friendly

Animal Deterrent Fencing

Manufacturer	Phone	Website	Type
Kinectrics	416-207-6000 ext. 6001	www.kinectrics.com	
TransGard Systems, Inc.	717-227-2600	www.transgardfence.com	
VANQUISH Fencing, Inc.	215-295-2863	www.vanquishfencing.com	
Virginia Plastics Utilities	540-888-6617	www.vaplastics.com	

Climbing Barrier Wraps

Manufacturer	Phone	Website	Type
Brooks Manufacturing Co.	360-733-1700	www.brooksmfg.com	
Critter Guard, Inc.	573-256-2110	www.critterguard.org	
Osmose, Inc.	770-632-6732	www.osmose.com	
TransGard Systems, Inc.	717-227-2600	www.transgardfence.com	
Virginia Plastics Utilities	540-888-6617	www.vaplastics.com	
Warren Heim Corp.	772-466-8265	www.warrenheimcorp.com	

Spinning Line Guards

Manufacturer	Phone	Website	Type
Critter Guard, Inc.	573-256-2110	www.critterguard.org	
Midsun Group, Inc.	860-378-0100	www.midsungroup.com	
Virginia Plastics Utilities	540-888-6617	www.vaplastics.com	

Nesting Deterrent

Manufacturer	Phone	Website	Type
H.J. Arnett Industries, LLC	800-684-9844	www.hjarnett.com	Spikeball

SWITCH PROTECTION

Animal-Friendly Switches

Manufacturer	Phone	Website
Bridges Electric, Inc.	800-743-6367	www.energy.siemens.com
Chance	573-682-5521	www.hubbellcatalog.com/hps
S&C Electric Company	888-762-8100 (Main) 410-266-8484 (DC) 570-619-7944 (DE/MA) 609-490-1667 (NJ) 804-320-8005 (VA)	www.sandc.com

Barrier Plates

Manufacturer	Phone	Website
Cantega Technologies, Inc./Greenjacket	780-448-9700	www.cantega.com
Cantega Technologies, Inc./Reliaguard	949-305-3311	www.reliaguard.com
Midsun Group, Inc.	860-378-0100	www.midsungroup.com
Rauckman Utility Products	618-222-7100	www.rauckmanutility.com
TE Connectivity Ltd.	336-689-7348	www.te.com

WINDOW STRIKE PROTECTION

Manufacturer	Phone	Website	Type
Acopian BirdSavers	610-258-6149	www.birdsavers.com	Nylon parachute cord
American Bird Conservancy	N/A	http://abcbirds.org/program/glass-collisions/abc-birdtape/	Tape
Artscape	877-729-0708	www.abirdseyeview.com	Film
Santa Rosa National	503-299-9941	http://stores.santarosanational.com/index.php	Nylon monofilament
BirdScreen Company	707-545-9899	www.birdscreen.com	Screen
CollidEscape	717-445-9609	www.collidescape.org	Perforated Film
Feather Friendly Bird Deterrents	830-255-7265	www.featherfriendly.org	Film, tape
Arnold Glass	888-835-5885	www.ornilux.com	Ultra-violet patterned glass
Whispering Pines	416-233-6900	www.wpines.com	White decals
WindowAlert	805-895-9436	www.windowalert.com	Ultra-violet decals, Ultra-violet liquid
Various	N/A	N/A	Tempura paint

WIRE-MARKING DEVICES

Passive

Manufacturer	Phone	Website	Device	Description
P & R Technologies	503-292-8682	www.pr-tech.com	FireFly HW (high wind)	ABS Makrolon Plastic Plate
Power Line Sentry, LLC	970-599-1050	www.powerlinesentry.com	Bird Flight Diverter	Tent
Preformed Line Products	440-461-5200	www.preformed.com	Bird Flight Diverter and Swan Flight Diverter	Coiled Solid PVC Wire Marker
Preformed Line Products	440-461-5200	www.preformed.com	Spiral Vibration Damper	Vibration Dampers
TE Connectivity	336-689-7348	www.te.com	Avian Flight Diverter	Tent

Active

Manufacturer	Phone	Website	Device	Description
Balmoral Engineering	02-9482-4222	balmoralengineering.com.au	ROTAMARKA	Spinning Pinwheel
Carbon 2050 Ltd.	44 (0)7557 406141	www.carbon2050.co.uk	CROCFAST Clamp - Static Diverter	Swinging Plate
Carbon 2050 Ltd.	44 (0)7557 406141	www.carbon2050.co.uk	CROCFAST Clamp - Dynamic Diverter	Spinning Plate
P & R Technologies	503-292-8682	www.pr-tech.com	BirdMARK BFD/ BirdMARK BM-AG	Swinging Plate
P & R Technologies	503-292-8682	www.pr-tech.com	FireFly FF	Swinging Plate
P & R Technologies	503-292-8682	www.pr-tech.com	QuickMark	Swinging Plate
Preformed Line Products	440-461-5200	www.preformed.com	Raptor Clamp Diverter	Swinging Plate
Preformed Line Products	440-461-5200	www.preformed.com	Raptor Clamp LED Diverter	Swinging Plate/LED
Preformed Line Products	440-461-5200	www.preformed.com	Overhead Warning Light (OWL) Diverter	Swinging Plate/LED/Coil

Aviation Marker Balls

Manufacturer	Phone	Website	Device	Description
P&R Technologies	503-292-8682	www.pr-tech.com	SpanGuard/SpanLite	Yellow/Red Lighted Sphere
TE Connectivity	336-689-7348	www.te.com	AVISPHERE	Bi-Colored Sphere

APPENDIX H

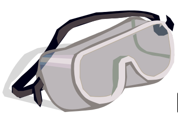
AVIAN SPECIES SUMMARIES

Although many bird species occupy or move through Colorado, species described in this appendix are limited to those birds that commonly occur, have been documented in the area, are considered rare or sensitive, or may be especially susceptible to electrocution and/or collision. The following information is presented for each of the species in this appendix:

- Federal and state regulatory status
- Risk factors (i.e., electrocution, collision, nesting, streamers/pollution)
- Distribution
- Habitat
- Diet

Although personnel are not authorized to handle birds or nests without the appropriate permit and authorization from the APP Coordinator, the following cautionary information is also presented as a safety reminder if a bird or nest materials must be handled.

Caution: Safety measures are used around nests and if handling dead or injured birds.

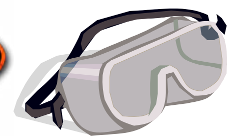

Eye Protection: Beaks vary significantly in size and shape from species to species. Some birds (e.g., birds of prey, vultures) have sharp beaks designed for tearing flesh. Others (e.g., wading birds) have long spear-like beaks for impaling fish. Eye protection is always worn when handling birds to avoid potential injury to personnel.


Heavy Leather Gloves: Extreme caution must be used when handling birds of prey. Heavy leather gloves are always worn when handling birds of prey, as their extremely sharp talons can cause serious injury. Heavy gloves are also suggested for birds with prominent beaks to avoid potential injury to hands.

Waterfowl

<u>Status</u> ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

<u>Issues</u> ☐ **Electrocution**
☒ **Collision**
☐ **Nesting**
☐ **Streamers**
☐ **Pollution**



Distribution

Birds in the waterfowl category include members of the order *Anseriformes* and includes ducks, geese, and swans. This large order is widely distributed throughout the Americas. Wetlands and waterbodies provide habitat for many species of waterfowl. A wide variety of ducks, geese, and swans occur throughout this area including large birds such as the Greater White-fronted Goose, Canada Goose, and Snow Goose (USFWS 2003, eBird 2019, USGS 2019).

Canada Goose, an example of an at-risk species in the waterfowl category (Rick Harness, EDM).

Habitat and Food Sources

Waterfowl have a wide variety of preferred habitats and foods. Members of the order forage by dabbling (surface feeding by tipping forward) and diving; land-based feeding is preferred by others. Waterfowl commonly feed on plants (e.g., grains, grasses, sedges, rushes, forbs, shrubs), seeds, tubers, berries, and arthropods (Cornell Lab of Ornithology 2019).

Wading Birds

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☒ **Collision**
☐ **Nesting**
☒ **Streamers**
☐ **Pollution**

Distribution

Wading birds include some species from the taxonomic orders *Pelecaniformes* (e.g., herons, egrets, ibises) and *Gruiformes* (e.g., cranes, rails). Both orders are widely distributed throughout the Americas. Some of the more common wading birds found in this part of Colorado include the White-faced Ibis, Black-crowned Night-Heron, Snowy Egret, and Cattle Egret (USFWS 2003).

Snowy Egret, an example of an at-risk wading bird (Rick Harness, EDM).

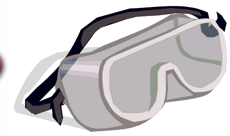
Habitat and Food Sources

Given the wide variety of species represented, habitats and food sources vary widely. Generally, these birds are closely associated with surface water, and commonly hunt fish, amphibians, insects, crustaceans, reptiles, and/or small birds and mammals from marshes, wetlands, streams, lakes, or mudflats. Additional food sources include plant materials and carrion (Cornell Lab of Ornithology 2019).

Sandhill Crane

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☒ **State Species of Special Concern**

Issues ☐ **Electrocution**
☒ **Collision**
☐ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Sandhill Crane breeds from as far north as Alaska and the coast of the Arctic Ocean south into the Great Lakes region and westward into portions of Wyoming, Idaho, Utah, Nevada, and northern California, with some populations occurring throughout the year in Florida and Cuba. Sandhill Cranes winter from portions of California to New Mexico and Texas, and south into Mexico. Populations also occur in northeastern Russia (Gerber et al. 2014). The migratory Greater Sandhill Crane (*tabida*) subspecies is found in Colorado and has been designated a state species of special concern.

Sandhill Crane (International Crane Foundation).

Habitat and Food Sources

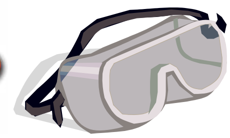
Sandhill Cranes typically breed in open freshwater wetlands and shallow marshes, but also use a broad range of habitats throughout the year including bogs, fens, sedge meadows, open grasslands, and agricultural lands. In the more arid parts of its western breeding range, these birds are found in shallow wetlands and along rivers. In agricultural areas, Sandhill Cranes prefer nesting sites close to cultivated fields (Meine and Archibald 1996).

Sandhill Cranes are omnivorous and feed on cultivated grains, roots, seeds, small mammals, frogs, toads, snakes, crayfish, insects, and eggs of other birds (Kingery 1998, Gerber et al. 2014).

Whooping Crane

Status ☒ **MBTA** ☒ **Federally Endangered** ☒ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☒ **ESA** ☐ **State Species of Special Concern**

Issues ☐ **Electrocution**
☒ **Collision**
☐ **Nesting**
☐ **Streamers/Pollution**



Distribution

There are four wild populations of Whooping Cranes: the Aransas/Wood Buffalo population, Louisiana population, Eastern Migratory population, and Florida population (Urbanek and Lewis 2015). The only self-sustaining wild population nests in wetlands in and around Canada's Wood Buffalo National Park and winters in coastal marshes at the Aransas National Wildlife Refuge (NWR) in Texas (Devokaitis 2018).

Whooping Crane (USGS, Public Domain).

Habitat and Food Sources

Whooping Crane nest sites are located primarily in shallow diatom ponds containing bullrush. Migrating cranes use a variety of habitats, but wetland mosaics appear most suitable. Whooping Cranes forage in shallow, seasonally and semi-permanently flooded palustrine wetlands, cropland, emergent wetlands, and riverine habitats. Wintering habitat in the Aransas NWR includes salt marshes, tidal flats, and barrier islands (USFWS 2011).

A Whooping Crane's diet consists of insects, frogs, rodents, fish, tubers, snakes, crayfish, grain, crabs, clams, snails, and acorns (Urbanek and Lewis 2015).

American White Pelican

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☐ **Electrocution**
☒ **Collision**
☐ **Nesting**
☐ **Streamers/Pollution**

Distribution

The American White Pelican is a common migrant to the intermountain west and breeds in scattered locations from Wisconsin, westward to northern California. American White Pelicans winter in California and Mexico, along the Gulf Coast, and in Florida (Knopf and Evans 2004).

American White Pelican (Rick Harness, EDM).

Habitat and Food Sources

The American White Pelican primarily breeds on isolated islands in freshwater lakes and forages on inland marshes, lakes, or rivers. During migration, pelicans stop at foraging and loafing areas similar to those used during the breeding season. In winter, this species favors shallow coastal bays, inlets, and estuaries with forage fish, exposed loafing sites, and minimum January temperatures above 39°F. When inland, this species overwinters below dams or on large rivers where moving water prevents the surface from freezing (Knopf and Evans 2004).

This species mostly feeds on fish, but also consumes crayfish and aquatic amphibians. It feeds cooperatively in groups, scooping up fish while swimming. The American White Pelican does not dive from the air into the water, as seen with Brown Pelicans (Knopf and Evans 2004).

Great Blue Heron

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☒ **Collision**
☐ **Nesting**
☒ **Streamers/Pollution**

Distribution

The Great Blue Heron is the best-known and most widely distributed heron in North America, occurring from Alaska to northern South America (Terres 1991).


Great Blue Heron (Rick Harness, EDM).

Habitat and Food Sources

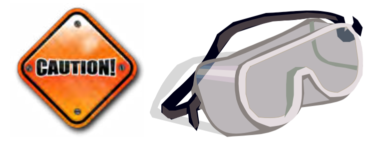
This species is typically associated with wet meadows, riparian corridors, suburban ponds, and reservoirs, and occupies fresh, brackish, and salt water areas (Terres 1991). Great Blue Herons usually nest near water sources and may nest in large colonies or “heronries.” Nests are often built in large trees near water; however, they also may be constructed on the ground, along rocky ledges, and on man-made structures (Terres 1991, Vennesland and Butler 2011).

The Great Blue Heron’s diet is comprised of a variety of fish species, in addition to frogs, salamanders, lizards, snakes, shrimp, crabs, crayfish, grasshoppers, dragonflies, and many aquatic insects. Occasionally, this opportunistic feeder may prey on birds and small mammals (Terres 1991, Vennesland and Butler 2011).

Turkey Vulture

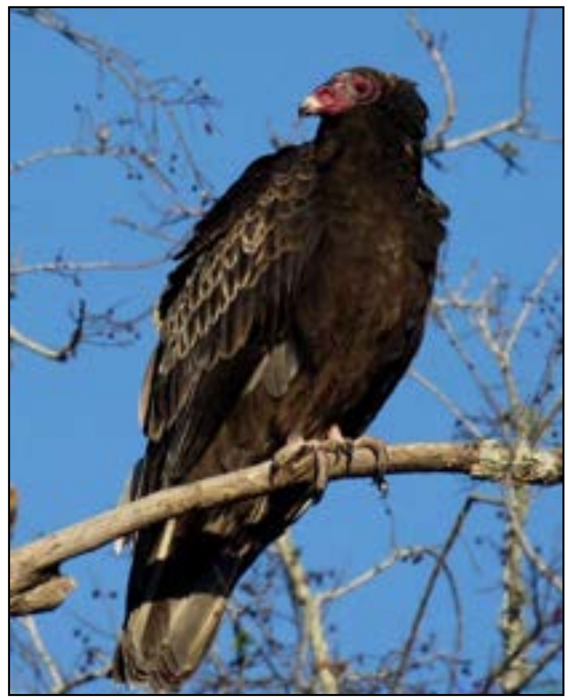
Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☐ **Nesting**
☒ **Streamers/Pollution**



Distribution

Turkey Vultures are the most widely distributed vulture species in North America. This species breeds throughout Colorado and occurs from southern Canada through Mexico, Central America, and South America (Kirk and Mossman 1998, USGS 2019).



Turkey Vulture (Rick Harness, EDM).

Habitat and Food Sources

A variety of habitats are used for foraging, roosting, and breeding. Turkey Vultures occur most frequently in open areas that provide adequate cliffs or large trees for nesting, roosting, and resting. Roost sites are often in undisturbed stands of large trees, but also routinely include artificial sites, such as communication towers and pylons supporting electrical wires (Kirk and Mossman 1998). Turkey Vultures regularly roost with Black Vultures, and as with Black Vultures, accumulations of excrement from vultures can disrupt service reliability when roosts occur regularly over unprotected equipment.

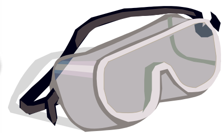
Preferred breeding habitat includes isolated and undisturbed forested areas that provide rock crevices, logs, stumps, and abandoned buildings for nest sites. Foraging habitats include grasslands, agricultural land, and pasture, but areas of intensive row crops appear to be avoided (Kirk and Mossman 1998).

Turkey Vultures have a well-developed sense of smell and are adept at detecting concealed carrion. They are almost exclusively scavengers and rarely take live prey. They primarily feed on mammals (wild and domestic) but also consume reptiles, amphibians, birds, fish, crustaceans, and sometimes plant material (Kirk and Mossman 1998).

Osprey

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☒ **Streamers/Pollution**




Distribution

Ospreys are commonly found along lakes, reservoirs, and seacoasts, and occur on most of the world's continents. Although closely associated with water bodies, during migration they are sometimes observed far from suitable foraging areas (Bierregaard et al. 2016).

Osprey (Joel Hurmence, EDM).

Habitat and Food Sources

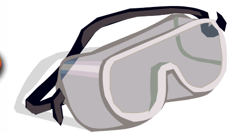
Breeding habitat varies; however, Ospreys typically nest within 12 miles of an adequate supply of accessible fish (i.e., shallow water) at open, elevated, predator-free sites. This raptor will nest on large living or dead trees, large rocks, bluffs, or man-made structures such as nest platforms, towers supporting electrical lines or cell phone relays, and channel markers near or over water (Bierregaard et al. 2016). Ospreys are widely documented as nesting on utility structures (Dunstan 1968, Olendorff et al. 1986, Blue 1996, Castellanos et al. 1999).

Live fish make up more than 99 percent of prey items taken. Ospreys forage for fish either on the wing or from perch sites (Bierregarrd et al. 2016).

Golden Eagle

<u>**Status**</u> ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☒ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

<u>**Issues**</u> ☒ **Electrocution**
☒ **Collision**
☐ **Nesting**
☒ **Streamers/Pollution**



Distribution

Golden Eagles are one of the largest raptors in North America, and their large size makes the species particularly vulnerable to electrocution hazards (APLIC 2006). Golden Eagles primarily occur throughout western North America; however, during winter, they also occur irregularly in eastern North America (Kochert et al. 2002).

Golden Eagle (James F. Dwyer, EDM).

Habitat and Food Sources

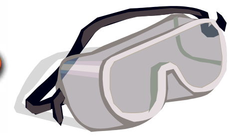
Golden Eagles are birds of open habitats and landscapes (Kochert et al. 2002).

Primary prey species for Golden Eagles consist of small and medium-sized mammals (e.g., ground squirrels, rabbits), but Golden Eagles will also feed on insects, snakes, birds, juvenile ungulates, and carrion. Although it is rare, this bird may take large, healthy mammals, hunting cooperatively in pairs (Terres 1991).

Bald Eagle

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☒ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☒ **State Species of Special Concern**

Issues ☒ **Electrocution**
☒ **Collision**
☒ **Nesting (Transmission)**
☒ **Streamers/Pollution**




Distribution

The Bald Eagle is widely distributed across Canada and the U.S. (Buehler 2000). Bald Eagles are most common, and tend to breed near fresh, brackish, or salt water, but juvenile, immature, sub-adult, and migrating birds can be observed in almost any natural landscape (Eakle et al. 2015).


Bald Eagle (Rick Harness, EDM).

Habitat

Throughout the year, Bald Eagles frequent the coast, rivers, lakes, reservoirs, and terrestrial habitats adjacent to these water bodies (Buehler 2000). Nests are typically located in the largest available tree capable of supporting the species' substantial nest, though they have also been documented on power transmission structures (Bohm 1988, Blue 1996). Nests are routinely used over consecutive years and new materials are added each year, leading to nests that can become extraordinarily large (Grubb 1976, Anderson and Bruce 1980, Buehler 2000).

The major habitat components on wintering grounds include a food source and suitable trees for diurnal perching and night roosting. Bald Eagles commonly feed on fish, waterfowl, and carrion, and food availability is likely the single most important factor influencing winter eagle distribution and abundance (Steenhof 1976). Wintering Bald Eagles may gather in large aggregations and share communal roosts, diurnal perches, and feeding areas. Perches are an essential element in Bald Eagles' selection of foraging areas, since perches are necessary for hunting and resting (Stalmaster and Newman 1979). Perch sites are typically in open view of potential food sources and are generally within 160 feet of water (Vian 1971).

Identification

Differentiating between adult Bald Eagles and adult Golden Eagles is relatively easy, based on the distinctive white head and tail of the Bald Eagle and the golden head of the Golden Eagle.

Adult Bald Eagle (Rick Harness, EDM).

Golden Eagle (Rick Harness, EDM).

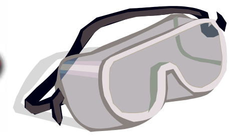
Distinguishing immature birds is more challenging. Juvenile Golden Eagles can be identified by distinctive white "windows" in the wings and a white base at the tail (Wheeler 2003, Liguori 2005). Juvenile Bald Eagles have neither of these markings, and Bald Eagles require 5 years to reach maturity and exhibit the full white head and tail feathers. Additionally, the immature Bald Eagle lacks the yellow beak and eyes of an adult bird.

Immature Bald Eagle (Rick Harness, EDM).

Swainson's Hawk

<u>Status</u> ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

<u>Issues</u> ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**




Distribution

Swainson's Hawks inhabit the Great Plains and desert shrublands of western North America from Canada to northern Mexico. They undertake one of the most remarkable migrations of any raptor species in North America when they vacate their breeding grounds and migrate in large flocks to Argentina (Bechard et al. 2010).

Red-shouldered Hawk (Rick Harness, EDM).

Habitat and Food Sources

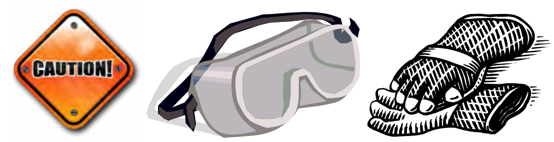
The Swainson's Hawk is a bird of open country, frequenting grasslands and desert shrublands that are interspersed with trees. The species also occurs in agricultural areas. They nest in scattered or isolated trees and in riparian areas on the edge of more open country. These hawks are quite tolerant of humans and occasionally place their nests near human habitation (Bechard et al. 2010).

Breeding birds forage primarily on small vertebrate species, particularly ground squirrels. Insects comprise the predominant portion of their diet during the non-breeding period (The Peregrine Fund 2009).

Red-Tailed Hawk

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**



Distribution

Red-tailed Hawks are the most common and widely distributed large raptor in North America. Except for the northern-most populations in Alaska and Canada, they are year-round residents in nearly every state, as well as in Mexico and Central America. This species is perhaps the most commonly electrocuted buteo species in North America (APLIC 2006).

Red-tailed Hawk (Rick Harness, EDM).

Habitat and Food Sources

Red-tailed Hawks are generalists in their habitat preference. During the nesting season, Red-tailed Hawks may occur from sea level to 9,000 feet in elevation. They commonly occupy forested lands, open country with scattered trees, edge areas between different habitat types, agricultural lands, and riparian zones. Red-tailed Hawks will use large trees, cliffs, and man-made structures for nesting, depending on the substrate and prey availability in nearby areas (Preston and Beane 2009), and have been documented nesting on electric utility structures (Gilmer and Wiehe 1977, Knight and Kawashima 1993, Blue 1996). This raptor is relatively tolerant of humans and often occurs in human-dominated landscapes, such as rural subdivisions and agricultural areas (Preston and Beane 2009).

This hawk typically prefers to nest in a tall tree with good aerial access, often nesting in a wide range of habitats including spruce forests, aspen stands, wooded stream valleys, canyons, woodlots, and lower-elevation coniferous or deciduous woodlands. The availability of tall trees for nesting with foraging habitat nearby is important in many areas, but cliffs or other elevated locations may also be used for nesting. Winter habitats tend to be more open and include upland pastures, grasslands, and forests (Preston and Beane 2009).

Perch availability is important for Red-tailed Hawks, which generally hunt from a perch. This raptor is an opportunistic forager, commonly preying on small and medium-sized mammals (e.g., rodents, rabbits), birds, and reptiles (including snakes) (Preston and Beane 2009).

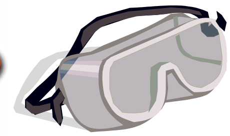
Rough-legged Hawk

<u>**Status**</u>

☒ **MBTA**	☐ **Federally Endangered**	☐ **State Endangered**
☐ **BGEPA**	☐ **Federally Threatened**	☒ **State Threatened**
☐ **ESA**	☐ **State Species of Special Concern**	

<u>**Issues**</u>

☒ **Electrocution**
☐ **Collision**
☐ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Rough-legged Hawk breeds across northern Canada and Alaska. This species occurs in the lower 48 states (in all but the southeastern U.S.) only during the winter (Bechard and Swem 2002).

Rough-legged Hawk (Rick Harness, EDM).

Habitat and Food Sources

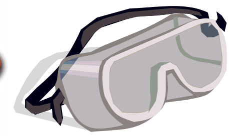
In its winter range in the western U.S., the Rough-legged Hawk occupies grasslands, shallow marsh habitats, and native meadows used for livestock grazing and hay production. Rough-legged Hawks often perch solitarily on utility poles, big sagebrush, trees, and hills but may roost communally in conifers or deciduous trees such as cottonwoods (Bechard and Swem 2002).

The Rough-legged Hawk’s winter diet consists mainly of small mammals, but species composition reflects different taxa available in their winter range. Voles, mice, and (to a lesser extent) shrews comprise the majority of prey items taken in most areas. They also will opportunistically feed on a wide variety of carrion during the winter (Bechard and Swem 2002).

Ferruginous Hawk

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☒ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**




Distribution

Ferruginous Hawks inhabit the Great Plains and Intermountain West, from southern Canada to central Mexico (Ng et al. 2017).


Ferruginous Hawk (Rick Harness, EDM.)

Habitat and Food Sources

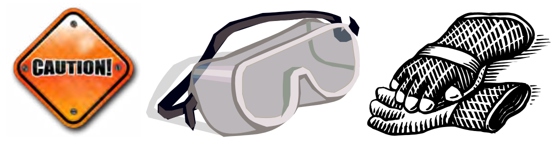
This large hawk is a bird of open country, inhabiting grasslands, shrub-steppes, and desert of North America. Nesting habitat consists of flat and rolling terrain in grassland or shrubsteppe regions. Areas sought for nesting include sparse riparian forests, canyon areas with cliffs and rock outcrops, and isolated trees surrounded by unbroken grassland; however, this species will nest on anthropogenic structures including transmission towers. During winter, Ferruginous Hawks often use open terrain from grassland to deserts where ground squirrels, lagomorphs, prairie dogs, or other major prey species are abundant (Ng et al. 2017).

Ferruginous Hawks primarily prey on few prey species, which vary by location. West of the Continental Divide, jackrabbits and cottontail are the main prey; east of the divide they feed on ground squirrels and prairie dogs (Ng et al. 2017).

Great Horned Owl

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Great Horned Owl is widespread throughout North America, from wilderness to rural locations to urban parks and suburbs (Terres 1991). Most individuals are permanent residents throughout their breeding range (Artuso et al. 2013).

Great Horned Owl (Rick Harness, EDM).

Habitat and Food Sources

The Great Horned Owl is very adaptable and probably has the most diverse habitat and climatic tolerance of any North American owl species. It inhabits virtually every type of terrain in North America from sea level to 11,000 feet in elevation (Owling.com 2001). If there is a preferred habitat, it would include open and secondary-growth temperate woodlands, swamps, orchards, and agricultural areas (Artuso et al. 2013).

During the day, this nocturnal species roosts in trees, snags, thick brush, cavities, ledges, and human structures (Artuso et al. 2013). Great Horned Owls forage from dusk until dawn; however, individual owls will also forage during the day (Terres 1991, Artuso et al. 2013).

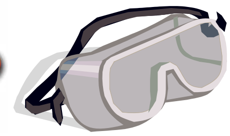
Great Horned Owls are highly territorial, and pairs defend their territories throughout the year. This species is the earliest nesting owl in North America. Great Horned Owls do not construct their own nest site, but customarily adopt the previous year's nest of other bird species such as Red-tailed Hawks and crows. Hollow trees are occasionally selected as nest sites. Great Horned Owls have also been documented nesting on electric utility structures (Blue 1996, Hunting 2002).

Small mammals compose the bulk of this owl species' diet. However, Great Horned Owls will prey on almost any animal ranging in size from scorpions and grasshoppers to geese, skunks, and small pets (Artuso et al. 2013).

Black-billed Magpie

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Black-billed Magpie ranges from south-central Canada south into northern Arizona and New Mexico and from eastern California to northwest Minnesota (Trost 1999).

Black-billed Magpie (Rick Harness, EDM).

Habitat and Food Sources

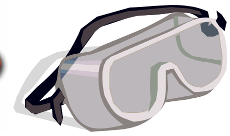
Nesting habitat for the Black-billed Magpie includes thickets in riparian areas, often associated with open meadows, grasslands, or sagebrush for foraging. This habitat is often linear along streams, and clumped in distribution, which can lead to near-colonial nest aggregations. Outside of the breeding season, these birds are frequently numerous near livestock feedlots, barnyards, landfills, sewage lagoons, grain elevators, and other human-influenced habitats. Magpies also seek riparian thickets, at least for roosting (Trost 1999).

The Black-billed Magpie feeds on both animals and plants, typically consuming ground-dwelling invertebrates, grain, acorns, carrion, small mammals, and some birds (Terres 1991, Trost 1999).

American Crow

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☐ **Nesting**
☐ **Streamers/Pollution**



Distribution

American Crows are the most widespread crow species in North America. They breed throughout much of the continental U.S. and southern half of Canada. Northern populations in much of Canada are migratory and breeding birds retreat south during the winter (Verbeek and Caffrey 2002).

American Crow (Rick Harness, EDM.)

Habitat and Food Sources

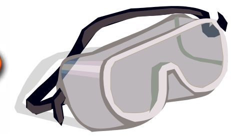
A habitat generalist, the crow occupies a variety of habitats including urban, rural, riparian, agricultural, coastal, pasture, and woodland areas. Crows avoid large, dense forests and areas with low-stature vegetation (e.g., grasslands, alpine areas) and absence of trees or other elevated perches (Verbeek and Caffrey 2002). Their ability to adapt has facilitated large population increases in some areas, especially in cities. Crows can form immense winter roosting flocks of up to 2 million birds (Cornell Lab of Ornithology 2019).

Crows are opportunistic foragers and will eat nearly anything including invertebrates, amphibians, reptiles, small birds and mammals, birds' eggs, grain crops, seeds and fruits, carrion, and discarded human food (Verbeek and Caffrey 2002).

Common Raven

Status ☒ **MBTA** ☐ **Federally Endangered** ☐ **State Endangered**
☐ **BGEPA** ☐ **Federally Threatened** ☐ **State Threatened**
☐ **ESA** ☐ **State Species of Special Concern**

Issues ☒ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Common Raven (**Error! Reference source not found.**) is one of the most widespread naturally occurring birds in the world. In western North America, the Common Raven may be found as far north as the Arctic Circle and as far south as Nicaragua. This species also occurs in portions of the eastern U.S. including the Adirondack, Catskill, Appalachian, and Allegheny mountains, as well as northern Minnesota, Wisconsin, and Michigan (Boarman and Heinrich 1999, USGS 2019).

Common Raven (Rick Harness, EDM).

Habitat and Food Sources

The Common Raven occupies a broad range of habitats from boreal, conifer, and deciduous forests; prairies and grasslands; isolated settlements, towns and cities; and deserts. It prefers heavily contoured landscaping (e.g., cliffs) for the thermals, which it uses to facilitate foraging flights. For nesting it also will utilize areas with cliffs, trees, or human structures (Boarman and Heinrich 1999).

Ravens are commonly associated with carrion, but are not limited to scavenging. The common raven also is an opportunistic feeder, often foraging on eggs, insects, garbage, carrion, birds, rodents, frogs, lizards, snakes, nuts, grains, fruit, and other plant matter (Knight and Call 1980; Heinrich 1989).

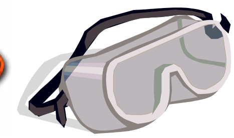
Non-Native Species

The MBTA provides legal protection for most birds and their nests in the U.S. (see 50 CFR Part 10.13 for a list of applicable species). However, the MBTA does not protect introduced species, such as the House Sparrow, European Starling, Rock Pigeon (formerly Rock Dove or Common Pigeon), Eurasian Collared-Dove, or Monk Parakeet. Refer to Federal Register 12710, Volume 70, No. 49 for a list of some of the non-native, human-introduced bird species not covered under the MBTA. Although these species are not protected under federal law, protection and regulation of non-native species varies under state statutes. This section describes those non-native species most likely encountered in this part of Colorado.

Rock Pigeon

Status ☐ **MBTA** ☐ **State Protected**
☐ **BGEPA**
☐ **ESA**

Issues ☐ **Electrocution**
☐ **Collision**
☒ **Nesting**
☒ **Streamers/Pollution**



Distribution

The Rock Pigeon (also known as the feral city pigeon) is an introduced species and occurs throughout the U.S. This species is larger and plumper than a Mourning Dove, with small heads and short legs, and two dark wingbars. Most birds are bluish gray, but some may be rusty red, white, black, or variations in between) (Lowther and Johnston 2014, Cornell Lab of Ornithology 2019).

Rock Pigeon (Rick Harness, EDM).

Habitat and Food Sources

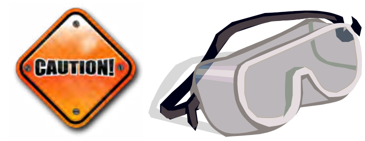
Rock Pigeons are opportunistic and will perch and nest on different substrates including ledges and beams on buildings, rocky cliffs, and highway infrastructures (e.g., bridges, overpasses) (Lowther and Johnston 2014).

Rock Pigeons primarily forage on seeds (e.g., corn, oats, millet, barley), fruits, and food left by people (Lowther and Johnston 2014, Cornell Lab of Ornithology 2019).

Eurasian Collared-Dove

Status
- ☐ **MBTA** ☐ **State Protected**
- ☐ **BGEPA**
- ☐ **ESA**

Issues
- ☐ **Electrocution**
- ☐ **Collision**
- ☒ **Nesting**
- ☐ **Streamers/Pollution**



Distribution

The Eurasian Collared-Dove was first released in the New World on New Providence, Bahamas in the mid-1970s. Since that time, this species has spread quickly across North America. There appears to be little to limit the spread of this species. It is unknown what effects the Eurasian Collared-Dove will have on native doves. The species' range currently covers all but the northeastern U.S. (Cornell Lab of Ornithology 2019, eBirds 2019, USGS 2019).

Eurasian Collared-Dove (Dr. Raju Kasambe).

Habitat and Food Sources

The Eurasian Collared-Dove is found mostly in suburban, urban, and agricultural areas where food, roost, and nest sites are available. This species nests in trees and buildings (e.g., barns) and avoids heavily forested areas and areas of intense agriculture if no suitable roost, nesting, and feeding sites are available (Romagosa 2012).

The Eurasian Collared-Dove primarily feeds on seed, cereal grain, some green parts of plants, berries, and small amounts of invertebrates (Romagosa 2012).

Identification

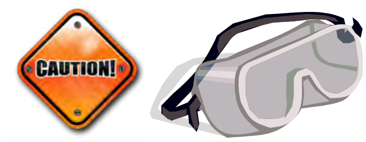
This dove is slightly larger than the native Mourning Dove, which is protected under the MBTA and occurs throughout Colorado. The Eurasian Collared-Dove is sandy color with a darker back and a blue-gray wing patch. It has white-tipped tail feathers and a black half-collar on the back of its neck from which it gets its name. The short legs are red and its beak is black (Romagosa 2012).

Larger Eurasian Collared-Dove in comparison with smaller native Mourning Dove (Marie Weinstein).

Monk Parakeet

Status ☐ **MBTA** ☐ **State Protected**
☐ **BGEPA**
☐ **ESA**

Issues ☐ **Electrocution**
☐ **Collision**
☒ **Nesting**
☐ **Streamers/Pollution**



Distribution

The Monk Parakeet (also known as the Quaker Parrot) is a relatively new addition to the list of non-native nuisance birds in the U.S. Monk Parakeets are from the temperate zones in South America and have flourished as far north as New York and Chicago, with large populations in Florida. The Monk Parakeet population in Florida was believed to exceed 100,000 in the early 2000s (Burgio et al. 2016, Cornell Lab of Ornithology 2019).

Monk Parakeet.

Habitat and Food Sources

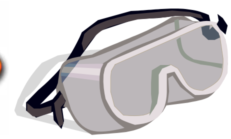
Like the other exotic bird species discussed, Monk Parakeets have easily adapted to urban areas and human-related activities. This green and gray parakeet constructs large dome-shaped nests of woven sticks, often on utility structures, and commonly nests in substations. They eat fruit, nuts, seeds, leaf buds, berries, and blossoms (Burgio et al. 2016).

Monk Parakeet Nest (Rick Harness, EDM).

European Starling

Status ☐ **MBTA** ☐ **State Protected**
☐ **BGEPA**
☐ **ESA**

Issues ☐ **Electrocution**
☐ **Collision**
☒ **Nesting**
☒ **Streamers/Pollution**



Distribution

The European Starling is an introduced species and occurs throughout the U.S. It is a medium-sized, black songbird with short, triangular wings, speckled plumage, and a short tail. The adult in breeding plumage has a distinctive yellow bill and speckled black plumage with purple-green iridescence (Cabe 1993).


European Starling (Kev Chapman).

Habitat and Food Sources

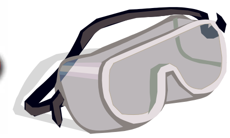
Starlings are cavity nesters and will nest in virtually any cavity or cavity-like opening in locations including cliffs, buildings, nest boxes, trees, and substations (Cabe 1993, Sundararajan and Gorur 2005).

They are opportunistic feeders, consuming an extremely diverse diet that varies seasonally, geographically, and with the age of the individual. In general, starlings feed on invertebrates, fruits, berries, grains, and certain seeds (Cabe 1993).

House Sparrow

Status
- ☐ **MBTA**
- ☐ **State Protected**
- ☐ **BGEPA**
- ☐ **ESA**

Issues
- ☐ **Electrocution**
- ☐ **Collision**
- ☒ **Nesting**
- ☐ **Streamers/Pollution**



Distribution

The House (or English) Sparrow is an introduced species and occurs throughout the U.S. It is a medium-sized, stocky sparrow with black-streaked brown upperparts and pale gray underparts (Lowther and Cinc 2006). Although the House Sparrow is not protected under the MBTA, it does bear a passing resemblance to protected species.

House Sparrow (Rick Harness).

Habitat and Food Sources

The House Sparrow is a cavity nester. Since they are small birds, they will nest in places too small for larger birds like starlings. They will occupy cavities within substations. House Sparrows typically forage on wild and domestic grains (corn, oats, wheat, sorghum), weed seeds, and commercial birdseed. During the breeding season, insects and other arthropods are consumed (Lowther and Cinc 2006).

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APPENDIX I

AVIAN PROTECTION TRAINING SYLLABUS AND RAPTORS AT RISK DVD

AVIAN ELECTROCUTION SYLLABUS

Opening and Introduction
- Purpose
- Scope

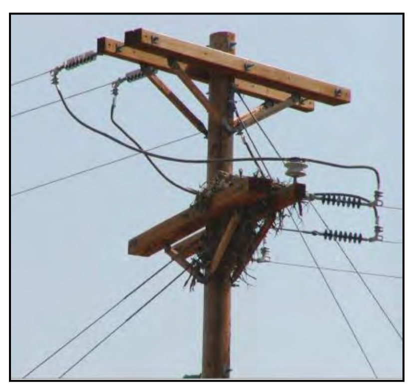
Protected Bird Species
- Background
- Primary Federal Laws Protecting Birds - MBTA, ESA, BGEPA
- Examples of Protected and Excluded Species

The State of the Art in Raptor Protection: A Historical Perspective
- Video: Raptors at Risk

Regulations and Enforcement
- Federal Requirements
- State Requirements
- Required Permits
- Reporting Requirements

Retrofitting and Construction Standards
- Mitigating Products – What's Available?
- Collision Problems and Solutions
- Raptors and Nesting Problems

Raptors and Other Birds
- Overview of Common Species
- Perching, Roosting, and Nesting Behavior



APLIC Guidelines
- Suggested Practices for Avian Protection (2006)
- Reducing Avian Collisions (2012)

Bird Incident Tracking Forms/Data Collection/Handling
- Nest Procedures
- Dead or Injured Bird Procedures
- Bird/Nest Report Form
- Monitoring
- Importance of Keeping Records

Questions and Open Discussion

APPENDIX J

LINEMAN'S GUIDE TO AVIAN DISEASES

NEW MEXICO AVIAN PROTECTION WORKING GROUP *"Working Cooperatively to Resolve Avian Issues"*

NMAP

Lineman's Guide to Avian Diseases

Table of Contents:

Photo Courtesy of Xcel Energy

As linemen, you may occasionally encounter birds (alive and dead), and may have to handle bird nests during the course of your work. Lately, the media has been full of stories of avian diseases, and their impact on humans. This guide has been put together to inform you of the current state of affairs of those diseases in New Mexico, and the proper procedures to protect yourselves.

Avian Flu – Overview

Although Avian Influenza (flu) viruses are relatively common in wild birds, most do not cause obvious symptoms. These viruses are primarily spread through saliva and feces. Most do not infect humans; however in 1997, a particular strain (called H5N1) was found that could spread directly from birds to humans. This is highly contagious and is deadly to poultry. Despite the ability to infect humans, only about 200 cases of H5N1 in humans have been reported worldwide. However, nearly half of those cases have been fatal. No human or avian cases of H5N1 have been reported in the U.S. at the time of writing.

"Will H5N1 come to the USA?"

There are reports of infected migratory birds in Asia; therefore, there is potential for the virus to be carried to North America. However, there is currently little evidence that migratory birds play a major role in the dispersal of H5N1.

"Will we know if it does arrive?"

Although there is currently little evidence that migrants disperse Avian Flu, this remains the most likely natural route. The virus could be transmitted via birds that come into contact with each other in the arctic, and then disperse south to Asia and North America. The accidental or intentional import of infected birds is a far more likely route to the U.S. Currently, there is a ban on the import of all birds and bird products from H5N1-infected countries. Additionally, the inter-agency National Influenza Pandemic Preparedness Task Force, organized by the U.S. Secretary of Health and Human Services, is monitoring migratory birds for Avian Flu, especially in areas where those birds interact with others from countries where H5N1 is already present.

A Lineman's Guide to Avian Diseases – Page 2

Common Avian Flu Misconceptions

***"There is an Avian Flu pandemic right now"* – False**. The current form of H5N1 is not efficient at passing from birds to humans. Therefore, although H5N1 is highly contagious and dangerous to birds, and can be transmitted to humans, the passage is difficult. Because the virus does not appear to spread easily to humans, it cannot spread rapidly among humans, as would be necessary for a pandemic to occur.

***"Avian Flu is present in the U.S."* – Partially True**. There are types of Avian Flu present in the U.S. but the H5N1 form has not been detected in either birds or humans.

***"All types of Avian Flu are dangerous"* – False**. Very few forms of Avian Flu are dangerous to birds, and even less are dangerous to humans. The majority do not cause visible symptoms in birds and are not transmissible to humans.

***"Any bird I come in contact with is likely to have Avian Flu"* – False**. The majority of outbreaks have been in domestic poultry farms. Although wild birds are known to be able to carry Avian Flu, they are less likely to be infected than poultry. In addition, birds in the U.S. do not have H5N1.

***"There is no cause for concern about Avian Flu"* – False**. There is some cause for concern, and it is better to be prepared than to be caught unaware. Although H5N1 does not currently transmit easily between birds and humans, nor from human to human, viruses can mutate over time and it is possible that one or both of those factors could change. In the event that the virus changes in a way that increases transmission, H5N1 could spread quickly and become a pandemic.

Avian Flu Links

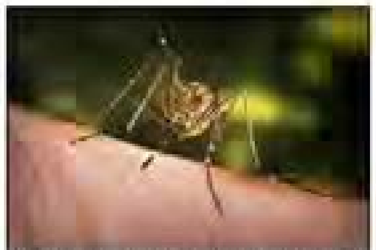
Center for Disease Control - www.cdc.gov/flu/avian/index.htm
National Wildlife Health Center - www.nwhc.usgs.gov/disease_information/avian_influenza/index.jsp
NWHC Safety Guidelines for Handling Wild Birds www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB_05_03.jsp
OSHA - www.osha.gov/dts/shib/shib121304.pdf
World Health Organization - www.who.int/csr/disease/avian_influenza/en/
Federal Government - www.pandemicflu.gov
US Dept of Interior - www.doi.gov/issues/avianflu.html
US Dept of Homeland Security - www.whitehouse.gov/homeland/nspi.pdf
US Dept of Agriculture - www.usda.gov/birdflu

Photo Courtesy of US FWS

A Lineman's Guide to Avian Diseases – Page 3

West Nile Virus (WNV) Overview

WNV has been in the U.S. since 1999 and in New Mexico since 2002. Since then, there have been approximately 330 laboratory-confirmed human cases, and 4 deaths in New Mexico. It is safe to assume that WNV is present in some local birds; however, very few mosquitoes carry the virus. WNV is transmitted when a mosquito that has bitten an infected bird also bites a human. The majority of human cases occur in immune-compromised individuals and the elderly. Occasionally healthy adults will contract WNV.



Mosquito (*Culex tarsalis*) photo courtesy of the CDC

Frequently Asked Questions

"Can I get WNV from human contact, or by contact with dead birds?"

No. WNV is transmitted by mosquito bite. However, it is always a good idea to wear gloves when handling sick or dead animals.

"Do all mosquitoes carry WNV?"

No. Most mosquitoes do not carry WNV. In fact some species of mosquito can't transmit the virus even if they are carriers. Even if you are in a location where you are frequently bitten by mosquitoes, you are still unlikely to become infected with WNV.

"Do all birds carry WNV?"

No. Similarly to mosquitoes, most birds do not carry WNV. Some carriers never exhibit symptoms, others cannot pass it on. WNV only stays active in most birds systems for 3-7 days, making it very difficult to pass on to a mosquito.

"What are the symptoms?"

The majority of people infected with WNV exhibit no symptoms, and never realize they were infected. About 1/5th of those infected will have mild flu-like symptoms (fever, fatigue, headache, etc.). About 1 in 150 people infected progress to West Nile encephalitis which is much more serious. Its symptoms can include: high fever, disorientation, tremors, convulsions, paralysis, coma or even death. Symptoms of WNV usually last for only a few days, although severe symptoms may last for weeks. Some neurological effects may be permanent.

Links

New Mexico Health Department - http://www.health.state.nm.us/wnv.html
Centers for Disease Control - http://www.cdc.gov/ncidod/dvbid/westnile/index.htm
US Geological Survey - http://westnilemaps.usgs.gov/

A Lineman's Guide to Avian Diseases – Page 4

Avian Ectoparasites

"What is an ectoparasite?"

Ectoparasites are parasites that live on the outside of animals, as opposed to endoparasites which live inside animals. Examples include: fleas, ticks, mites, flies, lice etc.

"Where would I encounter them?"

Many ectoparasites live on the bodies of animals and birds, however some also live in the nest material and only feed when the host (the animal or bird) is around. Therefore, if you are handling a bird or nest material, you may be exposed to any number of parasites. Many of these will abandon a dead host, but dead birds may also be infested with flies or ants, eating or laying eggs in the body.

"Are they dangerous?"

The vast majority of avian ectoparasites are host-specific, meaning that they will only live on one particular species or group of birds. Some will travel from bird to bird, but almost none are likely to bother humans, other than the "Ick" factor! Some spiders, which may also inhabit nests, can give a nasty bite, as can ants which may be defending a food supply (e.g. a dead bird).

Bird handling

Although the H5N1 form of Avian Flu has not yet arrived in North America, it is a good idea to take precautions when handling dead or injured birds. **PNM currently recommends that a dust mask and gloves be worn when handling birds. Additionally, some form of eye protection, as well as a long sleeved shirt and pants to reduce skin exposure are all good ideas.**

Viruses are transmitted primarily though oral secretions and feces, so avoid contact with either. If this is not possible, avoid touching your eyes, ears, nose, and mouth after handling any bird or nest, and wash hands thoroughly with antibacterial soap as soon as possible.

Local Contact Numbers

Hawks Aloft Inc. – 505-828-9455
US FWS – 505-248-6911
NM Public Health – 505-827-2613
USDA Wildlife Services – 1-866-487-3297
NM Game & Fish – 505-222-4700

Sponsored in 2006 by:

Hawks Aloft, Inc.
Conservation, Avian Research & Education

U.S. Fish & Wildlife Service

PNM

APPENDIX K

BIRD INCIDENT TRACKING FORM

Inspection Report for ☐ Avian Fatality on Avian Safe Structure
☐ Retrofitting: ☐ Historic Event ☐ New Event

Client: ____________ Date: ____________ Submitted by: ____________

Pole ID: ____________ Lat/Long: ____________ Photos: ____________

Primary Voltage ☐ 7.2/12.47 ☐ 14.4/24.9 ☐ Other ____________ Secondary Voltage ____________

Report History (*attach prior reports if possible*)

Death and Corrective Measure Report(s) (date/#) ____________ Salvage Report(s) (date/#) ____________

Wet conditions at time of fatalities? ☐ Yes ☐ No ☐ Don't Know

Bird Fatalities

Species: ____________ Carcass(es) present? ☐ Yes ☐ No Location relative to pole: ____________

Necropsy requested? ☐ Yes ☐ No ☐ Don't Know Cause of death, if known ____________

Mark and describe locations of any burned feathers, burned flesh, signs of entanglement, etc.

Detailed Inspection

- Look for any separation less than 60" horizontal, 40" vertical
- Note condition of retrofit materials, look for flash marks on possible contact points
- Consider "non-typical" perch points, e.g. conductors, neutral, clevises, etc.

Crossarms

Unit	Avian Protection	Types / Manufacturers
Primary Top Unit: ____________	☐ Wood ☐ Fiberglass	
☐ 60"h/40"v Const ☐ Covers	☐ Perch Discouragers ☐ Insulating Links	____________
Primary Low Unit: ____________	☐ None ☐ Wood ☐ Fiberglass	
☐ 60"h/40"v Const ☐ Covers	☐ Perch Discouragers ☐ Insulating Links	____________
Kicker Arm: ☐ None ☐ Wood ☐ Fiberglass	☐ Perch Discouragers	____________

Devices/Equipment

Device	Quantity	Avian Protection	Types / Manufacturers
Arresters	______	☐ Covers ☐ Perch Discouragers	____________
Cutouts	______	☐ Covers ☐ Perch Discouragers	____________
Transformers	______	☐ Covers ☐ Perch Discouragers	____________
Potheads	______	☐ Covers ☐ Perch Discouragers	____________
______	______	☐ Covers ☐ Perch Discouragers	____________
______	______	☐ Covers ☐ Perch Discouragers	____________

Other

Item	Avian Protection	Types / Manufacturers
☐ Primary Jumpers	☐ Covers ☐ Perch Discouragers	____________
☐ Stinger Wires	☐ Covers ☐ Perch Discouragers	____________
☐ Grounded Brackets	☐ Covers ☐ Perch Discouragers	____________
☐ Pole Ground Wire	☐ Covers ☐ Perch Discouragers	____________
☐ Grounded Guy	☐ Covers ☐ Perch Discouragers	____________
☐ Secondary Bushings	☐ Covers ☐ Perch Discouragers	____________

Inspection Report (Continued) for ☐ Avian Fatality on Avian Safe Structure
☐ Retrofitting: ☐ Historic Event ☐ New Event

Client: ______________________________

Pole ID: ______________________________

Evaluation

Describe possible situations for electrocution or entanglement. Include any suspected gaps in the retrofitting, and consider non-typical perch locations. Refer to photos or make drawings.

Conclusion

- ☐ Adequate retrofit/construction
- ☐ Inadequate retrofit/construction (describe)
- ☐ Adequate retrofit/construction but avian protection device(s) failed (describe)
- ☐ Retrofit/construction appears adequate – reason for fatality is not evident

Recommendation

☐ Please check, sign, and date after any additional measures are completed.

______________________________ Signature

______________________________ Date

APPENDIX L

RECOMMENDED BUFFER ZONES AND SEASONAL RESTRICTIONS FOR COLORADO RAPTORS

RECOMMENDED BUFFER ZONES AND SEASONAL RESTRICTIONS FOR COLORADO RAPTORS

Tolerance limits to disturbance vary among as well as within raptor species. As a general rule, Ferruginous Hawks and Golden Eagles respond to human activities at greater distances than do Ospreys and America Kestrels. Some individuals within a species also habituate and tolerate human activity at a proximity that would cause the majority of the group to abandon their nests. Other individuals become sensitized to repeated encroachment and react at greater distances. The tolerance of a particular pair may change when a mate is replaced with a less tolerant individual and this may cause the pair to react to activities that were previously ignored. Responses will also vary depending upon the reproductive stage. Although the level of stress is the same, the pair may be more secretive during egg laying and incubation and more demonstrative when the chicks hatch.

The term "disturbance" is ambiguous and experts disagree on what actually constitutes a disturbance. Reactions may be as subtle as elevated pulse rate or as obvious as vigorous defense or abandonment. Impacts of disturbance may not be immediately evident. A pair of raptors may respond to human intrusion by defending the nest, but well after the disturbance has passed, the male may remain in the vicinity for protection rather than forage to feed the nestlings. Golden eagles rarely defend their nests, but merely fly a half mile or more away and perch and watch. Chilling and over heating of eggs or chicks and starvation of nestlings can result from human activities that appeared not to have caused an immediate response.

A 'holistic' approach is recommended when protecting raptor habitats. While it is important for land managers to focus on protecting nest sites, equal attention should focus on defining important foraging areas that support the pair's nesting effort. Hunting habitats of many raptor species are extensive and may necessitate interagency cooperation to assure the continued nest occupancy. Unfortunately, basic knowledge of habitat use is lacking and may require documentation through telemetry investigations or intensive observation. Telemetry is expensive and may be disruptive so a more practical approach is to assume that current open space is important and should be protected.

Although there are exceptions, the buffer areas and seasonal restrictions suggested here reflect an informed opinion that if implemented, should assure that the majority of individuals within a species will continue to occupy the area. Additional factors, such as intervening terrain, vegetation screens, and the cumulative impacts of activities should be considered.

These guidelines were originally developed by CDOW raptor biologist Gerald R. Craig (retired) in December 2002. To provide additional clarity in guidance, incorporate new information, and update the conservation status of some species, the guidelines were revised in January 2008. Further revisions of this document may become necessary as additional information becomes available.

RECOMMENDED BUFFER ZONES AND SEASONAL RESTRICTIONS

BALD EAGLE

Nest Site:

No surface occupancy (beyond that which historically occurred in the area; see 'Definitions' below) within ¼ mile radius of active nests (see 'Definitions' below). Seasonal restriction to human encroachment (see 'Definitions' below) within ½ mile radius of active nests from October 15 through July 31. This closure is more extensive than the National Bald Eagle Management Guidelines (USFWS 2007) due to the generally open habitat used by Colorado's nesting bald eagles.

Winter Night Roost:

No human encroachment from November 15 through March 15 within ¼ mile radius of an active winter night roost (see 'Definitions' below) if there is no direct line of sight between the roost and the encroachment activities. No human encroachment from November 15 through March 15 within ½ mile radius of an active winter night roost if there is a direct line of sight between the roost and the encroachment activities. If periodic visits (such as oil well maintenance work) are required within the buffer zone after development, activity should be restricted to the period between 1000 and 1400 hours from November 15 to March 15.

Hunting Perch:

Diurnal hunting perches (see 'Definitions' below) associated with important foraging areas should also be protected from human encroachment. Preferred perches may be at varying distances from human encroachment and buffer areas will vary. Consult the Colorado Division of Wildlife for recommendations for specific hunting perches.

GOLDEN EAGLE

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ¼ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile radius of active nests from December 15 through July 15.

OSPREY

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ¼ mile radius of active nests. Seasonal restriction to human encroachment within ¼ mile radius of active nests from April 1 through August 31. Some osprey populations have habituated and are tolerant to human activity in the immediate vicinity of their nests.

FERRUGINOUS HAWK

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ½ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile radius of active nests from February 1 through July 15. This species is especially prone to nest abandonment during incubation if disturbed.

RED-TAILED HAWK

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within 1/3 mile radius of active nests. Seasonal restriction to human encroachment within 1/3 mile radius of active nests from February 15 through July 15. Some members of this species have adapted to urbanization and may tolerate human habitation to within 200 yards of their nest. Development that encroaches on rural sites is likely to cause abandonment.

SWAINSON'S HAWK

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ¼ mile radius of active nests. Seasonal restriction to human encroachment within ¼ mile radius of active nests from April 1 through July 15. Some members of this species have adapted to urbanization and may tolerate human habitation to within 100 yards of their nest.

PEREGRINE FALCON

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ½ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile of the nest cliff(s) from March 15 to July 31. Due to propensity to relocate nest sites, sometimes up to ½ mile along cliff faces, it is more appropriate to designate 'Nesting Areas' that encompass the cliff system and a ½ mile buffer around the cliff complex.

PRAIRIE FALCON

Nest Site:

No surface occupancy (beyond that which historically occurred in the area) within ½ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile radius of active nests from March 15 through July 15.

NORTHERN GOSHAWK

No surface occupancy (beyond that which historically occurred in the area) within ½ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile radius of active nests from March 1 through September 15.

BURROWING OWL

Nest Site:

No human encroachment within 150 feet of the nest site from March 15 through October 31. Although Burrowing Owls may not be actively nesting during this entire period, they may be present at burrows up to a month before egg laying and several months after young have fledged. Therefore it is recommended that efforts to eradicate prairie dogs or destroy abandoned towns not occur between March 15 and October 31 when owls may be present. Because nesting Burrowing Owls may not be easily visible, it is recommended that targeted surveys be implemented to determine if burrows are occupied. More detailed recommendations are available in a document entitled “Recommended Survey Protocol and Actions to Protect Nesting Burrowing Owls” which is available from the Colorado Division of Wildlife

Recommended Buffer Zones and Seasonal Restrictions Around Raptor Use Sites

Species and Use	Buffer	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bald Eagle													
ACTIVE NEST - No Surface Occupancy	¼ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
ACTIVE WINTER NIGHT ROOST without a direct line of sight- No Human Encroachment	¼ Mile												
ACTIVE WINTER NIGHT ROOST with a direct line of sight - No Human Encroachment	½ Mile												
HUNTING PERCH - No Human Encroachment	Contact CDOW												
Golden Eagle													
ACTIVE NEST - No Surface Occupancy	¼ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
Osprey													
ACTIVE NEST - No Surface Occupancy	¼ Mile												
ACTIVE NEST - No Human Encroachment	¼ Mile												
Ferruginous Hawk													
ACTIVE NEST - No Surface Occupancy	½ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
Red-tailed Hawk													
ACTIVE NEST - No Surface Occupancy	1/3 Mile												
ACTIVE NEST - No Human Encroachment	1/3 Mile												
Swainson's Hawk													
ACTIVE NEST - No Surface Occupancy	¼ Mile												
ACTIVE NEST - No Human Encroachment	¼ Mile												
Peregrine Falcon													
ACTIVE NEST - No Surface Occupancy	½ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
Prairie Falcon													
ACTIVE NEST - No Surface Occupancy	½ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
Northern Goshawk													
ACTIVE NEST - No Surface Occupancy	½ Mile												
ACTIVE NEST - No Human Encroachment	½ Mile												
Burrowing Owl													
ACTIVE NEST - No Human Encroachment	150 feet												
		= time period for which seasonal restrictions are in place											

DEFINITIONS

Active nest – Any nest that is frequented or occupied by a raptor during the breeding season, or which has been active in any of the five previous breeding seasons. Many raptors use alternate nests in various years. Thus, a nest may be active even if it is not occupied in a given year.

Active winter night roost – Areas where Bald Eagles gather and perch overnight, and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

Human encroachment – Any activity that brings humans in the area. Examples include driving, facilities maintenance, boating, trail access (e.g., hiking, biking), etc.

Hunting perch – Any structure on which a raptor perches for the purpose of hunting for prey. Hunting perches provide a view of suitable foraging habitat. Trees are often used as hunting perches, but other structures may also be used (utility poles, buildings, etc.).

Surface occupancy – Any physical object that is intended to remain on the landscape permanently or for a significant amount of time. Examples include houses, oil and gas wells, tanks, wind turbines, roads, tracks, etc.

CONTACT

For further information contact:

David Klute
Bird Conservation Coordinator
Colorado Division of Wildlife
6060 Broadway
Denver, CO 80216
Phone: 303-291-7320
Email: david.klute@state.co.us

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APPENDIX M

2003 AVIAN RISK ASSESSMENT RESULTS

The 2003 Avian Risk Assessment (ARA) retrofit recommendations reflected the pole configuration as seen in the field, and best industry practices at that time. Certain poles will have changed in the intervening years, as have some best practices. If any poles included in the 2003 ARA have not been addressed, the retrofit approach should be updated to reflect current best practices. Guidance is provided in Chapters 5-8 of the 2019 APP, which emphasize the use of insulation (e.g., conductor covers, cutout covers) over redirection (e.g., triangles). The 2003 ARA remains relevant because: (a) many best practices remain unchanged; and (b) retrofit priorities may also remain valid.