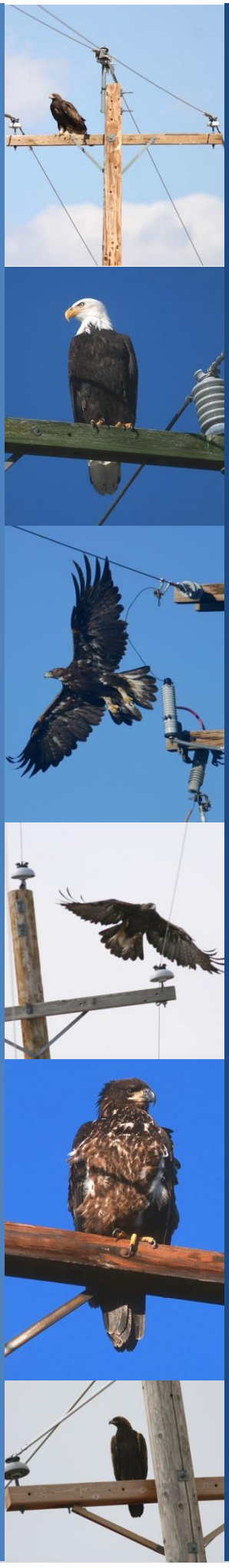
Avian Power Line
Interaction Committee

DEVELOPING POWER POLE MODIFICATION AGREEMENTS FOR COMPENSATORY EAGLE MITIGATION FOR WIND ENERGY PROJECTS

Considerations and Resources for Wind Energy Operators, Electric Utilities, and Agencies when Developing Agreements for Power Pole Modifications as Mitigation for Eagle Take

June 2014



AVIAN POWER LINE INTERACTION COMMITTEE (APLIC)

Developing Power Pole Modification Agreements for Compensatory Eagle Mitigation for Wind Energy Projects

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Table of Contents

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Introduction

The U.S. Fish and Wildlife Service (USFWS) Eagle Conservation Plan Guidance (ECPG) details the USFWS's current guidelines regarding minimizing impacts to eagles. Eagle take permits issued by USFWS require compensatory mitigation to offset eagle take. Actions to retrofit, reframe, or rebuild power poles to avian-safe designs (often collectively referred to as power pole "retrofitting" or "modifications") have been identified by USFWS as an option for offsetting eagle take occurring elsewhere (e.g., at wind facilities). This document has been developed by representatives of the electric utility and wind industries, working through the Avian Power Line Interaction Committee (APLIC), to identify practical considerations that should be taken into account when developing a pole modification program to offset eagle take at a wind facility.

Per the USFWS Wind Energy Guidelines (USFWS 2012) and Eagle Conservation Plan Guidance (USFWS 2013), wind energy operators (WEO) should initiate discussions with the USFWS regarding eagle take at wind energy project(s). The WEO may submit an application to USFWS for an incidental take permit. The application would include an Eagle Conservation Plan (ECP) developed by the wind company that includes a project-specific impact/risk assessment (using field studies, risk models, etc.) and mitigation levels calculated using the Resource Equivalency Analysis (REA). The REA models eagle mortality risk and is used to determine the potential amount of eagle mortality and compensatory mitigation needed to offset that mortality. If the wind energy operator and the USFWS agree to power pole modifications (PPM) as compensatory mitigation, the wind company can negotiate an agreement directly with an electric utility company. The utility company may also choose to apply for an eagle take permit concurrently with the WEO permit application. For electric utility and wind companies working together on a joint project/agreement to modify power poles, submitting applications concurrently may facilitate batch processing of the permits by USFWS. Electric utilities may also apply for an eagle take permit independent of a WEO agreement; in such cases the electric utility would be seeking a take permit for its electrocution/collision mortality, and would follow the ECPG to calculate anticipated mortality levels (using the REA) and quantifying mitigation (e.g., number of poles to retrofit/modify).

This document provides considerations and a series of possible steps for the WEO and electric utility to assess when developing an agreement for power pole modifications as a mitigation measure. It also identifies coordination points with the USFWS. Section 1 of this document identifies considerations to assess/discuss among collaborating parties. Section 2 contains an outline and flowchart detailing the steps/process in which such a program could be implemented. Appendix B contains these steps in a spreadsheet checklist format that can be used on an actual project. The sections within this document are complimentary and intended to be used together. Consequently, links have been embedded within the document between sections. For example, Section 1 contains questions that may be considered and the corresponding steps of the checklist in Section 2 provide more detail addressing these questions. Readers are encouraged to review the document in its entirety and use the links between corresponding sections.

This document was developed by APLIC-member companies representing both electric utility and wind energy industries. Expertise from APLIC-member utilities regarding the development of power pole modification programs, and associated logistical considerations, were used to develop the guidance in this document. This document provides a framework but is not intended to be a prescriptive guide. Much of this is subject to the situations and the resulting discussions and agreements between the Utility and WEO, and between the USFWS and WEO. Individual companies should assess their local situations and develop programs accordingly.

The following are key considerations that all parties (e.g. wind company, electric utility, USFWS) may assess in the development of a pole modification agreement for compensatory mitigation at a wind facility. Communication during the planning and implementation stages will be imperative to ensure that all parties understand and agree to various aspects and commitments of the agreement. Both the wind company and electric utility should conduct due diligence to avoid future implementation problems. **APLIC strongly recommends that only utilities with implemented Avian Protection Plans (APPs) participate in these agreements.** This will provide some protections/assurances to all parties that: (1) the utility is aware of current and effective avian protection techniques and technologies; (2) the utility is able to accurately identify areas with suitable poles for modification; (3) the utility is responsible for addressing its own electrocution and collision mortality poles; and (4) the poles identified for compensatory mitigation are indeed additive to existing efforts identified in the utility's APP. As an agreement is negotiated between the wind company and electric utility, roles and responsibilities should be clearly defined for various aspects including, but not limited to, risk assessments, pole modifications, inspections, maintenance, follow-up monitoring, and associated costs. Section 1 contains questions that are examples of items to be considered and discussed by collaborating parties.

Section 1: Key Considerations

Utility Avian Protection Plan and Risk Assessment Methods (*See Checklist # 1, 3, 5, 8, 11*)

Does the Utility have an implemented *Avian Protection Plan*? *Note: APLIC strongly recommends that the Utility have an implemented APP.*

How does the Utility identify eagle risk poles?

- Does the Utility have a risk assessment methodology? See the APP Guidelines and other APLIC guidance documents for information on risk assessment methodology.
- What specific criteria are used to identify high risk poles?
- Is the risk assessment appropriate to the eagle species and location targeted? For example, differences may occur among risk factors based on species, habitat, and other local conditions. Is local data available to use in risk assessments?

Does the REA model include data, where available, that is applicable to the regional eagle population, local factors influencing electrocution risk, and local mortality rates? Note: these variables likely differ between golden and bald eagles, and within different geographic areas; use of local data, where available, will likely provide more accurate results and better target mitigation efforts. This data may be available from USFWS, state wildlife agencies, and other electric utilities in the area.

Does the Utility retrofit or otherwise modify its own mortality poles to meet avian-safe designs? Do the poles being considered for modification as compensatory mitigation by the wind company meet high risk criteria, but have not yet resulted in a documented eagle mortality?

Communication and Coordination *(See Checklist # 1, 2, 3, 4, 5, 6, 7, 10, 13, 16, 17)*

Are the companies working with the appropriate *regional USFWS office*?

Have appropriate personnel within both the wind and utility companies been engaged in discussions? Appropriate groups may include executive management or other leadership, finance, contracts, environmental, procurement, logistics, operations, etc.

Does the agreement require approval of the local public service commission or related regulatory authority in order to receive third party funds? Will the Utility be levied additional tax rates on received funds?

Pole Retrofitting Methods *(See Checklist # 8, 9, 10, 11, 14, 15, 18, 19)*

Will the poles be addressed by installation of *bird protection covers, reframing, pole replacement, removing idle facilities, undergrounding,* or a combination of techniques? See Appendix A for examples of pole modifications. *Note: APLIC does not recommend the use of perch discouragers as a retrofitting tool to reduce electrocutions (see 2006 Suggested Practices).*

Does pole work charged to the wind company exclude pole maintenance or upgrades that are not necessary for making the structure *avian-safe*?

Is the cost per pole appropriate to the work being conducted? In general, installation of *insulator covers* costs less than reframing a pole. Installing covers on *equipment* poles (e.g., *transformers* and associated equipment) costs more than installing insulator covers on non-equipment poles. Pole reframing may necessitate pole replacement, depending on pole height, clearances, joint use, etc.

Does the cost accurately reflect all aspects of the contract (e.g., risk assessments, surveys, planning labor, training, pole modifications materials and labor, inspections, reporting, maintenance, taxes, etc.)?

Will cost estimates be used or will the companies "square up" on actual costs after work is completed?

What is the timeframe in which the work will be done? Have timeframes been identified for the various steps (e.g., job preparation, training, installation, monitoring, etc.)?

Has the electric utility company provided a copy of its avian protection standards (or those standards that may be used) to the wind company? Do these standards meet or exceed the recommendations in current APLIC guidance (see *2006 Suggested Practices*)?

If retrofitting products (e.g., covers) are to be installed, have the wind and electric utility companies both reviewed the products to be used, including appropriate testing data? Are the products approved by the Utility's standards group? Does the Utility already have experience with these covers and their effectiveness and durability in the field?

Will an inspector be used to verify completeness of retrofit and proper installation of products? Does the inspector have specific training in avian protection retrofitting and familiarity with the products being used?

Longevity and Maintenance of Retrofits *(See Checklist # 12, 19, 20, 21)*

What is the agreed upon duration for maintenance of pole modifications? The longevity of remedial actions will vary with the type of work (e.g. covers versus reframing), products used (e.g. differences between various cover designs and manufacturers), and local conditions (e.g. impacts of wind, UV, salts, contamination, etc., on cover-up products or pole life). PPM longevity should be assessed locally and

included as part of the agreement. The longevity should be estimated based on action type, performance history under similar environmental conditions for after-market bird protection product (if used), and post-modification inspection to verify remedial actions are complete and products properly installed. Because PPM longevity is a key factor in the USFWS's assessment, efforts made to increase the expected longevity of the PPM can provide benefit for a greater duration, which can be especially important for 30-year duration permits.

Do the REA model calculations include appropriate longevity data for the type of remedial action(s) being used?

Will poles be maintained (as needed) as avian-safe for the life of the pole, the duration of the agreement, or another timeframe? Has the agreement identified who is responsible for this cost? Would the electric utility address long-term maintenance through their APP as they would for other poles retrofitted as part of the company's APP?

Follow-up Surveys/Monitoring *(See Checklist # 13, 15, 16, 20, 21, 22, 23)*

What is the agreed upon duration/frequency for follow-up surveys or monitoring of retrofits? "Permanent" fixes (e.g. pole reframing and/or replacing to provide physical separation) would last for the life of the pole and may not necessitate additional monitoring if designs meet APLIC recommendations (see *2006 Suggested Practices*).

For retrofits using covers, will subsets of poles be sampled or will all poles need assessment during a follow-up survey? Is there applicable data from areas with similar environmental conditions and line designs that can be used as a surrogate? Can monitoring be included in Utility existing practices (e.g. routine monitoring/inspections)?

Who will pay for monitoring or additional follow-up surveys and their associated costs?

Will the Utility provide reporting on follow-up survey results? If so, in what format and frequency? Who shall receive this information (e.g., wind company, USFWS)?

Other Environmental Considerations *(See Checklist # 11, 14)*

Will the location or season of the pole retrofitting work potentially necessitate other environmental reviews, work practice modifications, or seasonal/timing stipulations? Examples include wetlands, cultural or historic sites, endangered species, big game winter range, raptor nest buffers, etc.

Section 2A – Checklist Outline

The following checklist provides a series of suggested steps for the WEO and the electric utility ("Utility") to consider in developing an agreement for PPM as a mitigation measure. It also identifies coordination points with the USFWS. These steps act as a guide with specifics dependent on needs, conditions, communication, costs, and schedules.

Phase 1: Initial Feasibility/Planning Discussions Between WEO, Utility, and USFWS

1. **WEO due-diligence on potential Utilities**
    - **a.** WEO (internally, pre-contact) identifies Utility (or Utilities) that may be suitable as a potential partner for development of an agreement for PPM as compensatory mitigation. WEO may seek input/guidance from USFWS or APLIC on utilities in the area that may be suitable.*
    - **b.** Utility should meet the following criteria:
        - **i.** Poles located in the same Bird Conservation Region (BCR) or regional population as wind facility seeking mitigation. Note: The WEO should seek input/guidance from USFWS on locations of mitigation actions in relationship to their wind facility.
        - **ii.** Species-specific (bald or golden) application or opportunities are available and quantifiable.
        - **iii.** Suitable operations (distribution/transmission system that poses eagle mortality risk).
        - **iv.** **Existing Avian Protection Plan (APP) in place to qualify** (see the APP Guidelines and *2006 Suggested Practices*).
2. **WEO enters into initial discussion(s) with potential Utilities**
    - **a.** Basis of discussions on PPM for compensatory mitigation.
    - **b.** Review PPM checklist for components of agreement between Utility and WEO (see this checklist).
3. **WEO and Utility confirm existing APP or understanding to develop APP to execute agreement on PPM (see** the APP Guidelines **and** *2006 Suggested Practices***).**
    - **a.** Develop/enhance Utility's APP as necessary to proceed; this could act as a foundation for establishing a PPM agreement. The funding of APP development/enhancement would be negotiated between the Utility and WEO. While the WEO may provide this funding, it would not likely count towards mitigation "credit" to offset eagle take as required by USFWS; rather, it may facilitate the implementation of a PPM project to offset eagle take.

b. Document that PPM is additive to existing Utility APP retrofit efforts and does not include existing/identified mortality poles. Need to document work beyond the existing APP commitments (see Step 11b). To show that work is additive, the Utility would likely document that these poles have not been associated with known mortalities, and that PPM conducted as per the agreement would be in addition to modifications planned in the Utility's APP, or that PPM would be used to expedite modifications planned in the Utility's APP over time.

4. **WEO initiates discussions with USFWS (Concurrent with Steps 1-5)**
   - **a.** Identify USFWS priorities (e.g. eagle risk areas, probability of success).
   - **b.** WEO to work with USFWS on its eagle take permit application, including discussions on suitable mitigation (type of actions, quantity of poles, locations, timeframe, etc.)
5. **WEO confirm suitability of Utility partner**
   - **a.** Confirm Utility (Public Utility District [PUD], Investor Owned Utility [IOU], co-op, or other) can receives funds or if it requires regulatory approval (e.g., from Public Utility Commission [PUC]).
   - **b.** Confirm that APP is developed and being actively implemented.
   - **c.** Review Checklist No. 1b (above) for Due Diligence criteria.
6. **Utility to confirm their participation**
   - **a.** Utility to conduct in-house coordination and approval:
     - i. Utility management review and approval.
     - ii. Verify that Utility can identify appropriate poles/locations to address eagle risk.
     - iii. Verify that Utility can properly retrofit identified poles to meet or exceed APLIC recommendations (see *2006 Suggested Practices*) within given timeframe.
7. **WEO and Utility enter into confidentiality agreement**
   - **a.** Execute agreement to allow exchange of relevant internal information.
8. **WEO and Utility develop preliminary understanding of process and measures to execute an agreement for the PPM**
   - **a.** Identify purpose of agreement and due diligence items.
   - **b.** Identify potential scope or level of mitigation (e.g., preliminary number of poles).
     - i. Estimated number/type of poles for compensatory mitigation.
     - ii. Identify retrofit techniques per Utility APP or *2006 Suggested Practices*.
     - iii. Identify tentative schedule.
     - iv. Estimate term of agreement or longevity.
   - **c. PPM program is in addition to the Utility's existing retrofit work and does not include poles with known/existing mortalities.**
   - **d.** PPMs for WEO may be tracked separately from Utility's APP to aid in independent reporting on progress. Utility should discuss with USFWS whether additional separate reporting is needed (e.g., for new PPM conducted as part of agreement with WEO) or if

no additional reporting beyond existing APP/agreements is needed (e.g., if long-term maintenance of PPM is included in Utility's ongoing APP).

9. **WEO and USFWS identify level or range of PPM needed**
    - **a.** Number of poles.
    - **b.** Desired schedule of implementation.
    - **c.** Other factors (e.g., species specific application, quality and longevity of remedial action).
    - **d.** Confirm/document coordination with USFWS.
    - **e.** Work with Utility to ensure feasibility and costs.
10. **WEO and Utility execute MOU or other preliminary agreement to proceed with planning**
    - **a.** Review the earlier scoping, liabilities, capabilities, and costs.
    - **b.** Confirm roles, responsibilities, and obligations.
    - **c.** Verify cost reimbursement level for types of work (planning, preparation, training, mitigation, monitoring, maintenance, etc.).

Phase 2: Identify PPM Locations, Conduct Field Risk Assessment Surveys, and Organize PPM Jobs

11. **WEO and Utility analyze PPM needs and options***
    - **a.** Identify areas of risk poles, circuits, or areas (reference Utility APP, risk assessment methodology) for locations of PPM. Consider test or pilot analysis to refine approach if Utility has not already identified potential eagle-risk areas.
    - **b.** Identify pole locations and configurations that pose potential eagle risk (see Utility's APP, the APP Guidelines and *2006 Suggested Practices*). Verify and document that PPM program work does not include poles with existing/known mortalities (as these should have already been addressed through the Utility's APP). The modified poles should, however, be in high risk habitat, use areas, or near poles where eagle mortality has occurred.
    - **c.** Apply geospatial data from APP, mortality reporting, outages, habitat types, various databases, and/or other sources (e.g., USFWS, state Heritage data) to overlay with Utility distribution/transmission system to aid selection of suitable areas/poles.
    - **d.** Conduct initial environmental review of constraints and permitting (wetlands, cultural, raptor nest buffers, etc.). Discuss how this would be handled within agreement (e.g., who would be responsible for necessary permitting efforts/cost, potential impacts to PPM timeframe, etc.).
12. **WEO and USFWS review mitigation efforts**
    - **a.** Incorporate into ECP as necessary.
    - **b.** Include anticipated PPM longevity into ECP and REA model. Longevity would likely vary depending on local conditions and type of PPM, however the overall goal would be to maintain PPM as needed for the life of the project (e.g., 30 years or as otherwise

agreed). Utility may roll ongoing maintenance into its existing Operations and Maintenance (O&M) activities, or develop a specific maintenance agreement with the WEO. This maintenance agreement would include costs for rendering PPMs as avian-safe throughout the permit and agreement durations.

c. Reassess relative productivity and use/risk levels from ECP.

13. **WEO and Utility review agreement/understanding and confirm USFWS acceptance of mitigation effort**.
14. **Utility conducts field inspection to select poles for modification**
    - **a.** Conduct on-site meeting with WEO and Utility as overview of area and poles identified in Step 11.
    - **b.** Work with personnel with APP/APLIC training/experience and Utility engineers*.
    - **c.** Document pre-modification condition of structure with pole number, circuit, GPS coordinates, configuration information, and photos.
    - **d.** Recommend pole specific modifications (see Utility APP-Design standards, *2006 Suggested Practices,* and APLIC website). Only designs that meet or exceed APLIC guidance should be used. Ensure that appropriate internal Utility personnel (e.g. Operations, Standards Engineering) have reviewed recommendations.
    - **e.** Consider value of tradeoffs of different remedial actions – effectiveness, longevity (see earlier APLIC longevity suggestions), monitoring, other engineering constraints/considerations, costs, maintenance, etc.
    - **f.** Assess environmental constraints and permitting (e.g., wetlands, cultural, raptor nest buffers, etc.) requirements, incorporate into planning.
15. **WEO works with Utility to develop costs/scheduling**
    - **a.** Identify remedial actions to be conducted at each structure*.
    - **b.** Assemble material, labor, equipment, inspection, reporting, monitoring, maintenance, and overhead costs**.**
    - **c.** Review other permitting/regulatory requirements (e.g., seasonal timing restrictions due to raptor nests or eagle roosts, etc.) and other constraints (e.g., seasonality of irrigation or peak loads) and determine appropriate timeframe for work.
    - **d.** Identify labor source (contractor vs. internal Utility crews), considering workloads and timing requirements.
    - **e.** Identify qualified inspector to ensure work is done accurately and completely*.
    - **f.** Develop schedule.
16. **WEO and Utility review and execute agreement.**
    - **a.** Review scoping, design, planning, recommendations, costs, schedule, and reporting.
    - **b.** Draft/execute mitigation agreement assigning responsibilities and funding (include implementation, quality control, monitoring, and maintenance; see below and Utility APP).

17. **USFWS review of compensatory mitigation proposed with Utility and coordination with WEO regarding permit application (see ECP).**
    - **a.** Mutually agreed upon objectives and criteria.
    - **b.** Meets preferred or priority categories.
    - **c.** Review Risk Analysis/proposed measures.

Phase 3: Implement and Inspect PPM

18. **Utility implements PPM with funding from WEO based on agreement and following normal Utility project protocols.**
    - **a.** Purchase materials.
    - **b.** Secure and schedule line crews and inspector*.
    - **c.** Conduct initial kick-off meeting and train crew and inspector. Training should be conducted by a qualified person that is experienced in avian-safe design and retrofitting, and APLIC guidance*.
    - **d.** Implement remedial actions.
    - **e.** Inspect work as poles are completed (recommended) or at project completion. Inspector to document any work changes and associated justifications. Inspector to check off work completed at each structure and take photos of completed poles.
    - **f.** Progress reporting by foreman, inspector, and/or project manager.
    - **g.** Final reporting by Utility to WEO and USFWS

Phase 4: Monitor Remedial Actions (Short-term)

19. **Quality Control**
    - **a.** Review inspection and progress reports to document completion/installation (see #18 e, f, g above).
    - **b.** Conduct follow-up inspection as per agreement or through normal Utility line patrols and O&M activities (see #21 and Utility's APP).
20. **Monitoring of PPM**
    - **a.** Monitoring plan developed and implemented per agreement with WEO, USFWS, and Utility.
        - **i.** Inspections of PPM as-built can help distinguish construction errors (e.g., products installed incorrectly) versus longevity problems (e.g., products installed correctly but not persisting due to environmental conditions).
        - **ii.** Monitoring of samples of representative configurations or particular product types can be used to provide data on overall performance, as per agreements

with USFWS, WEO, and Utility. Such sampling/monitoring may already be conducted as part of Utility's O&M efforts and APP.

iii. Pole reframing and/or replacement that meets avian-safe separations could be considered avian-safe for the life of the pole, and consequently would not warrant additional monitoring. This could be included in the agreements between USFWS, WEO, and Utility.

b. Utility tracks outages and avian mortality per their normal APP process to identify any future mortalities occurring in PPM areas. If mortalities are documented within the agreement term, Utility and WEO would address needed facility corrections, associated costs, and reporting requirements (as identified in initial agreement).

c. WEO conducts fatality monitoring at existing wind plant to assess actual take for comparison to predicted take (see ECP).

Phase 5: Maintenance of Remedial actions (Long-term)

21. Maintenance

a. Utility incorporates modifications into standard maintenance protocol and cycle (see Utility APP).

b. Utility would likely assume on-going maintenance of pole modifications. This may be conducted as part of ongoing O&M activities or through agreement with WEO.

c. If modified structure(s) are rebuilt for purposes not related to the PPM agreement (e.g., due to a car-hit pole or weather event) but within the agreement duration, the Utility should rebuild the structure(s) to avian-safe standards.

22. Reporting

a. Utility and/or WEO to provide reporting as per original agreement.

23. WEO Permit Renewal

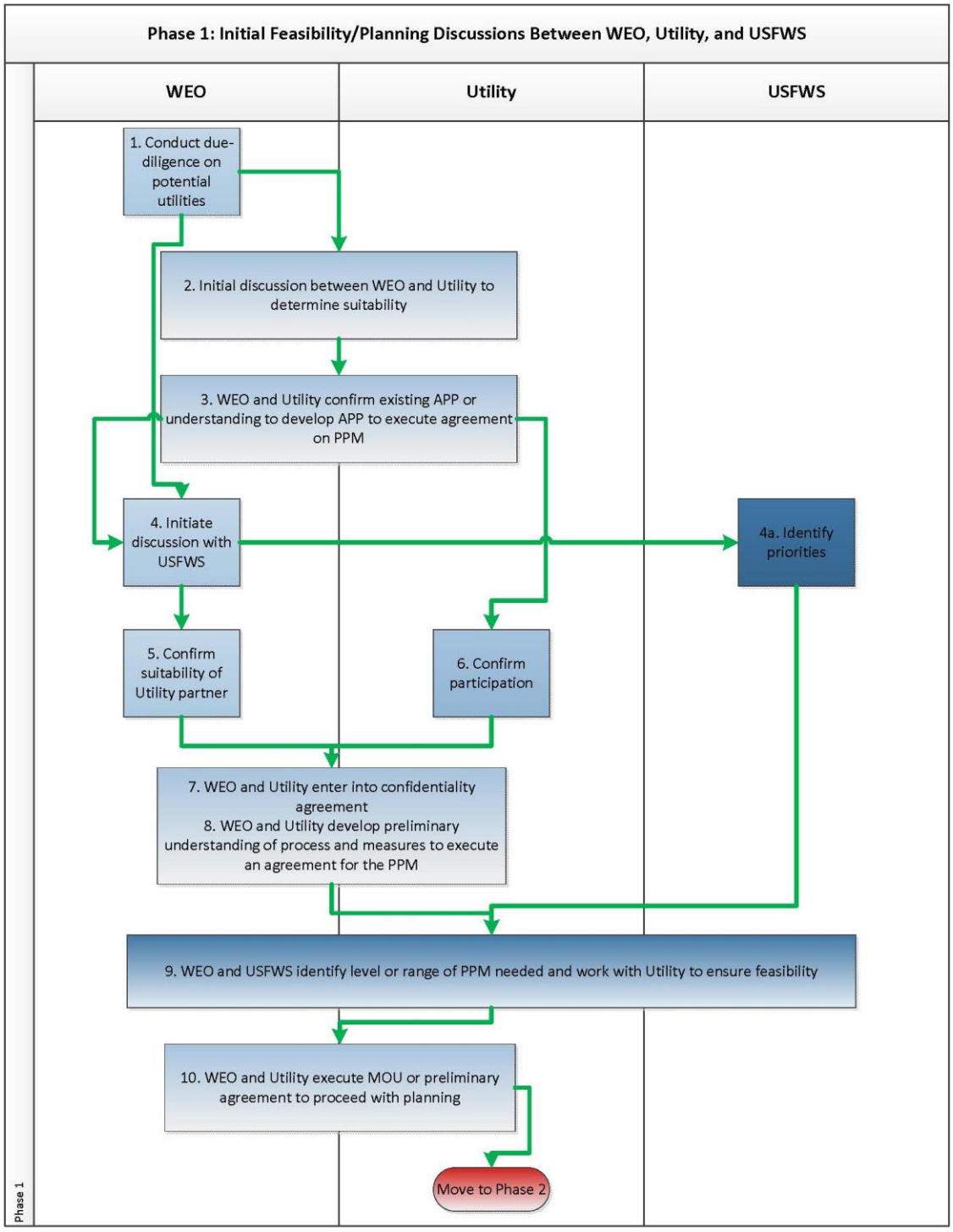
a. WEO coordinates with USFWS for permit renewal based on permit duration (e.g., 5 year or 30 year).

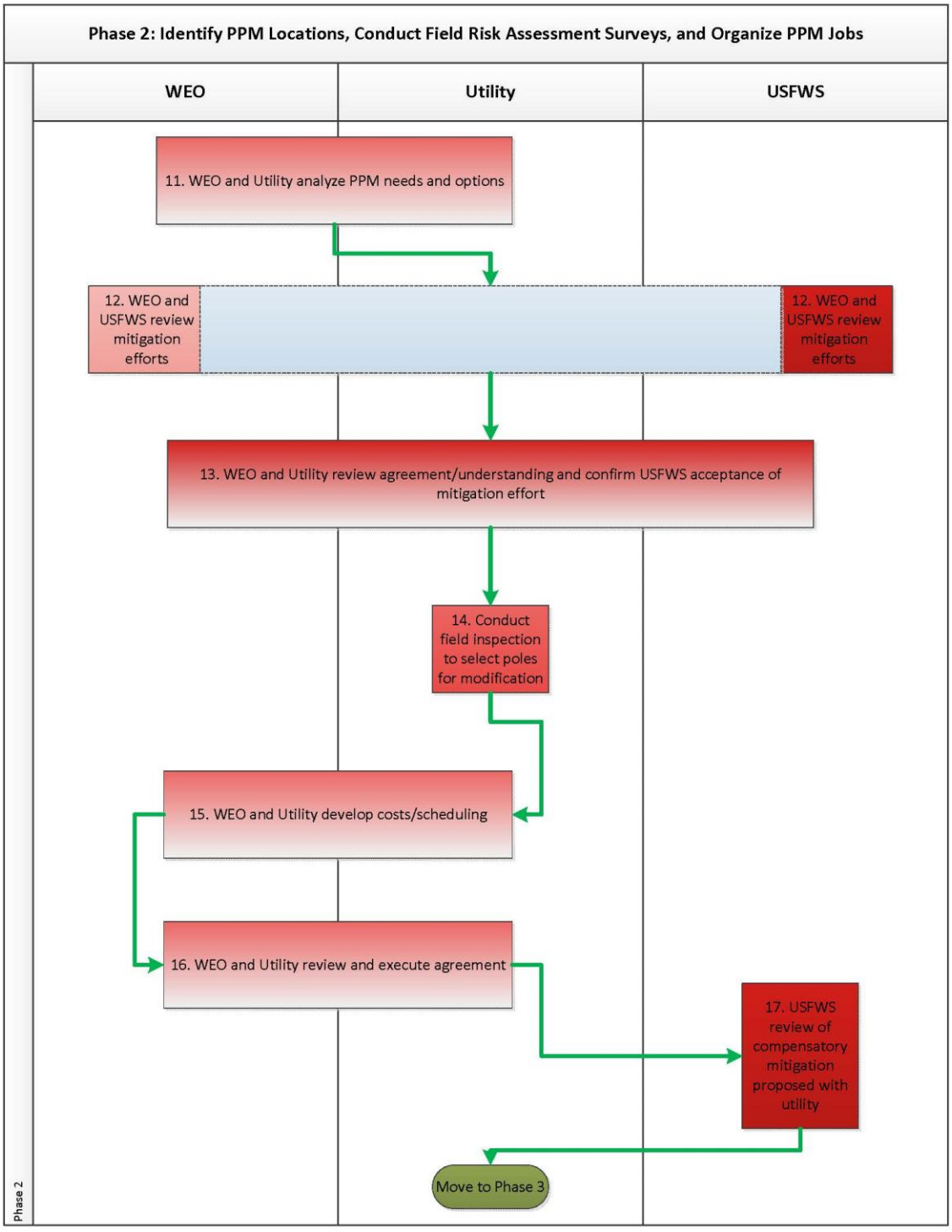
b. Assess actual vs. predicted levels of eagle mortality and incorporate effectiveness monitoring results of PPM to update REA model parameters as needed.

c. If WEO eagle take permit conditions change upon renewal, discuss changes in PPM agreement with Utility.

**It is recommended that surveyors, inspectors, and others responsible for implementing PPMs have attended APLIC short course trainings (see www.aplic.org for upcoming trainings). Surveyors and inspectors may be Utility employees or contractors; regardless, they should have adequate training and knowledge of avian protection designs, standards, retrofitting products, and techniques.*

Section 2B – Checklist Flowchart

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Utility
USFWS
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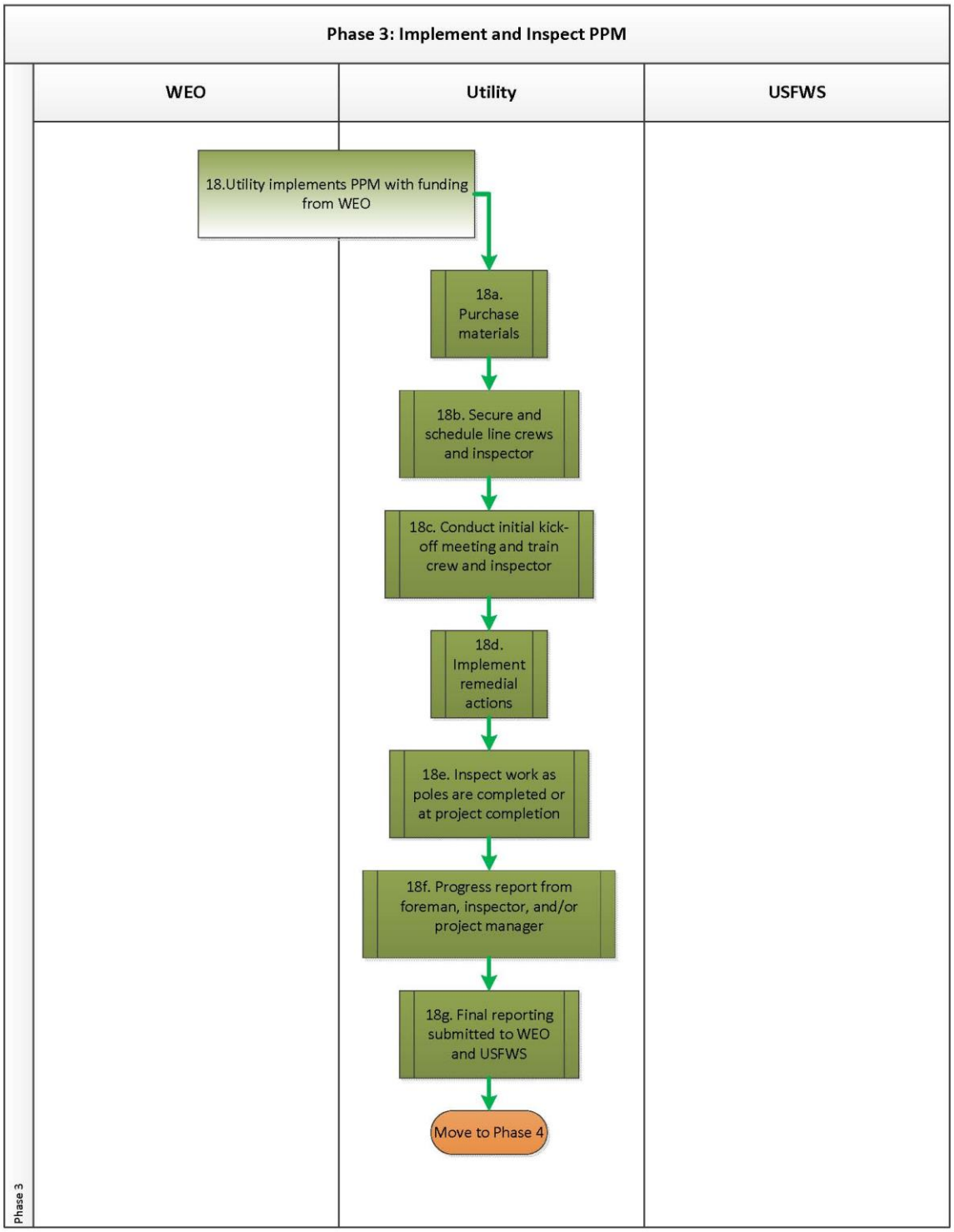
12. WEO and USFWS review mitigation efforts
12. WEO and USFWS review mitigation efforts
13. WEO and Utility review agreement/understanding and confirm USFWS acceptance of mitigation effort
14. Conduct field inspection to select poles for modification
15. WEO and Utility develop costs/scheduling
16. WEO and Utility review and execute agreement
17. USFWS review of compensatory mitigation proposed with utility
Move to Phase 3
Phase 2


Phase 3: Implement and Inspect PPM
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Utility
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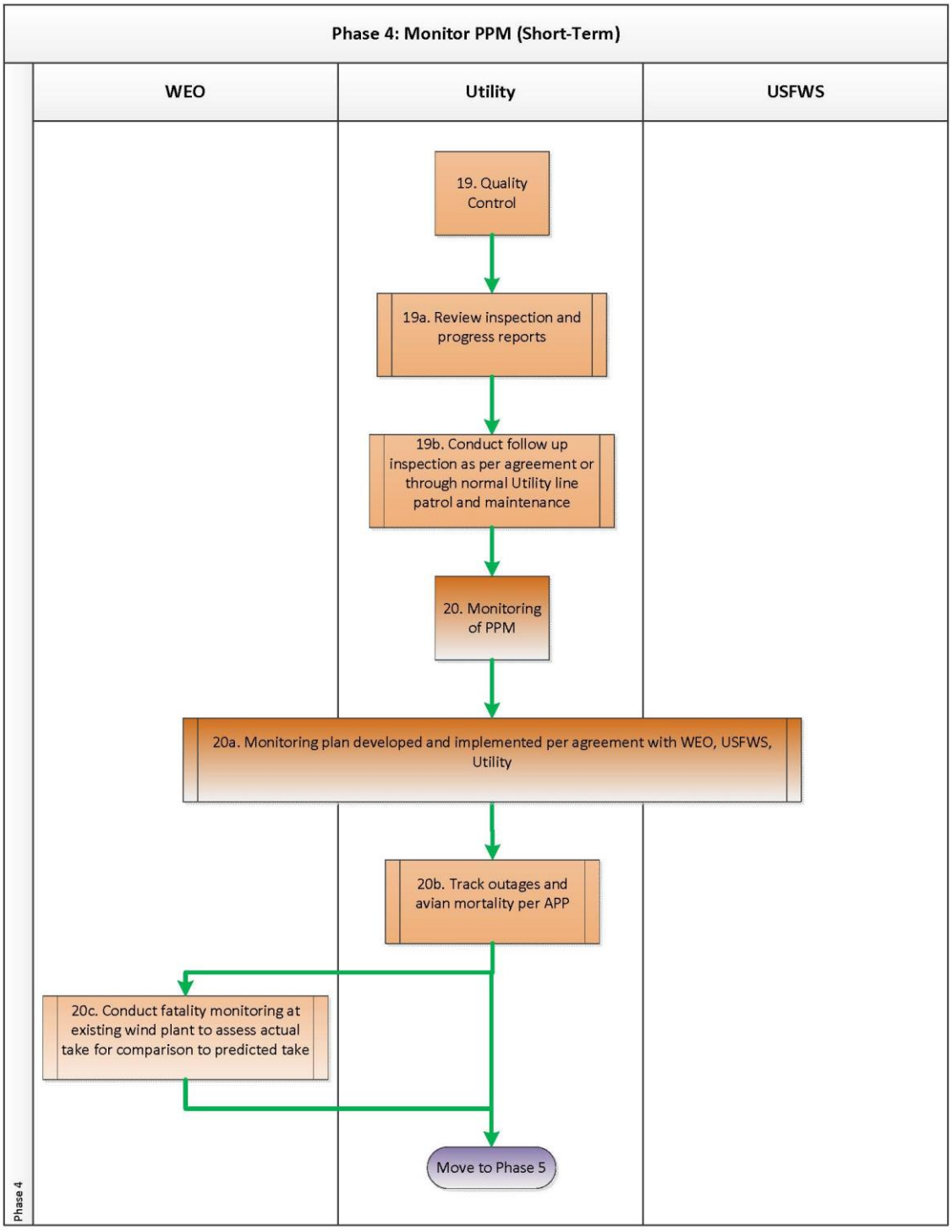
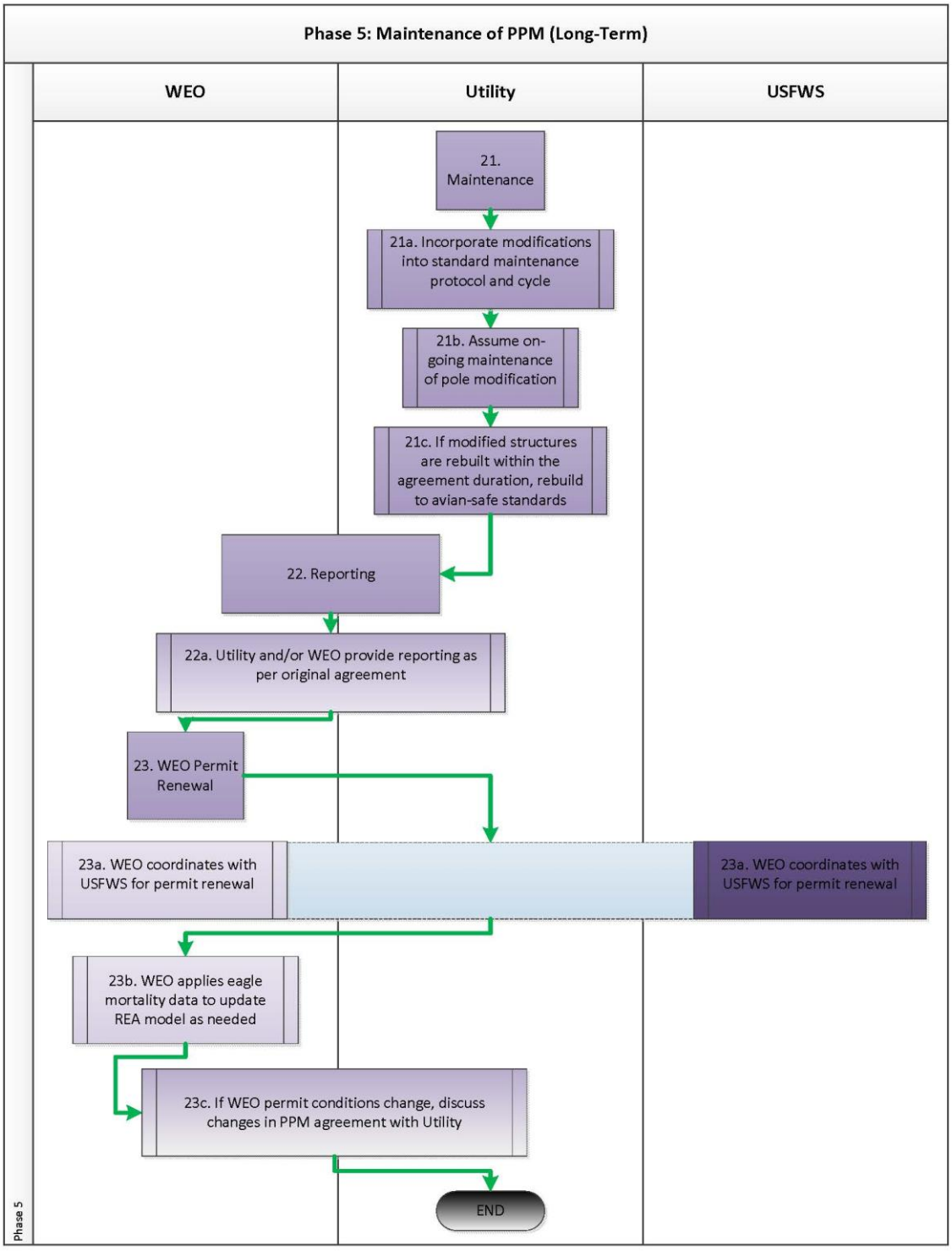
18a. Purchase materials
18b. Secure and schedule line crews and inspector
18c. Conduct initial kick-off meeting and train crew and inspector
18d. Implement remedial actions
18e. Inspect work as poles are completed or at project completion
18f. Progress report from foreman, inspector, and/or project manager
18g. Final reporting submitted to WEO and USFWS
Move to Phase 4
Phase 3


Phase 4: Monitor PPM (Short-Term)
WEO
Utility
USFWS
19. Quality Control
19a. Review inspection and progress reports
19b. Conduct follow up inspection as per agreement or through normal Utility line patrol and maintenance
20. Monitoring of PPM
20a. Monitoring plan developed and implemented per agreement with WEO, USFWS, Utility
20b. Track outages and avian mortality per APP
20c. Conduct fatality monitoring at existing wind plant to assess actual take for comparison to predicted take
Move to Phase 5
Phase 4


Phase 5: Maintenance of PPM (Long-Term)
WEO
Utility
USFWS
21. Maintenance
21a. Incorporate modifications into standard maintenance protocol and cycle
21b. Assume on-going maintenance of pole modification
21c. If modified structures are rebuilt within the agreement duration, rebuild to avian-safe standards
22. Reporting
22a. Utility and/or WEO provide reporting as per original agreement
23. WEO Permit Renewal
23a. WEO coordinates with USFWS for permit renewal
23a. WEO coordinates with USFWS for permit renewal
23b. WEO applies eagle mortality data to update REA model as needed
23c. If WEO permit conditions change, discuss changes in PPM agreement with Utility
END
Phase 5

List of Acronyms

APLIC – Avian Power Line Interaction Committee

APP – Avian Protection Plan

BCR – Bird Conservation Region

ECP – Eagle Conservation Plan

ECPG – Eagle Conservation Plan Guidance

GPS – Global Positioning System

IOU – Investor Owned Utility

O&M – Operations and Maintenance

PPM – Power Pole Modifications

PUC – Public Utility Commission

PUD – Public Utility District

REA - Resource Equivalency Analysis

USFWS – U.S. Fish and Wildlife Service

WEO – Wind Energy Operator

Glossary

Avian Protection Plan (APP)
An APP is a utility-specific program to reduce the operational and avian risks that result from avian interactions with electric utility facilities.

Avian-safe
A power pole configuration designed to minimize avian electrocution risk by providing sufficient separation between phases and between phases and grounds to accommodate the wrist-to-wrist or head-to-foot distance of a bird. If such separation cannot be provided, exposed parts are covered to reduce electrocution risk, or perch management is employed. This term has replaced the term "raptor-safe" used in the 1996 edition of APLIC's *Suggested Practices*.

Bird Conservation Regions (BCRs)
Ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. For more information on BCRs and to view BCR maps, see http://www.nabci-us.org/bcrs.htm.

Bushing (transformer)
An insulator inserted in the top of a transformer tank to isolate the electrical leads of the transformer winding from the tank. Bushings are usually made of porcelain, and are also used on circuit breakers and capacitor banks.

Capacitor
A device consisting of conductors isolated in a dielectric medium; each capacitor is attached to one side of a circuit only. It is used to increase the capacitance of a circuit. Capacitors are constructed in metal tanks and have bushings.

Circuit (single)
A conductor or system of conductors through which an electric current is intended to flow. The circuit is energized at a specified voltage.

Circuit (multiple)
A configuration that supports more than one circuit.

Conductor
The material (usually copper or aluminum)—usually in the form of a wire, cable or bus bar—suitable for carrying an electric current.

Configuration
The arrangement of parts or equipment. A distribution configuration would include the necessary arrangement of crossarms, braces, insulators, etc. to support one or more electrical circuits.

Crossarm
A horizontal supporting member used to support electrical conductors and equipment for the purpose of distributing electrical energy. Can be made of wood, fiberglass, concrete, or steel, and manufactured in various lengths.

Current
A movement or flow of electricity passing through a conductor. Current is measured in amperes.

Davit arm
A formed, laminated wood or steel crossarm attached to wood or steel poles and used to support electrical conductors or overhead ground wires.

Distribution line
A circuit of low-voltage wires, energized at voltages from 2.4 kV to 60 kV, and used to distribute electricity to residential, industrial and commercial customers.

Insulator
Nonconductive material in a form designed to support a conductor physically and to separate it electrically from another conductor or object. Insulators are normally made of porcelain or polymer.

Kilovolt
1000 volts, abbreviated kV.

Phase
An energized electrical conductor.

Phase-to-ground
The contact of an energized phase conductor to ground potential. A bird can cause a phase-to-ground fault when fleshy parts of its body touch an energized phase and ground simultaneously.

Phase-to-phase
The contact of two energized phase conductors. Birds can cause a phase-to-phase fault when the fleshy part of their wings or other body parts contact two energized phase conductors at the same time.

Pole
A vertical structure used to support electrical conductors and equipment for the purpose of distributing electrical energy. It can be made of wood, fiberglass, concrete, or steel, and manufactured in various heights.

Power line
A combination of conductors used to transmit or distribute electrical energy, normally supported by poles.

Power pole modification (PPM)
Actions to power poles to achieve avian-safe designs for electrocution prevention. These may include retrofitting with after-market bird protection products (such as covers), reframing to achieve avian-safe separations phase-to-phase and phase-to-ground, and/or rebuilding structures to meet avian-safe designs. Removal of abandoned facilities would also be considered a power pole modification to prevent avian mortality.

Problem or risk pole
A pole used by birds (usually for perching, nesting, or roosting) that has electrocuted birds or has a high electrocution risk.

Raptor-safe
See **avian-safe**

Reframing
The change of a pole configuration to meet avian safe distances.

Retrofitting
The modification of an existing electrical power line structure to make it avian-safe.

Rights-of-way (ROW)
The strip of land that has been acquired by an agreement between two or more parties for the purpose of constructing and maintaining a utility easement.

Separation
The physical distance between conductors and/or grounds from one another.

Span
The pole-to-pole or tower-to-tower distance of a power line.

Structure
A pole or lattice assembly that supports electrical equipment for the transmission or distribution of electricity.

Substation
A transitional point (where voltage is increased or decreased) in the transmission and distribution system.

Transformer
A device used to increase or decrease voltage.

Underbuild

Refers to a circuit that is placed on the same pole but underneath another circuit of a higher voltage. The lower circuit is often referred to as the underbuilt circuit.

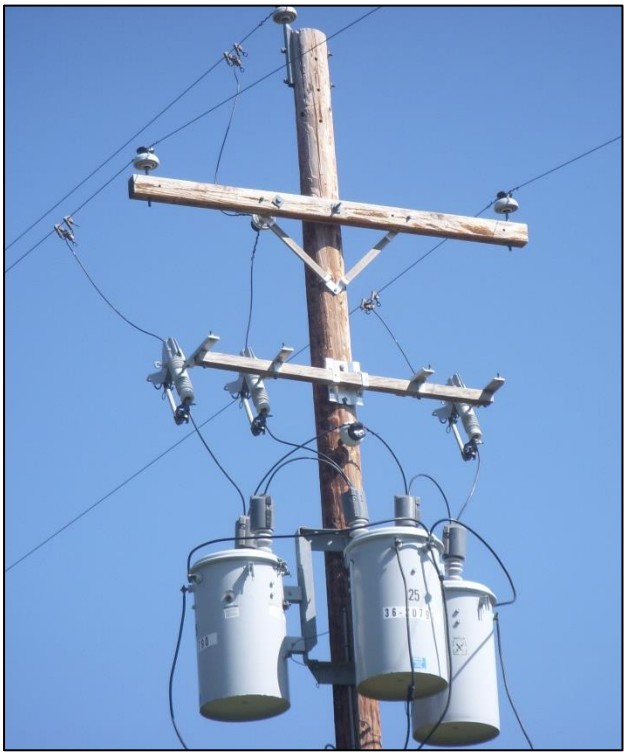
Volt
The measure of electrical potential.

Voltage
Electromotive force expressed in volts.

APPENDICES

Appendix A: Examples of Power Pole Modification Methods

Retrofitted pole with equipment (transformers, cutouts, arresters) and insulator cover



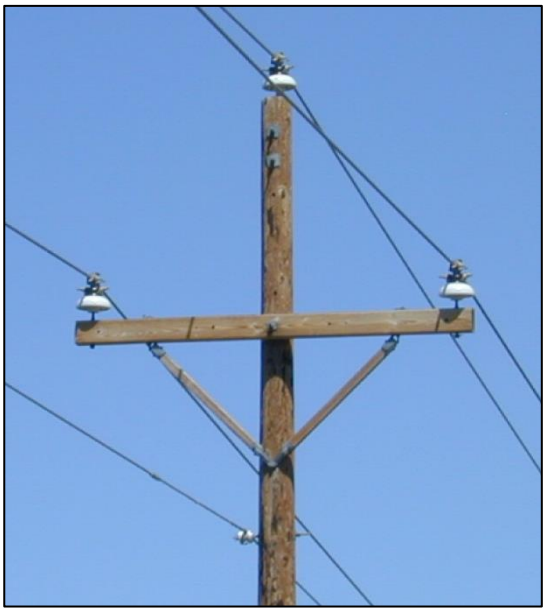
Retrofitted pole with equipment (transformers, cutouts, arresters) and avian-framed crossarm

Retrofitted pole with insulator cover

Retrofitted pole with equipment (transformers, cutouts, arresters) and deadend covers

Workers reframing crossarm to achieve avian-safe separations

Power pole framed avian-safe



Power pole framed avian-safe

Golden eagle perched on power pole framed avian-safe

Appendix B: Sample Power Pole Modification Checklist

Project Name: Key Project Contacts: Document Revision Number/Date:

Power Pole Modification (PPM) Checklist							
Phase #	Step #	Description	Responsible Group			Status	Completion Date
			WEO	Utility	FWS		
Phase 1	1	Conduct due-diligence on potential utilities	X				
	2	Initial discussion between WEO and Utility to determine suitability	X	X			
	3	Confirm existing APP or understanding to develop APP to execute agreement on PPM	X	X			
	4	Initiate discussion with FWS	X				
	4a	Identify priorities			X		
	5	Confirm suitability of utility partner	X				
	6	Confirm participation		X			
	7	WEO and Utility enter into confidentiality agreement	X	X			
	8	WEO and Utility develop preliminary understanding of process and measures to execute an agreement for the PPM	X	X			
	9	Identify level or range of PPM needed	X	X	X		
	10	Execute MOU or preliminary agreement to proceed with planning	X	X			
Phase 2	11	Analyze PPM needs and options	X	X			
	12	Review mitigation efforts	X		X		
	13	Review agreement/understanding and confirm FWS acceptance of mitigation effort	X	X	X		
	14	Conduct field inspection to select poles for priority retrofit		X			
	15	Develop costs/scheduling	X	X			
	16	Review and execute agreement	X	X			
	17	FWS review of compensatory mitigation proposed with utility			X		
Phase 3	18	Utility implements agreement with funding from WEO	X	X			
	18a	Purchase materials		X			
	18b	Secure and schedule line crews and inspector		X			
	18c	Conduct initial kick-off meeting and train crew and inspector		X			
	18d	Implement remedial actions		X			
	18e	Inspect work as poles are completed or at project completion		X			
	18f	Progress report from foreman, inspector, and/or project manager		X			
	18g	Final reporting submitted to WEO and FWS		X			

Project Name: Key Project Contacts: Document Revision Number/Date:

Phase 4	19	Quality Control		X			
	19a	Review modification/specifications and design with crews and inspectors		X			
	19b	Conduct follow up inspection as per agreements or with normal Utility line patrol and maintenance		X			
	20	Monitoring of PPM		X			
	20a	Monitoring plan developed and implemented per agreement with WEO, FWS, Utility	X	X	X		
	20b	Track outages and avian mortality per APP		X			
	20c	Conduct fatality monitoring at existing wind plant to assess actual take for comparison to predicted take	X				
Phase 5	21	Maintenance		X			
	21a	Incorporate modifications into standard maintenance protocol and cycle		X			
	21b	Assume on-going maintenance of pole modification		X			
	21c	If modified structures are rebuilt within the agreement duration, rebuild to avian-safe standards		X			
	22	Reporting	X	X			
	22a	Utility and/or WEO provide reporting as per original agreement	X	X			
	23	WEO permit renewal	X				
	23a	WEO coordinates with USFWS for permit renewal	X		X		
	23b	WEO applies eagle mortality data to update REA model as needed	X				
	23c	If WEO permit conditions change, discuss changes in PPM agreement with Utility	X	X			