

APPENDIX C – EAGLE FATALITY MONITORING PLAN

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Post-Construction Eagle Fatality Monitoring for the Red Pine Wind Project

April 2022

1 INTRODUCTION

Red Pine Wind Project, LLC (the Project Owner) is operating the Red Pine Wind Project (Project), in Lincoln County Minnesota. The Project has a generating capacity of 200 megawatts (MW) and includes 100 utility scale 2.0-MW wind turbines and their associated infrastructure (turbine pads, access roads, and underground electric collection system) within a 44,600-acre Project area. To follow the recommendations included in the U.S. Fish and Wildlife Service's (USFWS) *Land-based Wind Energy Guidelines* (USFWS 2012) and meet the commitments included in the site-specific Eagle Conservation Plan (ECP) prepared for the Project, post-construction eagle fatality monitoring studies (PCMM) will be conducted once the eagle monitoring approach has been agreed to with the USFWS and the Eagle Incidental Take Permit has been granted.

The objectives of the eagle PCMM are as follows:

- a. To ensure that actual take at the project does not exceed predicted take (i.e. that permitted take levels are not exceeded)
- b. To provide information that will assist the USFWS in updating the collision probability prior for bald eagles

It should be noted that although the Project Owner is only requesting incidental take coverage for bald eagles, the monitoring protocols described herein would be applicable to both bald and golden eagles, and the reporting process described would also be followed if any golden eagle takes are found at the Project.

2 STUDY PLAN

Eagle take monitoring over the permit term will be conducted using a combination of third-party consultants and trained operations and maintenance (O&M) staff. For purposes of this document, O&M staff (as related to the lower intensity monitoring years) could include either employees of Red Pine Wind Project, LLC or its affiliated companies, or third party contractors hired by the Project Owner to conduct O&M at the Project, including, when applicable, the lower intensity monitoring described herein. During all years when third-party consultant or O&M staff monitoring will be conducted, searches or scans will be conducted in all seasons. However, searches would

not be performed in winter weeks if ground conditions and weather are too extreme to safely conduct ground searches (i.e., difficult site access, snow storms, blizzards, high wind chill hazards, lightning, and other seasonal hazardous conditions), and when carcasses are difficult to detect due to heavy snow and ice conditions. For purposes of this document a monitoring year refers to a 12-month period, unless otherwise specified.

As described further in Sections 3 and 4 below, monitoring will consist of:

- Independent Third-party intensive monitoring (Section 3)
 - Stop and scan once a month from turbine base (when vegetation is 30" or shorter)
 - Transects (circular or straight lines) walked on same visit as scans when vegetation is 30" or shorter (narrower transects as vegetation grows taller; discussed further in Sections 3.1 and 3.2)
- O&M/lower intensity monitoring (Section 4)
 - Searches averaging approximately once a quarter at each turbine
 - Checks of road and pad during any additional turbine visits during routine maintenance

The schedule of third-party intensive monitoring and O&M/lower intensity monitoring is summarized in Table 1. Third-party intensive post-construction eagle fatality monitoring will be conducted as indicated in Table 1 to help calculate how much eagle take likely occurred, measure searcher efficiency during each season of third-party intensive monitoring (as described further below in Section 3), measure carcass persistence using raptor carcasses (when available, as described further below in Section 3), and determine searcher efficiency for O&M staff if they will be used as searchers in subsequent lower intensity monitoring years (as described further below in Section 4). The subsequent years of third-party intensive monitoring will follow the same general approach as described for the first year. Since the eagle permit term is lengthy, it is likely monitoring methods and correction formulas will evolve over the permit term. However, the monitoring methods may be revised if mutually agreed upon by the Project Owner and the USFWS, after the Project Owner and the USFWS discuss impacts on data comparisons across years and the necessary O&M training or data uncertainty across 5-year permit reviews. Either O&M staff or third-party contractors will conduct standardized, lower intensity eagle fatality monitoring with bias trials at the Project during all years when third-party intensive monitoring is not being conducted. The procedure and application of correction factors during these Lower Intensity Monitoring surveys are described below in Section 4.

Table 1. Proposed Schedule of Monitoring and Bias Trials at Red Pine Project

Permit Year	3rd-Party Intensive Monitoring – monthly at all 100 turbines	Lower Intensity Monitoring – quarterly at all 100 turbines	Measure Searcher Efficiency	O&M	Measure Carcass Persistence
1	X	X*	X*		X
2	X	X*	X*		X
3 to 7		X			
8	X	X*	X*		X
9 to 13		X			

14	X	X*	X*	X
15 to 18		X		
19	X	X*	X*	X
20 to 24		X		

*If third-party monitors are used for lower intensity surveys, quarterly surveys and O&M searcher efficiency trials would not occur in these third-party intensive monitoring years. Instead, trials would occur periodically during the lower intensity monitoring years to obtain data on the third-party monitor searcher efficiency during lower intensity monitoring years.

The schedule considers providing sufficient time before 5-year permit reviews to allow the third-party consultant to collect information for the Service to measure O&M staff searcher efficiency (if that is the proposed approach for the lower intensity monitoring years; see Section 4), prepare searcher correction factors, incorporate large raptor carcass persistence information in their analysis, and estimate g-value under Evidence of Absence, if applicable. This schedule also represents a balance between cost and sufficiently low uncertainty in the take estimate.

3 EAGLE POST-CONSTRUCTION INSPECTION SURVEYS – THIRD-PARTY INTENSIVE MONITORING

3.1 Third-party Intensive Monitoring

During intensive monitoring years when third-party monitoring is indicated, an independent third-party qualified consultant will be engaged to conduct eagle PCMM. Accurate eagle detection involves searching beyond roads and pad areas, especially for large carcasses which tend to fall beyond the turbine pads. However, due to crops, ground features, and large search areas it is not feasible to mow the ground for eagle carcass searching. Accordingly, third-party monitoring would include searching vegetation and crop areas except in locations and time periods during the growing season where vegetation exceeds 30" height, when transects (as described in Section 3.2, below) and scans would cease until harvest occurs. In order to address visibility when vegetation height and density increases, walking transects would be spaced farther apart where ground conditions and higher visibility allow it, and transects would be spaced closer together with a slower walking pace when ground conditions/vegetation height make searching more difficult. This is to keep searchers safe, and to maintain searching efficiency over time, with various crops, and across growing seasons. During intensive third-party monitoring years (Table 1) the consultant would provide training materials and, if O&M staff vs. third-party monitors are proposed to conduct the lower intensity monitoring for the next five year period, measure O&M staff's ability to detect simulated eagle carcasses and wings using surrogate decoys that would not attract scavengers. This work would provide detection bias corrections for estimating searcher efficiency during the years when lower intensity monitoring occurs, as described further in Section 4. The method to be used is as follows.

3.2 Eagle Searches (Visual Inspections combined with Search Transects)

The primary objective of this monitoring is to apply the appropriate method based on site visibility and search conditions. In areas that have been cleared of vegetation so that eagle remains are

likely visible, such as roads, pads, and construction areas with less than 6" of ground cover, searchers would scan the area in all directions around Project turbines for injured or dead eagles from suitable vantage points. Searches will be conducted during each monitoring year indicated in Table 1 after the Project receives an Eagle Incidental Take Permit. For areas out to 100 meters (328 feet) surrounding the turbine that are not readily visible from the vantage point due to vegetation exceeding 6 inches (6"), or with topography that limits visibility, searches would be conducted either by walking straight transects back and forth across the plot, or by walking two or more circular transects at different distances from the turbine. If straight transects are conducted, then spacing would be adjusted wider or narrower based on visibility conditions. Specifically, in bare soil, soybeans that have not grown up or spread laterally, and recently planted corn that is under 6" in height, walking transect spacing would be 20 meters apart. As vegetation grows from 6" to 30", transects would be narrowed to 7 meters apart to maintain searcher efficiency. If circular transects are conducted, the number of transects would similarly be adjusted based on visibility conditions. Specifically, in crops or other vegetation that is up to approximately 6" in height, two circular transects would be walked around the turbine approximately 25 meters from the turbine and 75 meters from the turbine. While walking, searches would scan the ground within 25 meters, resulting in search coverage of a circular plot extending 100 meters from each turbine. As vegetation grows from 6" to 30", three circular transects would be walked at approximately 20 meters, 50 meters, and 80 meters from the turbine. During these surveys, searchers would scan the ground within 15 – 20 meters, resulting in the same overall 100-meter radius search coverage for each turbine. In general, shorter crops such as soybeans could potentially be searched throughout the season, but vegetation that is 30" high or greater would not be searched.

Searches will be conducted at all 100 Project turbines out to a distance of approximately 100 meters once per month, resulting in an average 10 search events per year, when considering crop height and weather conditions. Searches may be discontinued during weeks when biologists confirm during a site visit that crops are greater than 30" high or ground conditions (such as heavy snow) significantly obstruct carcass visibility. Monthly checks will begin again when O&M staff notify the biologists that tall crops have been harvested or snow cover has reduced to make searches feasible and safe; as harvests can occur at different times depending on crop and field conditions, the searches may restart at different times for different turbines at the Project.

If large raptor carcass removal trials indicate that a high scavenger removal for eagle carcasses is likely compared to the monthly search interval, the frequency of searches likely will be increased. Searcher efficiency shall be measured during all four seasons to verify detection rates (see Searcher Efficiency Trials below).

It is important to note that O&M staff may also be conducting scans and at a minimum will be reporting any incidentally found eagles during all permit years, including third-party monitoring years (described below in Section 4). O&M staff will report all potential eagle finds to the third-party consultant for positive identification, and any eagle remains will be immediately reported to the USFWS, potentially increasing detection rates. If O&M staff searches are conducted four times per year per turbine on average during the third-party monitoring years, they will not be

treated as incidental finds, but will be included in the detection efficiency estimates and considered for estimating g-value under Evidence of Absence. If O&M staff are not conducting standardized checks during the third-party monitoring years, an incidentally found eagle will be examined to determine, through coordination with the USFWS, whether it could be predicted that it would have been found during the intensive monitoring surveys and it may or may not be included in the overall estimates. If the Owner or the third-party contractors determine it is feasible to replace an incidentally found eagle fatality with a decoy to determine if it would be detected by a naïve searcher on a subsequent search, the Owner will do so.

Should eagle remains be located, a qualified biologist will complete a data sheet (or input data into a tablet) to include reporting requirements per the eagle take permit conditions, and take photographs of the remains in the field. The remains will be marked in the field with a flag, and protected from scavenging (such as being covered by a bucket) until further direction from the USFWS is received. The remains will be immediately reported to all USFWS contacts listed on the eagle take permit within two business days. If directed by the USFWS, the remains will be stored in an on-site freezer, or transported to the nearest USFWS Field or Law Enforcement Office. A list of first, secondary, and tertiary phone contacts will be developed in coordination with the USFWS to determine all individuals that should be contacted, including the nearest USFWS office that may be able to accept the eagles. This phone list will also include contacts for wildlife rehabilitators and transporters should the eagle be injured rather than dead. A protocol for injured eagles will be developed (in conjunction with the USFWS) and given to all biologists and O&M staff.

3.3 Searcher Efficiency Trials

The objective of the searcher efficiency trials is to estimate the percentage of carcasses which are found by searchers. Searcher efficiency trials will be conducted in the same 100-meter plots where the eagle visual inspections/transect searches occur, on the schedule as laid out in Table 1. Trials will be conducted throughout the survey period where searcher efficiency will be estimated by viewshed complexity class (e.g., tilled ground, crops). Searcher efficiency trials will be designed to gather data specific to the different search methods as described in Section 3.2; i.e., for the wider transects and scans employed when vegetation ranges from 0 to 6", and the narrower transects employed when vegetation ranges from 6 to 30". No searcher efficiency trials will be conducted in areas where vegetation is higher than 30", since no searches will occur. Searcher efficiency trials will begin the same month when inspections/transects begin. Personnel conducting the inspections will not know the location or timing of the detection trials.

Red Pine Wind Project LLC plans to apply for a renewal of the current Special Purpose Utility (SPUT) permit as part of the eagle monitoring process, so that raptor carcasses can be used in the trials as available. To estimate searcher efficiency for the visual inspections/transect searches, about 25 eagle-sized carcasses, eagle decoys, or turkey feather decoys will be placed in each viewshed complexity class in each season during which searches occur. Surrogate eagle carcasses will consist of large raptor carcasses, if available; black domestic turkey carcasses (*Meleagris gallopavo*); artificial eagle decoys, and/or fully-feathered turkey decoys. All carcasses

will be placed within 100 meters of turbines prior to the inspection on the same day or the night before. Trial carcasses will be placed to appear similar to actual large raptor fatalities. Non-decoy bird trial carcasses will be discreetly marked with a black zip-tie around the leg. The number and location of the detection carcasses found during the carcass search will be recorded. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses. All carcasses (detected and undetected) will be retrieved after the trial has occurred.

3.4 Carcass Removal Trials

Carcass removal trials will occur during the same years when third-party monitoring occurs, on the schedule as laid out in Table 1. The objective of carcass removal trials is to estimate the likelihood that a carcass is available and not removed, as a function of the time (measured in days) since the trial carcass was placed in the field. Carcass removal includes removal by predation/scavenging or removal by other means such as being plowed into a field. Approximately twenty-five eagle surrogate carcasses (e.g., legally obtained raptor carcasses as available) will be placed within the 100-meter scanned plots in each season. Only relatively fresh carcasses (or carcasses that were relatively fresh/undecomposed when initially frozen) will be used for carcass removal trials. As there can be differences in the persistence rates between raptors and large game bird carcasses such as pheasants, third-party consultant will attempt to obtain raptor carcasses from the USFWS, use raptor carcasses found at the project, or acquire them from local licensed rehabilitation facilities as much as feasible. Raptors or raptor surrogates will be left to monitor for up to 120 days to estimate eagle persistence.

Trial carcasses for the Carcass Removal Trials placed in search plots will be marked clearly to avoid confusion with fatalities. Carcasses will be dropped from shoulder height and allowed to land in a random posture. Each trial carcass will be discreetly marked with a black zip-tie around the leg prior to placement so that it can be identified as a study carcass if it is found by other searchers or wind facility personnel.

Personnel conducting carcass searches will monitor the trial birds for up to 120 days according to the following schedule as closely as possible. Carcasses will be checked on day 1, 3, 7, 10, 14, 20, 30, 40, 50, 60, 75, 90, 105 and 120. This schedule may vary depending on weather and coordination with the other survey work. Additionally, if summer season scans are discontinued longer than 120 days, the carcasses placed for persistence trials during this time will be monitored for longer than 120 days until the carcasses are removed or the scans for the turbines restart. Experimental carcasses will be left at the location until the end of the carcass persistence trial. At the end of the persistence trial, any evidence of the carcasses that remain will be removed from the search plot.

Carcass persistence is a measure of the availability of carcasses to searchers. Because the current study proposes to use distance detection, a more conservative standard will be adopted for carcass availability. Feather spots will only be considered available for detection if they cover a 60 cm by 60 cm area. Because wind-blown feather spots are likely, searchers will take care to avoid double counting feather spots associated with persistence trial carcasses by increased

scanning surrounding feather spots to determine whether additional feather spots or other remains can be found that are likely from the same carcass.

3.5 Trial Schedule

Table 2 describes the approximate dates for seasons used in the 3rd Party Intensive Monitoring study, along with a list of what activities are proposed. These dates and/or seasons may be modified if mutually agreed upon by the Project Owner and the USFWS:

Table 2. Approximate Dates for Seasons used in the 3rd Party Intensive Monitoring Study.

Season	Dates	Activities
Spring	March 15 – May 14	Eagle Searches, SEEF, CPT
Summer	May 15 – July 30	Eagle Searches, SEEF (until crops too high, likely first part of June); CPT
Fall	August 1 – November 15	Eagle Searches, SEEF (not until crops harvested, likely late October); CPT
Winter	November 16 – March 14	Eagle Searches, SEEF, CPT

SEEF = Searcher Efficiency Trials; CPT = Carcass persistence trials

If O&M staff (either employees of the Project Owner, or O&M contractors) will be used during the lower intensity monitoring periods, then O&M staff will be trained on the proposed approach for the lower intensity monitoring, described below, during the first or second year of third-party intensive monitoring,. During the second year, the searcher efficiency of the O&M monitoring will be measured by the third-party consultant. If third party biological monitors are used for the lower intensity monitoring years, then searcher efficiency of those searches would be conducted during the lower intensity monitoring years.

4 EAGLE POST-CONSTRUCTION INSPECTION SURVEYS – LOWER INTENSITY MONITORING

4.1 Lower Intensity Monitoring Methods

4.1.1 Frequency of Lower Intensity Searches

During the lower intensity monitoring years, each turbine will be proposed to be searched once a quarter. However, due to potential unforeseen circumstances (e.g., weather, staff availability, etc.), it is possible a turbine may only be visited two or three times per year in a given year, which would be taken into account in the eagle fatality estimates. If the Service determines the lower intensity monitoring surveys being used in a 5-year period are not providing useful data with sufficient confidence, the Service and the permit holder will collaboratively determine whether these searches should be discontinued, altered, or augmented. Another method of low-level monitoring with bias correction will be designed and implemented if the initially proposed searches are discontinued; some potential options are described further below. This alternative method may be implemented prior to the next 5-year check-in.

4.1.2 Scan method

The Project Owner is considering several different methods for conducting standardized searches during the Lower Intensity Monitoring years. These include scans that could be conducted by either O&M staff (or third-party consultants, nacelle scans that would only be conducted by O&M staff, as well as the potential for use of drones or other technology. The following sections describe these various methods.

4.1.2.1 Eagle Scans – by O&M Staff or Third-party Monitors

Under this approach, either trained O&M staff (which, as described in Section 2, could include either Red Pine Wind Project, LLC employees or general O&M contractors) or qualified third-party biological monitors will visit each of the operating turbines on a quarterly basis and inspect roads, pads and any other area visible by binoculars (out to approximately 100-m) from a vehicle. During periods when crops start to grow and impinge the viewshed, if safe to do so, the searcher will park a pickup truck at the base of each turbine and scan the search area via binoculars while standing in the bed of the pickup, in order to gain some elevation. In crop-out situations, the scans will occur from ground level from cardinal points around the turbine base.

4.1.2.2 Nacelle Eagle Scans – by O&M Staff or Third-party Monitors

For the life of the Project, each of the Project's turbines is inspected in the nacelle by a technician every six months, and each turbine averages an additional two nacelle visits per year at varying intervals, with a minimum of four inspections per turbine. These nacelle visits average once per quarter, across the entire Project, and would be conducted regardless of the height of vegetation (i.e., including when vegetation is higher than 30"). Any turbines that do not meet the minimum four inspections per year can be scheduled for a turbine visit by O&M staff (either Red Pine Project LLC employees or general O&M contractors) to conduct the eagle nacelle scan. Every wind turbine service event involves time in which the technician is raising and lowering the tools and safety equipment using a service hatch facing downward, located under the turbine near the rear of the nacelle. The O&M technician sits at this hatch watching the chain hoist being lowered and raised for at least 15 minutes total, and there is a clear view of the turbine pad and the area surrounding the turbine in all directions, out to a wide radius, except the small triangular area near the turbine that is obscured by the tower. This monitoring procedure uses this opportunity to scan for potential eagles around the turbine from an elevated vantage point in order to provide searches during years in which third-party intensive eagle monitoring is not conducted. It is also possible that qualified third-party biological monitors, if properly safety-trained, could conduct nacelle scans on a quarterly basis during lower intensity monitoring periods, as described below.

During each turbine service event, a visual inspection of the ground from the service winch hatch shall be conducted. This inspection may be conducted while the safety bag is being hoisted up, provided all safety procedures are being observed. The distance of observer to ground is approximately 259 ft (79 meters).

During each inspection, the surveyor scans the ground from the hoist hatch in all directions out to an approximate 100-m radius to see if a large bird that could be an eagle is visible, and for any carrion, injured animals, or trash piles present in the area. Technicians will be provided ground visual aids to determine limits of the 100 meters search area. Scans are conducted with binoculars tethered with a safety lanyard and stored inside the nacelle or included in tool kits. The surveyor is instructed to safely change vantage points from left to right sides of the hoist hatch so areas behind the tower can be scanned with binoculars. Using this method it is estimated that less than 4% of the search area around the turbine will be obscured in an individual search, and since the turbine rotates around, no area will be unobserved from the nacelle during a search year. Additionally, a significant portion of the small unviewable triangle is close to the base of the turbine, and overlaps the gravel pad around the turbine; this area will be scanned visually from the ground as the technician works around the turbine at the quarterly check. If anything that is potentially an eagle or carrion is spotted, the distance and direction from the turbine is noted and a close ground inspection on foot is conducted as soon as practical, but no later than the next work day. If an injured or dead eagle, or federally listed species is identified by the ground inspection, the distance from the turbine and direction are recorded by GPS coordinates and at least 3 photos are taken from different angles to aid in species identification by a bird specialist. Each time a bird is found that could be an eagle remain, the Environmental Manager or Director is emailed with at least 3 photographs taken 2 to 4 feet from the remains from 3 different directions for species identification purposes. Because the Project will have been issued an eagle take permit, the remains may be re-positioned to facilitate clear photographs, or moved a short distance for worker safety reasons, or to preserve the remains from physical damage.

4.1.2.3 Eagle Scans – by Drone

The Project Owner anticipates that during the permit term, technology such as drones will become both accurate enough and economically feasible to potentially use in efforts such as the low-level monitoring at the Project. While details of the approach would depend on the specifics of the technology at the time (as far as wind speed restrictions, width of transects, etc.), the general approach would include quarterly flights by drone of every turbine within the 100-m search area, along with searcher efficiency trials (per Section 4.1.3). Note: this method of surveying must be approved by the Service prior to implementation.

4.1.3 Measuring Searcher Efficiency

If O&M staff are proposed to conduct the lower-intensity monitoring, the efficiency of turbine technicians in detecting potential eagles using the proposed monitoring approach will be measured during each preceding intensive monitoring year when third-party monitors are on-site, spaced on average 3 months apart. Realistic eagle decoys or other eagle surrogates that are not susceptible to removal by scavengers shall be placed in different locations within the searchable area of a minimum of 20% of the project turbines, and detection by the O&M technicians shall be measured by the third-party monitoring contractor. O&M technicians shall not be made aware that a search efficiency test is being conducted. After the test the eagle surrogates will be removed or relocated for additional testing at other turbines, or left in place to be detected on subsequent turbine visits. These O&M staff searcher efficiency rates will then be used in

subsequent years shown in Table 1 to correct for detection bias until the next O&M searcher efficiency trials are conducted. Searcher efficiency used in calculating detection under Evidence of Absence, or another method that replaces Evidence of Absence in future years, shall be the mean of the last two years when O&M searcher efficiency is measured.

If third-party biological monitors – either conducting scans per 4.1.2.1 or managing drone surveys per 4.1.2.3 - are used to conduct the quarterly searches in the lower intensity monitoring years, searcher efficiency of those searches will be tested during the lower intensity monitoring (not during the preceding intensive monitoring years).

4.1.4 Estimating Carcass Removal

During years when third-party monitoring is conducted, carcass removal shall be estimated as indicated for Third-party Monitoring above in Section 3 and Table 1. In years when Lower Intensity Monitoring is conducted, the most recent verified carcass removal rate shall be applicable during Lower Intensity Monitoring.

During each 5-year review period, correction factors for estimating take will use the following searcher efficiency and carcass persistence values:

- The third-party consultant will provide the raw data for searcher efficiency and carcass removal trials conducted during the Third-party Monitoring year to the Service for bias correction.
- During Lower Intensity Monitoring, for searcher efficiency if O&M staff are used, the raw data from the O&M staff searcher efficiency collected by the third-party consultant will be provided to the Service for bias correction.
- During Lower Intensity Monitoring, for carcass persistence, the third-party consultant will provide the raw data from the bias trials to the Service. The Service will determine carcass persistence and will apply this value to each year of O&M monitoring during the 5-year period.

4.2 Reporting and Record Keeping

The designated environmental manager is to be immediately notified of any injured or dead eagles of either species, or federally listed species. As required under the Eagle Incidental Take Permit, the appropriate USFWS contact(s) shall also be notified within 48 hours for further direction on any bald or golden eagles found, following the reporting approach described in Section 3 and all other reporting conditions as described in the eagle take permit, regardless of whether they are found during the scheduled monitoring surveys or incidentally. Any injured eagles or eagle

remains are to be handled pursuant to notification and collection procedures in coordination with USFWS.

4.3 Training

All O&M technicians who conduct wind turbine visits shall be trained in the eagle monitoring and identification procedure. A training document shall be maintained at the facility for use by technicians and site management.

Photographs and training materials on eagles, and restrictions on eagle handling, storage, and transportation will be posted at the O&M facility and provided in scheduled training to O&M new hires and continuing O&M staff. Example photos of eagle remains will be included to aid in identification. Training information shall include summaries of penalties for violation of the law.

Monthly training shall be conducted with all new hires and continuing O&M staff. Monthly training shall include example bald and golden eagle photos (both live and dead), a review of the scanning procedure, use of binoculars, ground inspection method, record keeping, and contact information. O&M staff will be trained on what photo angles and camera distances are most useful for identification of species (feet, nape of the neck, beak); the O&M staff will also be trained to look for and record any bands or telemetry backpacks found on eagles. The reporting requirements if an eagle or federally listed species is found will also be part of this ongoing O&M training.

5 STATISTICAL ANALYSIS

5.1 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures will be implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers are responsible for inspecting data forms for completeness, accuracy, and legibility; if a tablet system is used, the observers will make sure that the data has been properly uploaded at the end of the day. A sample of records from an electronic database will be compared to the raw data forms and any errors detected will be corrected. Irregular codes or data suspected as questionable will be discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis will be traced back to the raw data forms, and appropriate changes in all steps will be made.

5.2 Data Compilation, Storage and Reporting

A database, such as Microsoft® ACCESS or SQL should be used to store, organize, and retrieve survey data. Datasheets, if used, should be entered into the electronic database using a pre-defined format to facilitate subsequent QA/QC, data analysis, and to support reporting to USFWS. Due dates and processes for data transfer to the USFWS during third-party monitoring and non-

third-party monitoring years will be followed as laid out in the eagle take permit conditions and Statement of Responsibilities with third-party contractors.

5.3 Fatality Rate Estimation

Fatality estimation is a complex task due to a number of variables present in every study. Fatalities occur at an unknown rate, persist for variable amounts of time, and can be detected with varying levels of success based on carcass characteristics and ground cover. Carcasses may also fall beyond the bounds of searched areas. All of these variables influence the overall probability of detection, which is needed to make a fatality estimate.

Estimates of facility-related fatalities are based on:

- (1) Observed number of carcasses found during standardized searches during the monitoring year for which the cause of death is either unknown or is probably facility-related;
- (2) Persistence rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during persistence trials:
- (3) Searcher efficiency expressed as the probability that a carcass that is available for detection is discovered by a searcher; and
- (4) Search area adjustment based on the plot size and carcass density.

Cumulative (i.e. since the inception of the post-eagle permit monitoring study) fatality estimates will be provided for eagles. Per the implementing regulations of the Eagle Rule, at the five-year permit reviews, "In consultation with the permittee, the Service will update fatality predictions, authorized take levels and compensatory mitigation for future years, taking into account the observed levels of take based on approved protocols for monitoring and estimating total take."