

Stateline Wind Project: Oregon Wildlife Monitoring Plan

This plan describes wildlife monitoring the certificate holder shall conduct during operation¹ of the Stateline Wind Project facility in Oregon. The monitoring objectives are to determine whether the facility causes significant fatalities of birds and bats and to determine whether the facility results in a loss of habitat quality. This plan addresses the facility as permitted under the Oregon site certificate. The facility consists of 127 wind turbines.

Wildlife monitoring is necessary to determine whether operation of the facility results in a net loss of habitat quality. For raptors, this will require that the certificate holder obtain a reasonable estimate of the effect of the project on raptors in the context of local raptor populations.

The certificate holder shall use properly trained personnel to conduct this monitoring. For all monitoring except FPL's Wildlife Response and Reporting System (described below), the certificate holder shall hire an independent third party (not employees of the certificate holder) to perform monitoring tasks.

The Oregon Wildlife Monitoring Plan for the Stateline Wind Project includes the following components:

- 1) Fatality monitoring program involving:
 - a) Removal trials
 - b) Searcher efficiency trials
 - c) Standardized carcass searches
- 2) Established monitoring transect searches
- 3) Raptor nesting surveys
- 4) Burrowing owl surveys
- 5) FPL's Stateline Wind Project Wildlife Response and Reporting System

Following is a discussion of the components of the monitoring plan, statistical analysis methods for fatality data and data reporting.

1. Definitions and Methods

Seasons

This plan uses the following dates for defining seasons:

Season	Dates
Spring Migration	March 16 to May 15
Summer/Breeding	May 16 to August 15
Fall Migration	August 16 to October 31
Winter	November 1 to March 15

¹ This plan does not address pre-construction wildlife surveys that FPL Energy carried out in support of its application for a site certificate for the Stateline project.

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Search Plot Selection

The certificate holder shall conduct standardized carcass searches within search plots. The certificate holder, in consultation with the Oregon Department of Fish and Wildlife, shall select search plots based on a systematic sampling design (every other plot is sampled in a monitoring year). Turbine strings will be broken into rectangular search plots that contain two to four turbines each. The edge of plots will be no closer than 63 meters from the nearest turbine or meteorological (met) tower. The certificate holder shall provide maps of the search plots to the Office of Energy before beginning operation of the facility. The certificate holder shall use the same search plots for each search conducted during a monitoring year.

Scheduling and Sampling Frequency

The certificate holder will begin monitoring in Oregon upon the beginning of operation of the facility. The first “monitoring year” will commence upon the first day of the month following the beginning of commercial operation of the facility and will conclude twelve months later (for example, if commercial operation begins January 15, 2002, the monitoring year will commence on February 1, 2002, and conclude on January 31, 2003). Subsequent monitoring years will follow the same schedule (for example, monitoring year two would begin February 1, 2003).

Within each monitoring year, the certificate holder will conduct standardized carcass searches at the rates of frequency shown below. Over the course of one monitoring year, the certificate holder would conduct 16 searches. The total number of searches per season is based on applying the rate to the number of months in the season (as defined above).

Season	Frequency
Spring Migration	2 searches per month (4 searches)
Summer/Breeding	1 search per month (3 searches)
Fall Migration	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

Sample Size for Standardized Carcass Searches

For the standardized carcass searches described below, the sample size is the number of turbines searched per monitoring year. Because the number of turbines per search plot varies from two to four (as described above), the number of search plots will be less than the sample size (total number of turbines searched per year).

The determination of the sample size is based primarily on the expected precision in the fatality estimates for the entire Stateline Wind Project in Oregon and Washington. The certificate holder shall search a minimum of 123 turbines during the first monitoring year, of which at least 63 are in Oregon. The certificate holder shall search a minimum of 123 turbines during the second monitoring year, of which at least 63 are in Oregon. Over the first two monitoring years, all 127 Oregon turbines will be searched for at least 12 months. In addition, all permanent met towers will be searched each year of monitoring.

After the first two years, the certificate holder shall terminate the fatality monitoring program, subject to approval by the Office of Energy. The certificate holder shall use a worst-case analysis to resolve any uncertainty in the results based on the first two years of data and to

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determine whether the first two years of data indicate that mitigation is required. In lieu of approving the termination of the fatality monitoring program after two years, the Office of Energy may require additional, targeted monitoring if the first two years of data indicate the potential for unexpected impacts of a type that cannot be resolved appropriately by worst-case analysis and appropriate mitigation.

2. Removal Trials

The objective of the removal trials is to estimate the length of time avian and bat carcasses remain in the search area. Carcass removal studies will be conducted during each season in the vicinity of the search plots. Estimates of carcass removal will be used to adjust carcass counts for removal bias. “Carcass removal” is the disappearance of a carcass from the search area due to predation, scavenging or other means such as farming activity.

The certificate holder shall conduct carcass removal trials within each of the seasons defined above. Planted carcasses will not be placed in the carcass search plots because they might be confused with wind turbine-related fatalities, especially if they have been scavenged. Planted carcasses will be placed in the vicinity of search plots but not so near as to attract scavengers to the search plots themselves. The planted carcasses will be located randomly within the carcass removal trial plots.

Each season, approximately 10 carcasses of birds of two size classes (20 total carcasses) will be distributed in each of two habitat types (grassland/shrub-steppe and cultivated agriculture).² The total number of trial carcasses may vary. Small carcasses (e.g., house sparrows, starlings, commercially available game bird chicks) will simulate passerines and large carcasses (e.g., raptor carcasses provided by agencies, commercially available adult game birds or cryptically colored chickens) will simulate large birds such as raptors, game birds and waterfowl. If fresh bat carcasses are available, they may also be used.

The certificate holder shall conduct ten removal trials per monitoring year: two in the spring season, three in summer, two in fall and three in winter. In each trial in the spring and fall, at least five carcasses from each size class (10 total carcasses) will be placed in each of the two habitat types. In each trial in the summer and winter, at least three carcasses from each size class (6 total carcasses) will be placed in each of the two habitat types. Trials will be spread throughout the year to incorporate the effects of varying weather, climatic conditions, farming practices and scavenger densities.

Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (e.g., thrown over the left shoulder), 2) hidden to simulate a crippled bird (e.g., placed beneath a shrub or tuft of grass), and, 3) partially hidden.

It is expected that carcasses will be checked as follows, although actual intervals may vary. Carcasses will be checked for a period of 40 days to determine removal rates. They will be checked every day for the first 4 days, and then on day 7, day 10, day 14, day 20, day 30 and day 40. This schedule may vary depending on weather and coordination with the other survey work. At the end of the 40-day period, the trial carcasses will be removed. Trial carcasses will be

² This means that approximately 160 trial carcasses would be used in carcass removal trials during one monitoring year.

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marked discreetly (markers to be determined) for recognition by searchers and other personnel. Trial carcasses will be left at the location until the end of the carcass removal trial. The entire carcass may be marked with a substance that fluoresces under a black light as some carcasses may be reduced to feather spots.

Carcass searchers can check carcasses during their regular schedule of searches and additionally on days they are not conducting the searches. Properly trained personnel will conduct the removal trials.

3. Searcher Efficiency Trials

The objective of searcher efficiency trials is to estimate the percentage of bird and bat fatalities that searchers are able to find.

The certificate holder shall conduct searcher efficiency trials in the same area in which carcass searches occur in both grassland/shrub-steppe and cultivated agriculture habitat types. Trials will be conducted in each season. Searcher efficiency will be estimated by habitat type and season. Estimates of searcher efficiency will be used to adjust the number of carcasses found, correcting for detection bias.

Each season, approximately 10 carcasses of birds of two size classes (20 total carcasses) will be distributed in each of two habitat types (grassland/shrub-steppe and cultivated agriculture).³ The certificate holder shall conduct ten searcher efficiency trials per monitoring year: two in the spring season, three in summer, two in fall and three in winter. In each trial in the spring and fall, at least five carcasses from each size class (10 total carcasses) will be placed in each of the two habitat types. In each trial in the summer and winter, at least three carcasses from each size class (6 total carcasses) will be placed in each of the two habitat types.

Personnel conducting searches will not know when trials are conducted; nor will they know the location of the trial carcasses. If suitable trial carcasses are available, trials during the fall season will include several small brown birds to simulate bat carcasses. Legally obtained bat carcasses will be used if available.

On the day of a standardized carcass search (described below) but before the beginning of the search, efficiency trial carcasses will be placed at random locations within areas to be searched. If scavengers appear attracted by placement of carcasses, the carcasses will be distributed before dawn.

Efficiency trials will be spread over the entire season to incorporate effects of varying weather and vegetation growth. Carcasses will be placed in a variety of postures to simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture (thrown over the left shoulder), 2) hidden to simulate a crippled bird, and 3) partially hidden. Each carcass will be discreetly secured at its location to discourage removal by scavengers.

Each non-domestic carcass will be discreetly marked so that it can be identified as an efficiency trial carcass after it is found. The number and location of the efficiency trial carcasses found during the carcass search will be recorded. The number of efficiency trial carcasses

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available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

If new searchers are brought into the search team, additional detection trials will be conducted to insure that detection rates incorporate searcher differences.

4. Standardized Carcass Searches

The objective of the standardized carcass searches is to estimate the number of bird and bat fatalities that are attributable to facility operation. The goal of bird and bat fatality monitoring is to obtain a precise estimate of the fatality rate and associated variances.

On an annual basis, the certificate holder shall report an estimate of fatalities in five categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors and 5) bats. The certificate holder shall base these estimates on search data from the entire Stateline Wind Project in Oregon and Washington. In addition, the certificate holder shall report fatalities of Washington ground squirrels observed during the carcass searches.

The certificate holder shall estimate the number of avian and bat fatalities attributable to operation of the facility based on the number of avian and bat fatalities found at the facility site whose death appears related to facility operation. All carcasses located within areas surveyed, regardless of species, will be recorded and, if possible, a cause of death determined based on blind necropsy results. Total number of avian and bat carcasses will be estimated by adjusting for removal and searcher efficiency bias. If the cause of death is not apparent, the mortality will be attributed to facility operation.

If analysis of the fatality data collected after two monitoring years indicates that a significant impact on wildlife and wildlife habitat has occurred, the certificate holder shall implement appropriate mitigation, subject to the approval of the Office of Energy. Mitigation is discussed in Section 12 below.

Personnel trained in proper search techniques (“the searchers”) will conduct the carcass searches by walking parallel transects. The searchers will search rectangular search plots with the long axis of the plot centered on the turbine string. All area within a minimum of 63 meters from turbines or met towers will be searched. Transects will be initially set at 6 meters apart in the area to be searched. A searcher will walk at a rate of approximately 45 to 60 meters per minute along each transect searching both sides out to three meters for casualties. Search area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial. It should take approximately 45 to 90 minutes to search each turbine (each search plot contains multiple turbines), depending on the habitat type.

The searchers will record the condition of each carcass found, using the following condition categories:

- Intact – a carcass that is completely intact, is not badly decomposed and shows no sign of being fed upon by a predator or scavenger
- Scavenged – an entire carcass that shows signs of being fed upon by a predator or scavenger, or portions of a carcass in one location (e.g., wings, skeletal remains, legs, pieces of skin, etc.)

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- Feather Spot – 10 or more feathers at one location indicating predation or scavenging

All carcasses (avian and bat) found during the standardized carcass searches will be photographed, recorded and labeled with a unique number. Each carcass will be bagged and frozen for future reference and possible necropsy. A copy of the data sheet for each carcass will be kept with the carcass at all times. For each carcass found, searchers will record species, sex and age when possible, date and time collected, location, condition (e.g., intact, scavenged, feather spot) and any comments that may indicate cause of death. Searchers will photograph each carcass as found and will map the find on a detailed map of the search area showing the location of the wind turbines and associated facilities. The certificate holder shall coordinate collection of state endangered, threatened or protected species with the Oregon Department of Fish and Wildlife (ODFW). The certificate holder shall coordinate collection of federal endangered, threatened or protected species with the U.S. Fish and Wildlife Service (USFWS). The certificate holder shall obtain appropriate collection permits from ODFW and USFWS.

The searchers might discover carcasses incidental to formal carcass searches (e.g., while driving within the project area). If the incidentally discovered carcasses are found at turbines that are not part of the formal search sample, the searchers will identify, photograph and collect the carcasses as is done for carcasses within the formal search sample during scheduled searches. If the incidentally discovered carcasses are within the formal search plots, the searchers will leave the carcasses undisturbed, unless the carcass is a state or federally threatened or endangered species. The certificate holder shall coordinate collection of state endangered, threatened or protected species with ODFW. The certificate holder shall coordinate collection of federal endangered, threatened or protected species with the USFWS. The searchers will record the location of all incidentally discovered carcasses or injured birds on a detailed map of the study area showing the location of wind turbines and associated facilities such as power lines and met towers. Any injured native birds found will be carefully captured by a trained Project Biologist or technician and transported to Blue Mountain Wildlife Center in Pendleton in a timely fashion. The certificate holder shall follow a protocol for handling injured birds that has been developed with Lynn Thompkins of Blue Mountain Wildlife.

5. Established Monitoring Transect Surveys

The objective of surveys of established monitoring transects is to determine whether the operation of the facility results in a loss of habitat quality. A reduction in use by grassland/steppe avian species near the facility would indicate a loss of habitat quality.

The certificate holder shall establish 24 transects perpendicular to the turbine strings in non-agricultural grassland steppe and CRP habitats.⁴ The transects will be a maximum of 1000 feet (300 meters) long, but, if no alternative exists, some transects may be shorter due to access problems or a change of habitat type from non-agricultural habitats to cultivated agricultural habitats. The certificate holder will provide to the Office of Energy a map or other clear indication of locations where landowners refuse access and a map of the locations of the established monitoring transects before beginning operation of the facility.

⁴ The certificate holder shall use the same established monitoring transects that FPL used for pre-construction surveys and shall use the same survey methodology.

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A qualified observer will walk the pre-established transects and record observations of grasshopper sparrows (singing males and perched birds), long-billed curlews and other grassland/steppe avian species. The approximate distance along the transect will be recorded for each detection, and the habitat type will be recorded for each 50 meter (m) segment of the transect (6 segments).

Three searches will be conducted between mid-April and late June. The searches will occur at times spread throughout the period, and the same timing of searches will be used for each monitoring year. Observers will record observations of grassland/steppe avian species within 50 m on either side of the transect. Numbers of individual birds (if possible to determine) for each species will be recorded for each transect. Observers will map the locations where individual birds are first observed. During each transect search, observers will record detections of Washington ground squirrels (scat, holes and live detections).

The certificate holder shall conduct a gradient analysis, using regression analysis or other appropriate statistical methods, to determine the relationship between density of grassland/steppe avian species and distance from turbines. A “gradient analysis” means an analysis that assesses whether a significant or a biologically substantial relationship exists between distance from project structures and abundance or use of the area. The certificate holder will conduct post-construction established transect surveys for two years (in 2002 and 2003). Based on the results of these surveys after two years, the certificate holder shall determine whether the gradient analysis indicates that project structures are causing reduced wildlife use of habitat near the project. If the analysis indicates any displacement of grassland/steppe avian species has occurred, the certificate holder shall implement appropriate mitigation, subject to the approval of the Office of Energy. If the gradient analysis suggests that displacement has occurred but lacks statistical power, the certificate holder shall make the worst-case assumption that displacement has occurred to the extent demonstrated in available scientific literature (Leddy et al. 1999) and shall mitigate accordingly. Such mitigation may include the enhancement of an amount of habitat necessary to support the estimated number of grasshopper sparrows and other grassland nesting passerines displaced by the wind turbines and the protection of that enhanced habitat for the life of the facility. The certificate holder shall estimate the displacement effect and distance using the gradient analysis described above.

The Office of Energy may require additional, targeted surveys if the first two years of data indicate the potential for unexpected impacts of a type that cannot be resolved appropriately by worst-case analysis and appropriate mitigation.

6. Raptor Nest Surveys

The objectives of raptor nest surveys are to estimate the size of the local breeding populations of tree-nesting raptor species in the vicinity of the facility and to determine whether operation of the facility results in a reduction of nesting activity or nesting success in the local populations of target raptor species: Swainson’s hawk, ferruginous hawk, golden eagle and prairie falcon.

Aerial and ground surveys will be used to gather nest success statistics on active nests, nests with young and young fledged. The certificate holder will share the data with state and federal biologists. The certificate holder will conduct two years of post-construction raptor nest surveys.

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During each monitoring year, the certificate holder will conduct a minimum of two helicopter surveys, one in May and one in June, and additional surveys as described in this section. All nests will be given identification numbers, and nest locations will be recorded on U.S. Geological Survey 7.5-minute quadrangle maps. Global positioning system coordinates will be recorded for each nest. Locations of inactive nests will also be recorded as they may become occupied during future years. All new nests not previously mapped, whether active or inactive, will be given an identification number and their locations (coordinates) will be recorded.

The certificate holder shall conduct the aerial surveys within the site of the facility and a 5-mile buffer around the Oregon and Washington turbines to determine nest occupancy. Determining nest *occupancy* will likely require two visits to each nest (i.e., the two helicopter surveys). For occupied nests of the target raptor species (listed above) within 2 miles of the facility, the certificate holder shall determine nesting *success* by a minimum of one ground visit to determine species, number of young and nesting success. “Nesting success” means that the young have successfully fledged (flown from the nest).

Given the very low buteo nesting densities in the area, statistical power to detect a relationship between distance from a wind turbine and nesting parameters (e.g., number of fledglings per reproductive pair) will be very low. Therefore, impacts may have to be judged based on trends in the data, results from other wind energy facility monitoring studies and literature on what is known regarding the populations in the region.

If analysis of the raptor nesting data collected after two monitoring years indicates any reduction in nesting success by the target raptor species within two miles of the facility, the certificate holder shall implement appropriate mitigation, subject to the approval of the Office of Energy. At a minimum, if the surveys reveal that a target raptor species has abandoned a nest or territory identified during the 2001, 2002 or 2003 surveys within ½ mile of the facility, or has not fledged any young over the two year period, the certificate holder shall assume the abandonment or unsuccessful fledging is the result of the project unless another cause can be demonstrated conclusively. Based on that assumption, the certificate holder shall implement appropriate mitigation. In addition, if the data indicate clear evidence of displacement or disturbance of target raptor nesting species between ½ mile and 2 miles from the facility, the certificate holder shall implement appropriate mitigation.

For ferruginous hawks, appropriate mitigation may include creation, maintenance and monitoring of nesting platforms; specifically, eight nesting platforms would be created a minimum of 2 miles away from turbines for every ferruginous hawk nest assumed or shown to be affected.

Due to the difficulty in replacing nesting habitat for Swainson’s hawks, appropriate mitigation may include determining the status of the tree structures currently supporting Swainson’s hawks within three miles of the turbines and, with landowner approval, implementing protection measures to retain those structures and to protect existing nest trees. This may include fencing to protect existing trees or spraying black locust trees for insect infestation. It may be appropriate to recruit native tree species.

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7. Burrowing Owl Surveys

The objectives of owl surveys are to estimate the size of the local breeding population of burrowing owls in the vicinity of the facility and to determine whether operation of the facility results in a reduction of nesting activity or nesting success in the local burrowing owl population.

Given the expected small sample size of active burrowing owl nests within 1000 feet of the facility, impacts may have to be judged based on trends in the data, results from other wind energy facility monitoring studies and literature on what is known regarding the populations in the region. No burrowing owls were observed within 1000 feet of the proposed Oregon turbines during the 2001 spring pre-construction surveys. Therefore, there is no ability to make any statistical or descriptive inferences on burrowing owl displacement or disturbance impacts to burrowing owls in Oregon.

The certificate holder shall conduct burrowing owl surveys in association with the standardized carcass searches during the breeding season in 2002 and 2003 within suitable grassland habitat. Each year, the certificate holder shall conduct a minimum of two surveys for burrowing owls to obtain estimates of burrowing owl nest density near the turbines. For these surveys, the certificate holder shall follow a protocol developed in consultation with ODFW. Taped burrowing owl vocalizations will be played to enhance the ability to detect burrowing owls. Two historic nest sites within the Oregon project area will be checked for use. The burrow and an adjacent 100 meters will be surveyed for sign of activity and alternate nest sites. Based on the results of these surveys after two years and data from the standardized carcass searches, the Office of Energy may require the certificate holder to conduct additional burrowing owl nest surveys or other related surveys (e.g., radio-tagging owls) or to provide mitigation. During the burrowing owl surveys, observers shall record and document detections of Washington ground squirrels (scat, holes and live detections).

8. Avian Use Surveys

During each standardized carcass search, observers will record birds detected in a ten-minute period at approximately one-third of the turbines within the carcass search plots (e.g., one point count station per carcass search plot which may consist of two to four turbines) using standard variable circular plot point count survey methods. Additional observations of species of concern will be made if observed during the carcass searches, but collecting this information is secondary to the actual searching for carcasses so the searchers are not distracted from their main task of finding carcasses.

9. FPL's Stateline Wind Project Wildlife Response and Reporting System

FPL's Stateline Wind Project Wildlife Response and Reporting System is a monitoring program set up for searching for and handling avian and bat casualties found by maintenance personnel. A description of this system and associated data forms used for the Vansycle Ridge Wind Project are found in FPL's application for a site certificate (Attachment P-6, Appendices B and C).

This system has been in place at the Vansycle project since early 2000, and a similar system will be in place for the Stateline project as soon as construction begins. Construction and maintenance personnel will be trained in the methods. This monitoring program includes both reporting of carcasses discovered incidental to construction and maintenance operations

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(“incidental finds”) and reporting of carcasses discovered under a standardized search protocol for an area within approximately 50 meters of the turbines, measured from the base of the tower (“protocol searches”). A sample of approximately 45 turbines not included in the standardized carcass searches will be chosen to be included in protocol searches in each monitoring year. The certificate holder shall select this sample from the overall Stateline Wind Project in Oregon and Washington.

All carcasses discovered by maintenance personnel will be photographed and recorded. If maintenance personnel find carcasses within the search plots for protocol searches, they will notify a project biologist who will collect the carcasses. If maintenance personnel discover incidental finds at turbines that are not within search plots for the standardized carcass searches described in section 4, they will notify a project biologist who will collect the carcasses. If maintenance personnel discover carcasses within search plots for the standardized carcass searches described in Section 4, they will leave the carcasses undisturbed, unless the carcass is a state or federally threatened or endangered or otherwise protected species. The certificate holder shall coordinate collection of state endangered, threatened or protected species with ODFW. The certificate holder shall coordinate collection of federal endangered, threatened or protected species with the USFWS.

10. Statistical Analysis Methods for Fatality Data

The estimate of the total number of wind facility-related fatalities will be based on:

- (1) Observed number of carcasses found during standardized carcass searches for which the cause of death is either unknown or is probable facility-related.
- (2) Searcher efficiency expressed as the proportion of planted carcasses found by searchers
- (3) Non-removal rates expressed as the length of time a carcass is expected to remain in the study area and be available for detection by the searchers

Definition of Variables

The following variables are used in the equations below:

- c_i the number of carcasses detected at turbine (i) for the period of study for which the cause of death is either unknown or is probable facility-related.
- k the number of turbines searched
- s the number of carcasses used in removal trials
- t_i the time a carcass remains in the study area before it is removed
- d the total number of carcasses placed in searcher efficiency trials
- p the estimated proportion of detectable carcasses found by searchers
- N the total number of turbines in the facility
- I the interval between searches in days

Observed Number of Carcasses

The estimated average number of carcasses (\bar{c}) observed per turbine (or met tower) is:

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$$\bar{c} = \frac{\sum_{i=1}^k c_i}{k}$$

The estimated variance in the average number of carcasses is calculated using the usual sample variance formula:

$$v(\bar{c}) = \frac{1}{k} \left[\frac{\sum_{i=1}^k (c_i - \bar{c})^2}{k-1} \right]$$

The total number of carcasses observed (\hat{C}) is calculated by:

$$\hat{C} = k * \bar{c}$$

with variance:

$$v(\hat{C}) = k^2 * v(\bar{c})$$

Estimation of Carcass Removal

Estimates of carcass removal are used to adjust carcass counts for removal bias. Mean carcass removal time (\bar{t}) is the average length of time a carcass remains at the site before it is removed:

$$\bar{t} = \frac{\sum_{i=1}^s t_i}{s}$$

The sample variance $v(\bar{t})$ is calculated using the formula:

$$v(\bar{t}) = \frac{1}{s} \left[\frac{\sum_{i=1}^s (t_i - \bar{t})^2}{s-1} \right]$$

If a significant number of birds are remaining in the study area at the end of 40 days, then the average length of time (\bar{t}) will be estimated by statistical methods appropriate for censored data (Shumway *et al.* 1989). Removal rates will be estimated by major habitat, carcass size and season.

Estimation of Searcher Efficiency

Searcher efficiency is expressed as p . The variance of searcher efficiency is calculated by the formula:

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$$v(p) = \frac{p(1-p)}{d}$$

Carcass detection rates will be estimated by major habitat, carcass size and season.

Estimation of Total Number of Facility-Related Fatalities

The estimated total number of facility-related fatalities (m) for the period of study (e.g., one year) is calculated by:

$$m = \frac{N * I * \hat{C}}{k * \bar{t} * p}$$

The certificate holder shall calculate this estimate separately for each of five categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors and 5) bats. Estimates will be provided separately for turbines and met towers. The certificate holder shall calculate the “all birds” estimate and the “small birds” estimate for all species and, separately, for only those species protected by law. Modifications to these estimates will be made to incorporate the varying search efforts by season (monthly in winter and summer, twice monthly in fall and spring). Additional modifications may be made, subject to approval by the Office of Energy.

The variance of m is difficult to estimate due to the products and ratios of random variables in the equation above. The certificate holder may estimate the variance and confidence intervals using the computer intensive technique of bootstrapping (Manly 1997, Barnard 2000).

11. Data Reporting

The certificate holder will report the monitoring data and analysis to the Council. This report may be included in the annual report required under OAR 345-026-0080 or may be submitted as a separate document at the same time the annual report is submitted. In addition, the certificate holder shall provide to the Council any data or record generated in carrying out this monitoring plan upon request by the Council.

The certificate holder shall notify USFWS and ODFW immediately in the event that any federal or state endangered or threatened species are taken.

The public will have an opportunity to receive information about monitoring results and to offer comment. Within 30 days after receiving the annual report of monitoring results, the Office of Energy will give reasonable public notice and make the report available to the public. The notice will specify a time in which the public may submit comments to the Office. The Technical Advisory Committee established under the Walla Walla County conditional use permit may offer comments about the results of monitoring programs in Oregon.

12. Mitigation

The selection of the mitigation actions that the certificate holder may be required to implement under this plan should allow for flexibility in creating appropriate responses to monitoring results that cannot be known in advance. If mitigation is needed, the certificate holder shall propose appropriate mitigation actions to the Office of Energy and shall carry out mitigation actions approved by the Office of Energy. In addition to mitigation described above, possible mitigation actions include but are not limited to the measures discussed in this section.

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Grassland Nesting Species

Grassland nesting species include grasshopper sparrow, savannah sparrow, vesper sparrow, short-eared owl, burrowing owl, northern harrier, horned lark, western meadowlark, long-billed curlew, ring-necked pheasant, Hungarian partridge, chukar partridge, California quail and any other resident grassland nesting bird species that is found in the area. The certificate holder shall determine significant impact to grassland nesting species based on the fatality monitoring program discussed above. The certificate holder shall calculate the average annual fatality rate separately for turbines and met towers. If the average annual fatality rate⁵ is greater than 1.25 fatalities per turbine or met tower per year for all species combined or if the average annual fatality rate is greater than 0.5 fatalities per turbine or met tower per year for a single grassland nesting bird species, then the certificate holder shall assume that a significant impact on habitat has occurred and shall implement appropriate mitigation. The certificate holder shall include in this estimate any grassland nesting species fatality that is observed, even if it is observed during the non-nesting period. The certificate holder shall include in the estimate all carcasses unidentified as to species and for which there is no evidence to rule out the carcass as one of the grassland species listed above.

The certificate holder shall determine the need for mitigation for turbine towers and meteorological towers separately. If the analysis of turbine fatality data indicates that mitigation for grassland nesting species is required, the certificate holder shall enhance sufficient habitat to support the number of grassland nesting birds affected. The number of birds affected includes the number of fatalities above the all species threshold (1.25 fatalities/turbine/year) and the number of fatalities above the single species threshold (0.5 fatalities/turbine/year). The certificate holder shall protect that enhanced habitat for the life of the facility. The certificate holder shall propose the amount of habitat enhancement based on expected densities and habitat requirements of these species as described in the literature and studies of the Stateline facility and other wind energy facilities in the Northwest. If the analysis of met tower fatality data indicates that mitigation for grassland nesting species is required, the certificate holder shall implement appropriate mitigation such as 1) enhancing sufficient habitat to support the number of grassland nesting birds affected (determined as above for turbine-related fatalities), 2) moving met towers associated with high fatalities or 3) changing the design of the met towers to reduce fatality risk.

If the mitigation threshold for grassland nesting species is not met but fatalities of a sensitive species, such as grasshopper sparrow, burrowing owl or long-billed curlew are at a level of concern, the Office of Energy may require the certificate holder to implement mitigation for that species.

Raptors

The certificate holder shall determine significant impact to raptors (excluding burrowing owls, short-eared owls and northern harriers, which are considered under grassland nesting species) based on the fatality monitoring program data and any other raptor fatalities found. If more than an average of two raptor fatalities are found per year, then the certificate holder shall assume that a significant impact on raptor habitat has occurred and shall implement appropriate mitigation.

⁵ The “average annual fatality rate” is the average of the two annual estimates of fatalities.

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To mitigate for a significant impact on raptor habitat, the certificate holder shall provide funding to fence draw bottom areas. The certificate holder shall fence draw bottom areas within the facility site or up to 15 miles away within Oregon. The objective of fencing is to retain or establish recruitment of deciduous trees for future raptor nesting. The certificate holder shall include funding for annual monitoring and maintenance of the fencing for the life of the facility. For each raptor fatality above the mitigation threshold, the linear length of fencing, at a minimum, shall be sufficient to fence 1,000 feet of draw bottom⁶ that has trees or the potential to grow trees. If no suitable nesting structures are present in the fenced areas, the certificate holder shall plant 10 trees in each fenced area.

If the mitigation threshold is not met but fatalities of a sensitive raptor species, such as ferruginous hawk or Swainsons' hawk are at a level of concern, the Office of Energy may require the certificate holder to implement mitigation for that species.

Other Bird Species and Bats

Mitigation measures for grassland nesting birds and for raptors, if implemented, would also benefit other bird species and bats. There is no mitigation threshold for these species. However, if fatalities to these species are higher than expected and are at a level of concern, the Office of Energy may require the certificate holder to implement mitigation for these species.

13. Amendment of the Plan

This Oregon Wildlife Monitoring Plan may be amended from time to time by agreement of the certificate holder and the Council. Such amendments may be made without amendment of the site certificate. The Council authorizes the Office of Energy to agree to amendments to this plan and to mitigation actions that may be required under this plan. The Office of Energy shall notify the Council of all amendments and mitigation actions, and the Council retains the authority to approve, reject or modify any amendment of this plan or mitigation action agreed to by the Office.

⁶ The fenced area would be about 50 feet wide for most intermittent streams in the area.