

LAMAR UTILITIES BOARD AVIAN PROTECTION PLAN



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*100 North 2nd Street
Lamar, CO 81052-2505
719-336-7456*

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Section 1. Avian Protection Plan Overview

Lamar Utilities Board (LUB) serves 167 square miles of service area including Lamar and throughout Prowers and Bent Counties (Exhibit 1-1). LUB has approximately 408 miles of overhead distribution lines and 39 miles of overhead subtransmission lines. Both the overhead and underground electric facilities serve approximately 4,249 customers in a safe, reliable, and cost effective manner. Unfortunately, some overhead power lines pose an electrocution or collision hazard to birds. As a result, LUB has incorporated avian protection practices in its construction standards.

This Avian Protection Plan (APP) formalized and enhances past practices of avian protection and incorporates industry best practices for future installations as necessary. This document is passed on and is organized according to the APP Guidelines, a joint guidance document prepared by the Avian Power Line Interaction Committee (APLIC) and the U.S. Fish and Wildlife Service (USFWS) (APLIC and USFWS 2005).

The LUB service area supports an abundance of nesting and migrating birds. Of particular note are the presence of certain birds and bird groups that are most susceptible to electrocution and collision mortality, such as large raptors and large water-associated birds, such as cranes, egrets, and herons. Raptors are most susceptible to electrocution due to their large size, use of utility poles as perches, and potential contact with phase conductors or electrical equipment that can result in electrocution. Large water birds are most susceptible to collision with overhead wires – particularly during periods of low visibility (e.g., fog conditions) – when lines intersect with wetland, open water, or other traditional feeding and roosting sites.

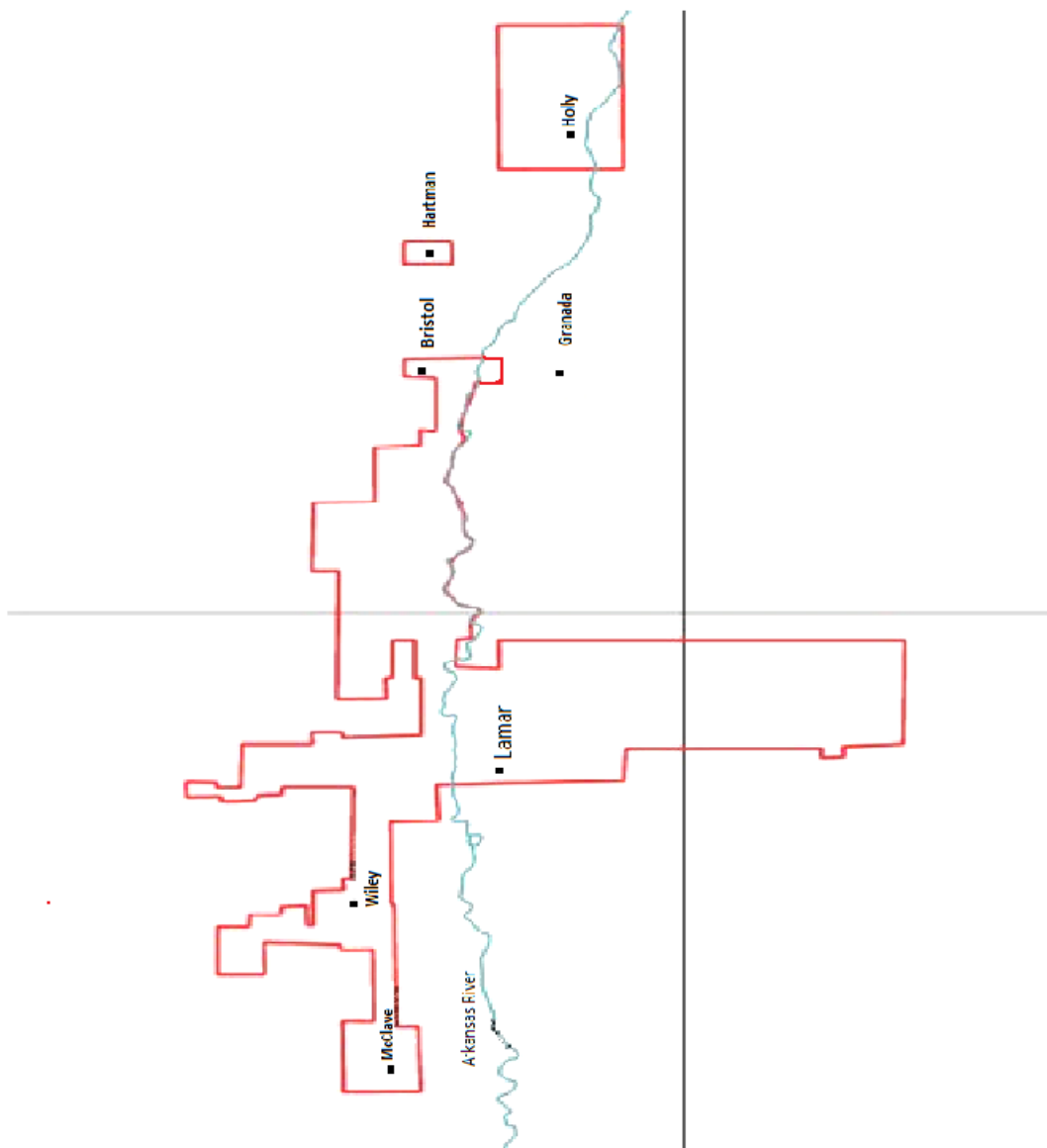


Exhibit 1-1. Lamar Utilities Board Service Area Map

1.1 Intent and Need

Avian mortality from interactions with the human-built environment is a world-wide phenomenon. The causes of incidental avian mortality are numerous, but primary causes are associated with obstacles to bird flight, such as moving vehicles, tall buildings, and radio towers. Overhead electrical facilities also take a toll on bird populations. Inherent in the construction and operation of overhead high-voltage energized facilities is the potential for bird collision with overhead wires and electrocution from contact with conductors or a conductor and ground source. While incidental avian mortality is generally an accepted consequence of the built environment, measures can be taken to reduce the impact of certain structures, such as overhead electric facilities on avian resources; such measures are identified in this plan.

It is not the intent of this Avian Protection Plan to eliminate all potential sources of collision and electrocution within the LUB service area, nor is there any intent to perform a carte blanche assessment or retrofit of LUB facilities. With over 408 miles of overhead power lines in the service area, it is neither economically prudent nor biologically necessary to consider targeting all areas for remedial actions. LUB will continue to address the issue of avian mortality with an approach that takes into account a number of different factors as described in the following sections. Engineering design, assessments, data keeping, and practical experience will all contribute to having a positive impact on the phenomena of avian mortality. This will entail a multi-year effort spanning decades into the future. This is a living document that may be periodically revised based on new information or new developments in avian protection.

The APP will provide a level of compliance with regulatory agencies and their regulatory requirements, such as the US Fish and Wildlife Service and the Colorado Department of Parks and Wildlife (e.g., Migratory Bird Treaty Act, Endangered Species Act).

1.2 Background

When considering avian mortality and the types of electrical facilities used in the industry, (e.g., transmission, subtransmission and distribution lines), distribution lines tend to be responsible for the majority of bird electrocutions and collisions, and this may be due to the sheer number of miles of distribution lines compared to others. Typically, avian risk occurs where 1) poles provide perching opportunities and conductor separation and/or proximity to other energized hardware creates electrocution potential and 2) where overhead wires cross traditional bird use areas and create collision potential. This is found more often than not with distribution facilities.

Even though data is currently maintained on outages caused by avian activity, the exact extent of existing bird mortality within the LUB service area is uncertain. Several issues are relevant to the APP process, including the mechanisms of electrocution and collision mortality as it relates to structures and operations; the costs – both avian and economic of bird-caused power outages; and state and federal laws and regulations that protect birds. The APP was developed to minimize the potential for mortality and comply with state and federal laws and regulations by implementing mortality reduction actions based on reported incidents and through a risk assessment process. It is designed to identify problem areas and implement measures to prevent or reduce mortality associated with new construction and with existing power lines.

1.3 Approach

The approach used in the formulation of this APP focuses on the following two response mechanisms:

- **Reactive** – responds to reported incidents and problem nests.
- **Proactive** – incorporates avian standards in new projects and new structures as required.

These processes are incorporated into the elements of the APP described below:

1.4 Response Procedures for Power Outages and Incidental Observations

Response procedures address *actual* reported bird incidents identified through outage investigations or actual observations. Actual observations are either witnessed contacts by LUB staff or incidental observations reported by LUB staff or the public of possible electrocution or collision mortality incidents. This process includes investigating and reporting procedures, and implementing avian-safe designs.

1.5 Risk Assessment Procedures

The proactive process addresses the *potential* for incidents by assessing mortality potential associated with new projects and selecting the appropriate construction standards. Based on proximity to important bird use areas, habitats, and relevant historical information, environmental staff will assist the project designer to select a route and pole construction that minimized the potential for avian contact.

1.6 Mortality Reduction Actions

Mortality reduction actions are triggered as a result of reported incidents or the risk assessment process for new projects. Mortality reduction actions would include:

- Consideration of alternative routing of new facilities to avoid sensitive or high use areas (e.g., siting new high bird use areas);
- Avian-safe pole configurations for new construction;
- Mortality monitoring by troubleshooter and specialty staff (with expertise in avian species); and
- Retrofitting demonstrated hazard poles and lines to reduce electrocution and collision hazard potential.

1.7 Design and Siting Standards

Where potential problem areas are identified, reducing the risk of electrocution or collision requires modifications to structures and structural design, and consideration for high risk areas during project route siting. To provide guidance on design and siting standards, this APP establishes:

- Siting standards for new power line corridors,
- Avian-safe design standards for new construction, and
- Avian-safe design standards for existing power poles and overhead lines.

1.8 Nest Management

The APP also provides a process for risk determination and if necessary removal or relocation of bird nests. Bird nests often pose no problems for system functioning and reliability and are thus allowed to remain. Occasionally, however, bird nests are constructed in areas that pose either a risk of system malfunction, create maintenance issues, or a risk to the birds themselves. In these cases, LUB may elect to remove or with the assistance of the Colorado Department of Parks and Wildlife, relocate nests. The APP provides guidance on nest detection, risk determination, and an approach for dealing with problem nests.

1.9 Avian Reporting System

The LUB Outage Reporting System (ORS) will be enhanced to provide a more complete avian reporting system, including identification of species, location of the contact or problem nest, and notification for corrective action.

1.10 Training

Successful implementation of this APP will require a thorough understanding of the issues and corresponding protocols. To accomplish this, LUB will develop a training program focusing on staff with direct and indirect implementation responsibilities including, supervisors, first responders, line crews, engineers, and dispatch staff.

1.11 Avian Enhancement Options

LUB has and will continue to promote natural resource protection and actions that benefit local and regional bird populations and other wildlife. LUB commits to a continuing partnership with local agencies and state and federal resources agencies to explore and participate in activities that enhance and restore habitat.

1.12 Program Review and Quality Control and Public Awareness

LUB will institute program review and quality control measures to ensure continuing monitoring of the effectiveness of the APP, and expand its public awareness campaign to provide information on implementation and effectiveness of mortality reduction actions.

1.13 Avian Mortality Associated with Overhead Power Lines

Many bird species are quite adaptable to the presence of man-made structures. Electrical facilities are no exception and in fact in some cases attract bird use by providing perching and nesting structures. However, electrical structures can also pose risk to birds through electrocution by exposure to energized wires and related devices. These and other man-made structures (e.g., buildings, communication towers, etc.) can also act as obstacles to bird flight occasionally resulting in collision mortality or injury.

Electrocution and collision-related bird mortality from power lines and related structures have been documented for many decades. Focusing primarily on raptor mortality, in the mid-1970s the Edison Electric Institute (EEI) developed a manual for addressing raptor electrocution on power lines entitled *Suggested Practices for Raptor Protection on Power Lines* (Miller et al. 1975). Since then, this guidance document has been updated and expanded several times beginning with the 1981 version (Olendorff et al. 1981). Following the formation of the Avian Power Line Interaction Committee (APLIC, which is composed of biologists from the utility industry, the U.S. Fish and Wildlife Service, the Bureau of Land Management, and the National Audubon Society, and updated guidance manual was prepared in 1996 (APLIC 1996) followed by the most recent version entitled *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006).

APLIC also produced a guidance document that addresses bird collisions with power lines entitled *Mitigating Bird Collisions with Power Lines; the State of the Art in 1994* (APLIC 1994).

To supplement these APLIC guidance documents and to provide a standard approach that can be adopted industry-wide, APLIC and the USFWS jointly prepared the Avian Protection Plan (APP) Guidelines (APLIC and USFWS 2005). The intent of the APP guidelines is to provide utilities with a planning approach designed to reduce avian risk as well as reducing risk of enforcement under the Migratory Bird Treaty Act (MTBA). This APP was prepared according to the guidance in the APP Guidelines.

1.14 LUB's Current Avian Protection Plan

LUB has taken steps to minimize avian electrocution on power poles. As far back as 1988 LUB has implemented avian protection measures in its service area such as: incorporating the installation of 10' crossarms, covering middle phase, covering bushings and lead wires to transformers and metering sets, and installing triangular braces between phases on crossarms.

Power line and design characteristics are evaluated with respect to potential avian mortality and other biological resource-related issues during environmental review of all new 69 kV and substation projects.

LUB's present Outage Reporting System (ORS) documents and stores information on not only avian, but also other types of outages (e.g., primary failures, wind or lightning caused, animal and automobile-pole accidents). Both the ORS and the previous outage logging system did not capture information regarding bird species, type of contact (e.g., phase-to-phase or phase-to-ground), or other relevant data. Enhancing the ORS, as described in the APP, will provide distribution operators staff with the ability to collect, store, and monitor specific information about the species and the mechanisms of electrocution and collision mortality that gives the engineering staff data to determine appropriate mitigation.

1.15 Purpose

This Avian Protection Plan (APP) formalized and enhances past practices of avian protection and incorporates industry best practices for future installations as necessary. This document is based on and is organized according to the APP Guidelines, a joint guidance document prepared by the Avian Power Line Interaction Committee (APLIC and the U.S. Fish and Wildlife Service (USFWS) (APLIC and USFWS 2005).

It is not the intent of this APP to eliminate all potential sources of collision and electrocution with the LUB service area, nor is there any intent to perform a carte blanche assessment or retrofit of existing LUB facilities. With over 408 miles of overhead power lines in the service area, it is neither economically prudent nor biologically necessary to consider targeting all areas for remedial actions. LUB will continue to address the issue of avian mortality with an approach that takes into account a number of different factors such as: Engineering design, assessments, data keeping, and practical experience will all contribute to having a positive impact on the phenomena of avian mortality. This will entail a multi-year effort spanning decades into the future. The APP is therefore a living document that may be periodically revised based on new information or new developments in avian protection.

The overall purpose and goal of this APP is to reduce the potential for bird mortality associated with LUB's electrical, subtransmission and distribution facilities by responding to reported incidents of electrocution and collision mortality, by assessing the potential for electrocution and collision-related

mortality, and by implementing specific mortality reduction actions designed to address mortality associated with existing and proposed facilities.

Section 2. Relevant Avian Issues

This section discusses the relevant issues related to avian interaction with power lines that establish the need to prepare this APP and implement mortality reduction actions, including the mechanisms of bird mortality, bird nesting on subtransmission towers and utility poles, power outages and the economic costs of bird interactions, and the regulatory protection provided to most bird species.

2.1 Avian Mortality

The use of power lines by birds is influenced by several ecological factors including 1) the presence and distribution of natural perches (e.g., trees, outcrops); 2) topography; 3) vegetation; and 4) prey abundance and availability. Thus, use of power lines and utility poles by raptors and other large birds is primarily an issue associated with rural areas and open natural or farmland landscapes.

Bird fatalities occur as a result of electrocution through contact with energized phase conductors and associated hardware and collision with wires.

2.1.1 Electrocution

Electrocution is usually associated with distribution poles because they provide perching and sometimes nesting opportunities for birds in close proximity to energized hardware and phase conductors. Certain bird species and species groups are more susceptible to electrocution mortality than others based on their size and behavior that increases their risk of exposure to energized wires and hardware. For example, raptors (e.g., hawks, eagles, falcons, and owls) are more susceptible to electrocution mortality than other bird groups because they will readily perch on utility poles and conductors, exposing them to energized electrical hardware and power lines (see Exhibit 2-1 below).



Exhibit 2-1. Red-tailed hawk perching on cross arm

Electrocution occurs when a bird completes an electric circuit by simultaneously touching two energized conductors or an energized conductor and a grounded part of the electrical equipment. This can occur in several ways, including:

- Phase to phase contact: this can occur when a bird that is perched, landing, or taking off from a utility pole cross-arm comes into contact with two conductors completing an electrical circuit. Where the wrist-to-wrist distance of the bird is greater than or equal to the distance between conductors, phase-to-phase contact is possible and electrocution can occur. Larger birds of prey are at particular risk of this type of electrocution because of their larger wingspan. For example, an adult golden eagle has a wrist-to-wrist distance of approximately 54 inches. If the distance between the conductors is less than 54 inches, upon landing, taking off, or stretching of the wings, the eagle has the opportunity to touch both conductors simultaneously.
- A complete circuit can also occur through simultaneous contact with energized phase conductors and other equipment. Poles with equipment such as transformers, reclosers, sectionalizers, and capacitor banks are at higher risk for electrocution through contact with jumper wires and equipment bushings, particularly where these energized parts are in close proximity to neutral or ground conductors.
- Phase to ground and phase to neutral contact: simultaneous contact with an energized wire and a grounded wire or other grounded device or neutral wire can result in an avian injury or death.

Exhibits 2-2 and 2-3 illustrate the elements of a power pole that are most commonly associated with bird electrocutions.

While a fatality can potentially occur at any unprotected pole, certain configurations have been shown to be more lethal than others (APLIC 2006). Most electrocutions occur on medium-voltage distribution lines (4 to 34.5 kV) where the spacing between conductors is typically less than on higher voltage lines. As noted above, poles with exposed hardware or equipment such as transformers, capacitor banks, jumper wires, cutouts, or lightning arresters tend to be responsible for a disproportionate amount of mortality. Multiple phase distribution lines with conductor separation less than 60 inches, dead-end structure, and corner pole multi-phase configurations are also responsible for a disproportionate amount of mortality (APLIC 2006).

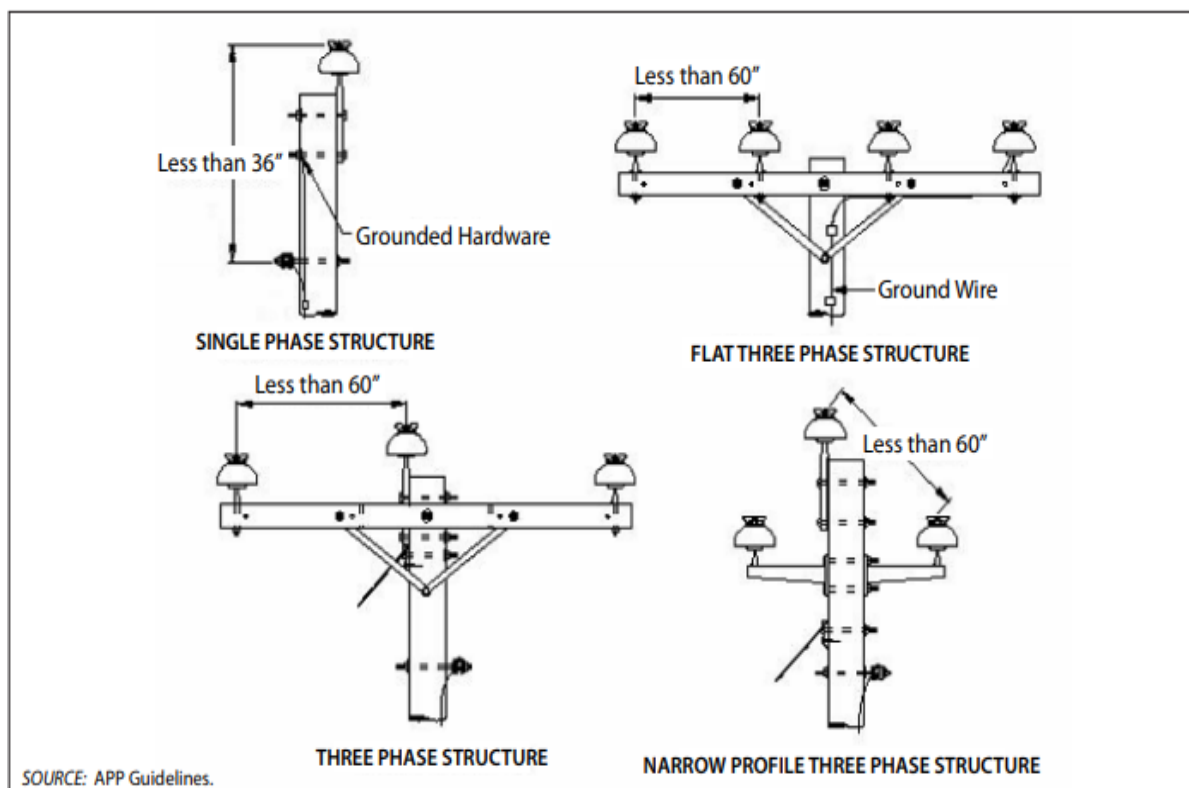
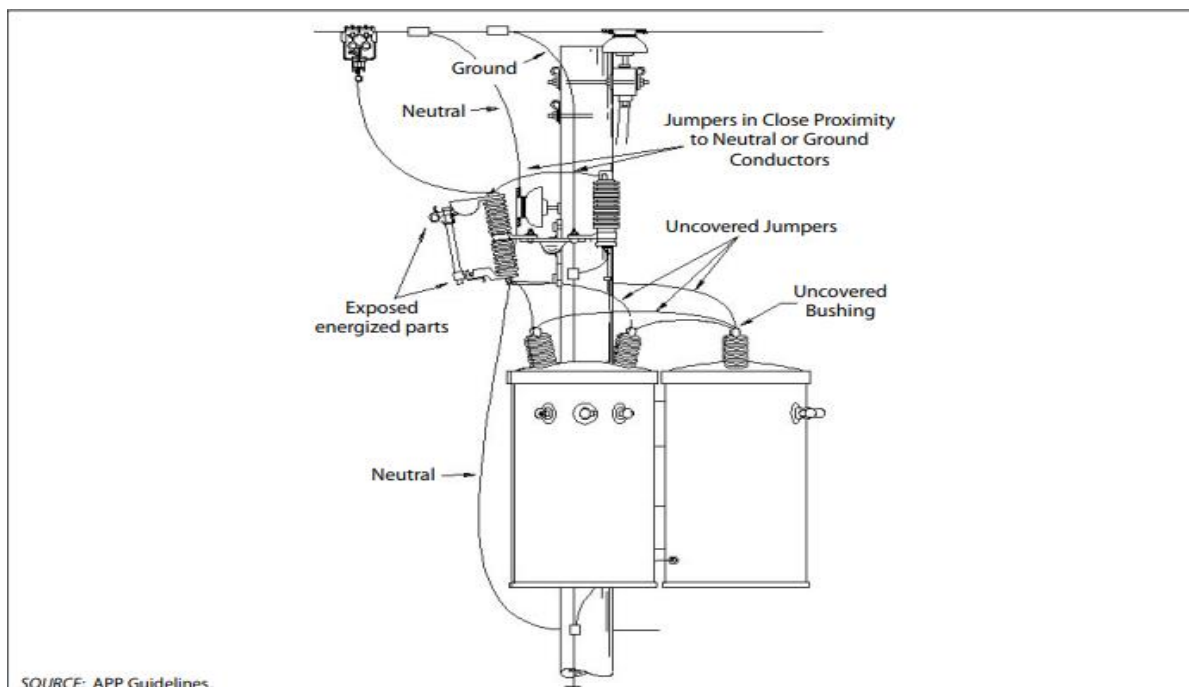


Exhibit 2-2. Examples of avian electrocution risk based on conductor spacing and configuration



SOURCE: APP Guidelines.

Exhibit 2-3. Examples of avian electrocution risk based on type, configuration, and proximity of transformers and related hardware components

2.1.2 Collision with Power Lines

Collision with power lines occurs during circumstances when the lines are not detectable by flying birds. Collisions are influenced by the conductor size (smaller conductor sizes are more difficult to see); the type and behavior of the bird species (large, slower moving birds, species that are active at night, flocking birds, less experienced juvenile birds, and raptors distracted during hunting or defensive maneuvers tend to be more susceptible); and inclement weather (which reduces visibility).

Raptors are more susceptible to collision with power lines when the visibility of the line is partially obscured by vegetation, particularly in areas where small diameter lines cross trees and other tall vegetation and where multiple lines intersect near poles or other raptor perches (Exhibit 2-4). Waterfowl, cranes, egrets and herons, and other water birds are susceptible to collision when lines are placed in the vicinity of traditional use areas such as wetlands and certain types of agricultural habitats – and particularly during inclement weather when visibility is reduced (Exhibit 2-5).



Exhibit 2-4. Conductors in vegetation reduce visibility



Exhibit 2-5. Small diameter conductors reduce visibility particularly during inclement weather

2.2 Bird Nesting

Utility poles and subtransmission towers also provide nesting opportunities for many bird species. Raptors, particularly golden eagle, osprey, and red-tailed hawk often construct nest sites on subtransmission towers, especially in areas where other nesting habitat is limited. Nests are constructed on a variety of flat surfaces depending on the configuration of the subtransmission tower (Exhibit 2-6). Many nests in subtransmission towers pose little risk to the nesting birds or to the functionality of the line. Nests are occasionally constructed in areas that may pose risk to the birds or interfere with access or maintenance of the tower. In these cases, further action such as relocation of the nest is often considered.



Exhibit 2-6. Red-tailed hawk nest on transmission tower

Nests constructed on distribution poles generally pose a greater risk to birds and greater likelihood of power outages. Nests are often constructed on tops of transformers or other flat locations in close proximity to energized conductors and hardware (Exhibit 2-7).



Exhibit 2-7. Red-tailed hawk nest on transformer

2.3 Protected Species

Most native migratory birds are protected under the federal Migratory Bird Treaty Act (MBTA). Bird electrocution and collision mortality associated with aboveground electrical lines have been interpreted by the U.S. Fish and Wildlife Service, the Department of Justice and the United States Courts (U.S. v Moon Lake) as a violation of the MBTA. In addition, several special-status species that are afforded additional protection under state or federal regulation occur within the LUB service area that may be susceptible to electrocution or collision mortality (Table 2-1). Electrocution or collision mortality of state or federally listed species may be considered take pursuant to the state or federal endangered species acts and in the absence of required permits may constitute violations of one or both acts.

2.3.1 Federally-Listed Threatened/Endangered Species

Federally-listed threatened/endangered (T/E) species are protected by the ESA and MBTA. The following list identifies species in the LUB service territory that are listed as threatened (T) or endangered (E) by the U.S. Fish and Wildlife Service or by the State of Colorado wildlife agencies.

Table 2-1 Threatened or Endangered Species in Lamar Utilities Board Electric Service Territory

Species	Federal	Colorado
Whooping Crane	E	E
Least Tern	E	E
Southwestern Willow Flycatcher	E	E
Plains Sharp-tailed Grouse	E	E
Piping Plover	T	T
Mexican Spotted Owl	T	T
Bald Eagle	E	T
Golden Eagle	E	T
Burrowing Owl	E	T
Lesser Prairie-Chicken	E	T

It is a violation to injure, kill, or otherwise harm federally-listed species. It is also a violation to **disturb** a federally-listed species. Active nests are specifically protected. Inactive nests are not specifically protected because many bird species build new nests every year; however, the species' nesting habitat is protected.

The ESA protects habitat, so federally-listed species' nests along right-of-way are protected. Special permits can be obtained under extraordinary circumstances to perform activities that might affect federally-listed species (Special Purpose Relocation-Expedited). These permits are highly specific, of short duration, and handled on a case-by-case basis, should the need arise.

2.3.2 Bald and Golden Eagles

Bald and golden eagles are protected by federal (and state) laws including the Bald and Golden Eagle Protection Act (BGEPA) and MBTA. Both inactive and active eagle nests are protected, and it is a violation to disturb or harass eagles. Special permits can be obtained under extraordinary circumstances to perform activities that might affect these species (Eagle Take Permit). These permits are highly specific, of short duration, and handled on a case-by-case basis, should the need arise.

In general, the LUB service territory will experience an influx of bald and golden eagles (Exhibits 2-8 and 2-9) during the winter months. In the summer, many bald eagles return to the northern latitudes to breed. Golden eagles are year-round Colorado residents and found to be most common in summer months. It is easy to discern the difference between adult bald and golden eagles because bald eagles have a distinctive white head and tail (Exhibits 2-8 and 2-9 respectively).



Exhibit 2-8. Adult Bald Eagle



Exhibit 2-9. Adult Golden Eagle

However, this distinction is not apparent with immature birds. Bald eagles take five years to reach maturity and during this period they do not have white heads or tails and young bald eagles may appear to be very similar to golden eagles. Note the immature bald eagle shown in Exhibit 2-10 lacks a yellow beak, feet and eyes of an adult bird.



Exhibit 2-10. Immature Bald Eagle Lacking a White Head and Tail

Section 3. Regulatory Framework

3.1 Applicable State and Federal Regulations

Most birds are protected under one or more state or federal regulations. The following state and federal laws and regulations are directly applicable to the issues of avian mortality from electrocution or collision and nest management on utility poles and towers

3.1.1 Migratory Bird Treaty Act (MBTA)

The MTBA (Title 16, United States Code [USC], Part 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the (former) Soviet Union and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and

bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CRR 21, 50 CFR 10). Most actions that result in taking or in permanent or temporary possession of a protected species constitute violations of MBTA.

The MBTA is the overriding federal regulation that has guided the development of bird protection guidelines, including the APP Guidelines. Most birds receive protection under the MBTA; however, the Act is not regularly enforced with respect to power line-associated bird mortality due to ongoing efforts on the part of utilities to take corrective actions to minimize the potential for mortality. The U.S. Fish and Wildlife Service actively engages the electric utility industry to reduce the incidental take of protected birds, and reserves the option of seeking prosecution when deemed necessary.

The human-built environment is an inescapable reality for most birds and a circumstance that poses a variety of risks as well as some benefits to some species. The MBTA has been interpreted to cover bird mortality that could occur as a result of construction or operation of virtually any man-made structure. However, while most bird mortality goes undetected and undocumented, mortality associated with certain industries is more visible and in some cases has been documented for many years. Bird electrocution on power poles has been documented and studied for over 100 years (California Energy Commission 1995). It is considered a particularly important problem because it affects mainly birds of prey, species that breed at relatively low densities and that could suffer significant regional population declines as result of electrocution events. As a result of this more visible and potentially more biologically significant issue, the USFWS has and likely will continue enforcement of the MBTA where raptor mortality has been reported and where the utility is not in compliance with standard practices to reduce electrocution and collision mortality.

3.1.2 Federal Endangered Species Act

The USFWS administers the federal Endangered Species Act (ESA) as it relates to terrestrial wildlife. The ESA requires USFWS to maintain lists of threatened and endangered species and affords substantial protection to listed species. The USFWS can list species as either endangered or threatened. An endangered species is at risk of extinction throughout all or a significant portion of its range (ESA Section 3[6]). A threatened species is likely to become endangered within the foreseeable future (ESA Section 3[19]). Section 9 of the ESA prohibits the take of any fish or wildlife species listed under the ESA as endangered and most species listed as threatened. Take, as defined by the ESA, means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Harm is defined as “any act that kills or injures the species, including significant habitat modification.”

The ESA includes mechanisms that provide exceptions to the Section 9 take prohibitions. For non-federalized projects, Section 10 allows for the issuance of a 10(a)(1)(b) permit to take covered species during otherwise lawful activities with approval of a habitat conservation plan. In the absence of permits or authorization by the USFWS, fatality of federally listed species from electrocution or collision could potentially result in an enforcement action under the federal ESA.

3.1.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Under this act, it is a violation to “...take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle

commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof....” Take is defined to include pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, and disturbing.

3.1.4 State-Listed Threatened/Endangered Species

State-listed threatened/endangered species are protected under each state’s respective laws and regulations. Individual birds are protected as well as their eggs and nests. No additional state permit is required in Colorado to remove an active nest assuming the appropriate federal permit is obtained.

Section 4. Description of the LUB Service Area

This section describes the LUB service area in terms of the landscape and land uses, bird populations and distribution, and the LUB electrical subtransmission and distribution system network.

4.1 Landscape Characteristics

The LUB service area extends from Las Animas west to Holly east, and from Big Bend north to the AT & T Tower south of Lamar (Exhibit 4-1).

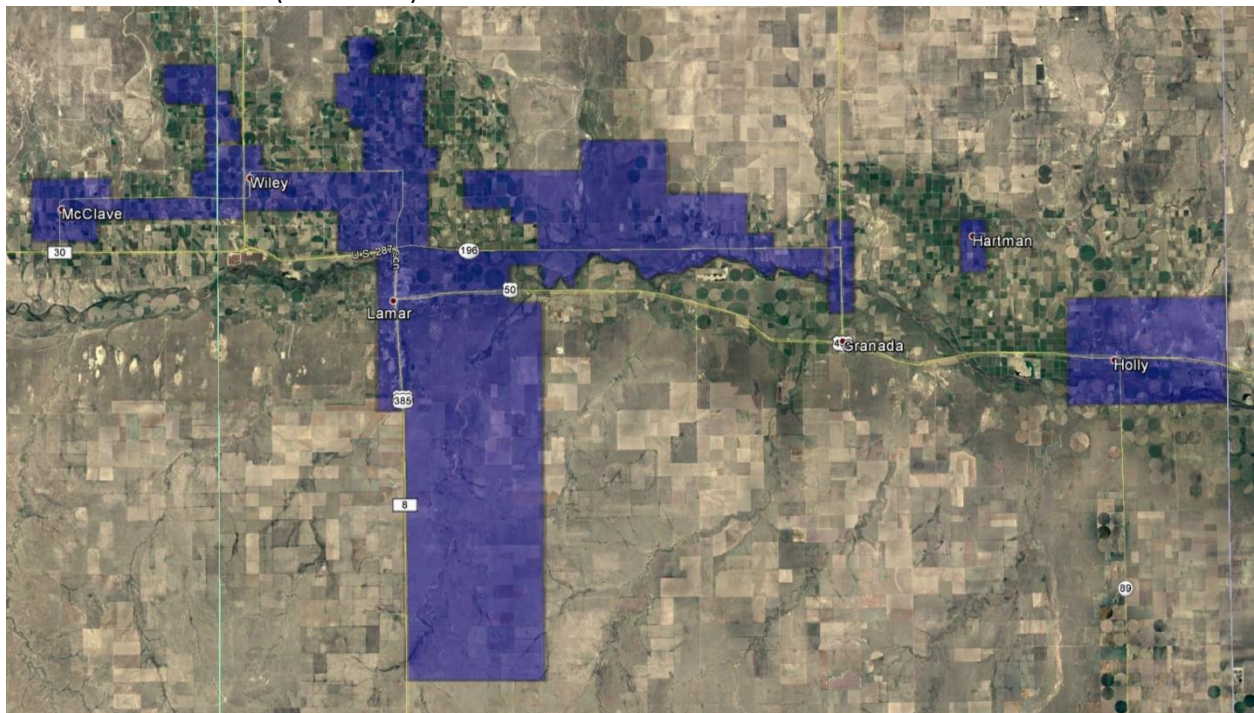


Exhibit 4-1. Lamar Utilities Board Service Area

- Irrigated cropland. This type is defined as areas that are dominated by crop patterns that involve annual cultivation (Exhibit 4-2).
- Irrigated cropland/irrigated pastureland. This type is defined as areas that are dominated by a mixture of irrigated croplands and a large percentage of irrigated pasture (Exhibit 4-3).

- Uncultivated grasslands. This type is defined as uncultivated annual grassland habitat and vernal pool grasslands that are regularly or irregularly grazed by livestock and that have retained most topographical and other natural features (Exhibit 4-4).
- Woodlands and grassland. Elm and cotton wood trees occur primarily near creeks and water ways (Exhibit 4-5).
- Watercourses and Riparian Systems. Mainly occur along the Arkansas River, lakes, ponds and creeks (Exhibit 4-6).
- Low Density Urban. Low density urban development occurs inside and outside the Lamar city limits (Exhibit 4-7).



Exhibit 4-2. Irrigated cropland



Exhibit 4-3. Irrigated cropland/pastureland



Exhibit 4-4. Uncultivated grasslands



Exhibit 4-5. Cottonwood land and grassland



Exhibit 4-6. Watercourses and riparian vegetation - river



Exhibit 4-7. Low density rural residential

4.2 LUB Electrical Transmission and Distribution System Network

The LUB electrical, subtransmission, and distribution system includes the following components:

- 39 circuit miles of overhead 69 kV sub-transmission
- 408 circuit miles of overhead distribution (4kV and 24.9 kV)
- 6 electrical substations
- 11,000 sub-transmission and distribution poles

LUB typically uses cross arm, standoff brackets, and line post insulators for its overhead subtransmission and distribution lines. A 10 foot-long cross arm is typically used for poles with and without equipment.

Exhibits 4-8 through 4-15 illustrate some of the more typical distribution pole and hardware configurations within the LUB service area.



Exhibit 4-8. Three phase, two on one side



Exhibit 4-9. Three phase, center kingpin



Exhibit 4-10. Three phase, one center, fiberglass crossarms



Exhibit 4-11. Double crossarm, three phase each; upper with center, lower with two on one



Exhibit 4-12. Double crossarm, three phase corner pole



Exhibit 4-13. Single transformer bank



Exhibit 4-14. Double transformer bank



Exhibit 4-15. Triple transformer bank

Section 5. Avian Protection Plan

5.1 LUB Policy

The LUB will conduct its business affairs and operation in a manner that reduces adverse environmental impact, reduces pollution, and enhances resource conservation and stewardship.

5.2 Approach and Organization

The approach used in the formulation of this APP is a process of assessment and implementation of mortality reduction actions. Assessment is accomplished through standard observation and/or investigation, monitoring, and data collection procedures. Based on assessment results, mortality reduction actions are implemented according to the following two response mechanisms (Exhibit 5-1).

- **Reactive** – responds to reported incidents and problem nests. LUB’s current program consists of responding to power outages, investigating the cause of the power outage, and if the result of a bird electrocution, implementing retrofitting measures to reduce the potential for future incidents at that specific location. This program will be expanded to include assessment of surrounding power poles from where the avian-caused power outage occurred. It will also include examination of additional mortality observations reported by field staff and the public.
- **Proactive** – responds to new projects and new structures with avian-safe standards. Based on known avian use and habitat data, the appropriate construction standards will be implemented for all projects (includes new projects and reconstruction) to minimize the potential for avian mortality. Alternate routes for new lines will be considered when available to avoid specific habitats.

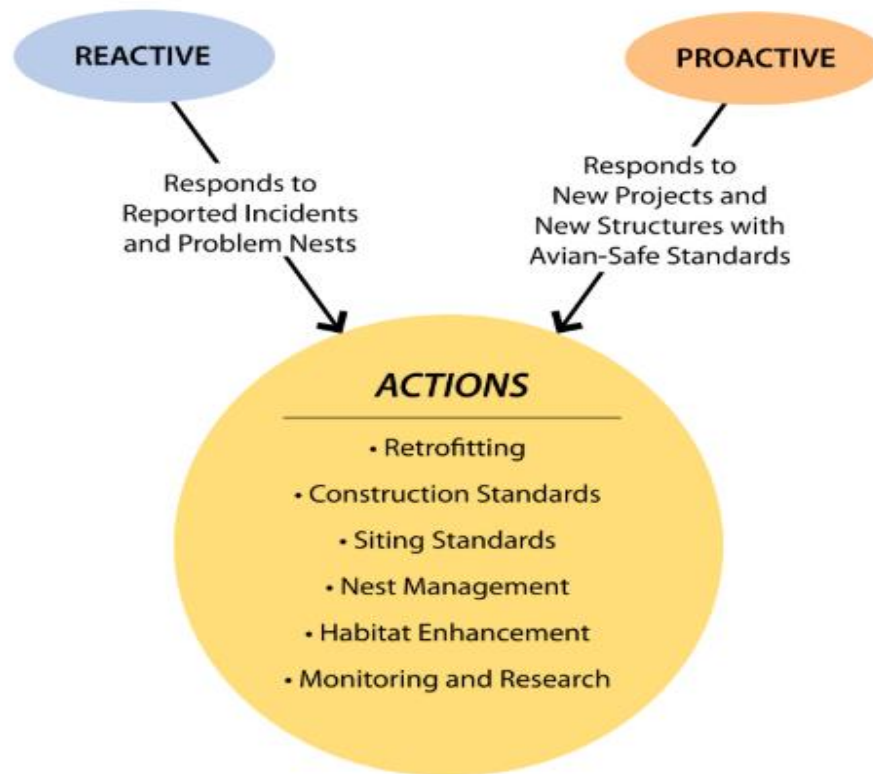


Exhibit 5.1. Plan Implementation Approach – Response Mechanisms

5.3 Organization

The APP is organized into the following sections:

Response procedures for power outages and incidental observations. Describes the procedures for responding to and investigating the cause of avian-related power outages and incidental observations of bird injury or mortality.

Risk assessment. Describes the procedures used to evaluate the risk of future avian contact when planning for new facilities or reconstruction of existing facilities.

Mortality reduction measures. Describes the mortality reduction actions that may be implemented based on an assessment of reported incidents and the results of the risk assessment procedures.

Construction design and siting standards. Describes the construction design and siting standards that may be used to reduce the potential for electrocution and collision mortality through siting of new power line corridors, design standards for new construction, and design standards for retrofitting existing power poles.

Nest management. Describes assessment procedures and additional mortality reduction actions that will be implemented to address bird nests on pole or tower structures.

Avian reporting system. Describes the process of reporting, processing, and managing data collected through implementation of the APP.

Training. Describes the framework for a staff training program.

Program review and quality control. Outlines program review and quality control procedures.

Public awareness. Describes the potential for public awareness of avian mortality reduction actions implemented by LUB.

Key contacts. Lists a variety of local regulatory and support contacts.

5.4 Response Procedures for Avian-caused Power Outages and Incidental Observations

Response procedures address *actual* reported bird-caused outages or incidental observations. Incidental observations refer to observations made by LUB staff or reported to LUB of a dead or injured bird – or bird remains that suggest a possible electrocution or collision fatality. The process includes the following steps:

- Respond to power outage and determine if it is bird-related, and respond to reports of incidental mortality observations.
- Determine the species or bird group.
- If state or federally listed species or banded bird, contact the local Colorado Division of Parks and Wildlife office.
- Investigate the possible cause of the injury or fatality.
 - o Take photographs of the incident
 - o Document location of the bird contact (pole ID#)
 - o Document visible injuries
 - o Based on location (i.e., beneath pole, mid-span) and type of injuries, record the possible cause (e.g., electrocution, wire collision, vehicle collision, predation, shot, etc.)
- Complete Avian Incident Report
- Submit completed Avian Incident Form to the Superintendent

5.5 Risk Assessment

With over 408 miles of overhead distribution and subtransmission lines in the service area, it is neither economically prudent nor biologically necessary to consider targeting all areas for remedial actions. Thus, the risk assessment process under this APP is currently limited to new project routes and reconstruction efforts along existing routes. Establishing risk assessment procedures is a proactive approach to guiding management efforts and focusing remedial actions into areas with the highest potential for avian incidents.

5.6 Mortality Reduction Actions

The mortality reduction actions that will be implemented based on an assessment of reported incidents and the results of the Predictive Analysis and Risk Assessment procedures.

Mortality incidents reported as a result of power outages or through incidental observations are immediately reviewed. If the review indicates the cause is related to an unprotected power pole or conductor visibility issues, mortality reduction actions (i.e., retrofitting poles or installation of flight diverters) will be implemented accordingly. Adjacent pole retrofits will be considered on a case-by-case basis.

As noted above, once completed the Risk Assessment can be used to inform, strategize, and direct mortality reduction actions. This is a proactive strategy designed to minimize risk by targeting remedial actions into areas identified as having the greatest risk. Actions may include:

- Alternative siting of new facilities to avoid sensitive or high use areas
- Avian-safe pole configurations
- Retrofitting distribution poles to reduce electrocution hazard
- Installing flight diverters to reduce collision hazard

Each action is described below and implementation sequence of each action is illustrated on Exhibit 5-2.

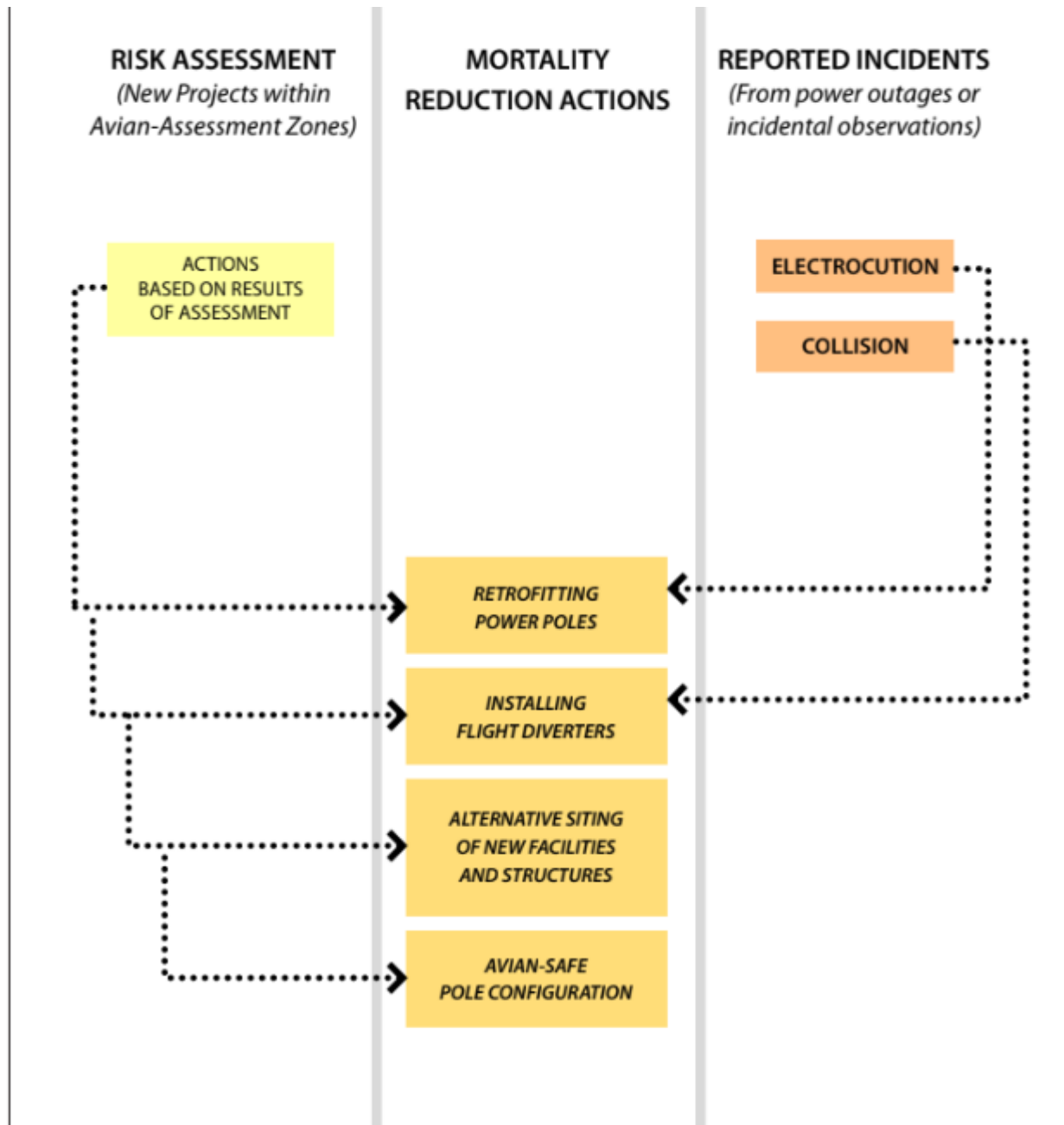


Exhibit 5-2. Implementation of Mortality Reduction Actions

5.7 Construction Design and Siting Standards

This section describes and illustrates the design and siting standards that can be used for new and retrofit construction in avian assessment zones. As discussed in Section 2, avian risk occurs where 1) poles provide perching opportunities and conductor separation and/or proximity to other energized hardware create electrocution potential and 2) where power lines cross historical bird use areas and create collision potential. To reduce this potential requires modifications to structures and structural

design, and consideration for sensitive areas during project route siting. This section describes how this can be achieved by implementing the following:

- Siting standards for new power line corridors,
- Avian-safe design standards for new construction, and
- Avian-safe design standards for existing power poles and overhead lines.

5.8 Nest Management

Utility poles and transmission towers often provide nesting substrate for a variety of bird species. In some areas, these artificial landscape features provide valuable nesting habitat for birds, particularly raptors. They often pose no problems for system functioning and reliability and are thus allowed to remain. Occasionally, however, bird nests are constructed in areas that pose either a risk of system malfunction or a risk to the birds themselves. In these cases, LUB will notify the local Colorado Division of Parks and Wildlife for possible removal or relocation of the nests.

5.9 Avian Reporting System

The Avian Reporting System is the process by which all avian incidents, nest sites, and monitoring data are recorded and cataloged into the data base. It includes the following three components:

- Detection
- Investigation, and
- Reporting

5.9.1 Detection

The detection of avian fatalities occurs through the investigation of avian-caused power outages and incidental observations. The detection of nest sites occurs through incidental observations and through monitoring efforts.

5.9.2 Investigation

Once detected, field staff will record the circumstances associated with dead or injured birds. Data will be recorded on standardized field forms (See Reporting below).

A site assessment will be conducted in response to all power outages to determine the cause and circumstances involved. If the cause is bird-related, the assessment will include a determination of bird species; the types of injuries, the pole type and configuration; the specific cause of the fatality if possible; and other relevant data. To enhance the probability of incidental detections, all field staff will be directed to be alert for dead or injured birds in the vicinity of all LUB facilities.

Data collection activities associated with assessments conducted within avian assessment zones will provide information on site conditions, avian use and behavior, and mortality risk within these zones. These data can be used to determine the need for remedial measures on existing structures and assess the need to explore siting alternatives for new construction.

Information on all bird nests will also be recorded as described under Nest Management and a determination made regarding the potential risk posed by the presence of the nest to system function and hazard to the nesting birds.

5.9.3 Reporting

Once a fatality or injury has been detected and investigated, the incident will be reported by submitting an Avian Incident Form (Exhibit 5-1) to the staff responsible for maintaining the data base. Information will be entered into the ORS data base and then forwarded to staff responsible for making decisions regarding remedial actions.

Nest data are recorded on the Bird Nest Report form (Exhibit 5-2). This information will also be entered into the ORS data base and then forwarded to staff responsible for making decisions regarding remedial actions.

5.10 Training

Successful implementation of this APP will require a thorough understanding of the issues and corresponding protocols. To accomplish this, LUB will develop a training program focusing on staff with direct and indirect implementation responsibilities including supervisors, first responders, field crews, engineers, dispatch staff, and design staff.

The training program will consist of the following elements:

- Introduction and description of the issue
- LUB Policy
- Identification of bird-related issues – electrocution and collision mechanisms
- Description of avian resources within the service area and species most susceptible to electrocution and collision mortality
- Discussion of state and federal regulations that protect birds, legal implications, and the need for compliance
- Construction and design standards and retrofitting standards designed to reduce mortality
- Protocols of plan implementation including assessing problems, proactive approaches, and recording/reporting data
- Discussion of each of the APP elements
- Responsibilities of staff to implement the APP

5.11 Program Review and Quality Control

The primary goal of this APP is to reduce electrocution and collision-related avian mortality and injury associated with LUB's above ground facilities. To do so, in addition to the monitoring, reporting, and management measures described above, LUB will institute program review and quality control measures to ensure effectiveness of the APP. This will include the following elements:

- Responsibility for program review and quality control will be assigned to senior staff in LUB's management group.

- Staff will annually review the mortality data base, submitted field forms, monitoring results, and associated mortality reduction actions to ensure that the processes described above is adhered to, the data base is up-to-date, information is recorded accurately, and mortality reduction actions are implemented. The staff person will report the results of the review and recommend remedial actions needed.
- Sites that have been subject to retrofitting, nest protection/avoidance measures, etc. will be monitored to assess their effectiveness and need for maintenance.
- LUB will coordinate with the USFWS representatives periodically to review the program and its effectiveness.

5.12 Public Awareness

LUB will include avian protection in its ongoing public awareness campaign. The APP will be initially highlighted as a formalized program designed to reduce avian mortality and will describe the management efforts taken to reduce avian incidents. Ongoing public awareness will target the effectiveness of the program including retrofitting actions and ongoing monitoring to detect problem areas. There may be opportunities to increase public awareness of the Avian Protection Plan via the internet and on the LUB's website.

5.13 Key Resources

As noted above, LUB will partner with local, state, and federal agencies in its efforts to successfully implement this APP. Some of the key resources include the following:

Federal Agencies

U.S. Fish and Wildlife Services
9297 S. Wadsworth Blvd.
Littleton, CO 80128
720-981-2777

State Agencies

Colorado Division of Wildlife
Lamar, CO 81052
719-336-6600

Colorado Parks and Wildlife
6060 Broadway
Denver, CO 80215
303-291-7227

Exhibit 5.1**Lamar Utilities Board (LUB) Avian Incident Report****Date Found:** _____ **Name of Staff:** _____**Location**

Line (Circuit) Name: _____ Segment: _____ Voltage: _____ Pole/Tower ID: _____

Pole Type and Configuration: _____**Electrical parts** (circle):

Transformers Capacitor Cutouts Arresters Jumper Wires

Other: _____

General Land Use (circle one):

Farmland Rangeland Rural Residential Urban Urban/Rural Interface

Location of Bird Relative to Pole or Line

Beneath Pole: _____ Beneath mid-span of Line: _____ Distance in feet from pole or line: _____

Species or Bird Group (note species if known, otherwise circle the most representative category)

Species (if known): _____

Hawk	Eagle	Falcon	Owl	Raptor	Duck
Goose	Waterfowl	Crane	Heron/Egret	Water bird	Crow/Raven
Magpie	Passerine	Large Unidentified Bird	Small Unidentified Bird		

General Condition of Bird (circle one)

Fresh Partially Decomposed Mostly Decomposed Bones and Feathers Only

Injuries (circle one)

Burn marks Dismembered Holes Trauma Non Visible

Describe: _____

Likely Cause of Death (circle one)

Electrocution Wire Collision Vehicle Collision Shot Undetermined

Comments: _____

Exhibit 5.2**Lamar Utilities Board Bird Nesting Record**

Date:_____ **Name of Staff:**_____

Location

Line (Circuit) Name:_____ Segment:_____ Voltage:_____ Pole/Tower ID:_____

Crossroads or other specific location information:_____

General Land Use (circle one)

Farmland Rangeland Rural Residential Urban Urban/Rural Interface

Description of location of nest on tower or pole:_____

Species or Bird Group (note species if known, otherwise circle the most representative category)

Species (if known):_____

Hawk Eagle Falcon Owl Raptor Crow/Raven
Magpie Passerine Large Unidentified Bird Small Unidentified Bird

Condition of nest (circle one)

Currently in use Intact Partially Deteriorating Mostly Deteriorating

Comments:_____

Eggs or Nestlings Observed:_____

Description of Nesting History at this Location:_____

Risk to Birds/System and Recommended Actions (circle one)

No risk Not Imminent Risk Imminent Risk Emergency

Comments:_____

Section 6. Works Cited

Avian Power Line Interaction Committee. 1994. Mitigating Bird Collisions with Power Lines: the State of the Art in 1994. (<http://aplic.org>)

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Avian Power Line Interaction Committee. 2006. Suggested Practices for Raptor Protection on Power lines: The State of the Art in 2006. (<http://aplic.org>)

Avian Power Line Interaction Committee and U.S. fish and Wildlife Service. 2005. Avian Protection Plan (APP) Guidelines. (<http://aplic.org>)