

Montague Wind Power Facility: Wildlife Monitoring and Mitigation Plan

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1 This plan describes wildlife monitoring that the certificate holder shall conduct during
2 operation of the Montague Wind Power Facility (MWPF).¹ The monitoring objectives are to
3 determine whether the facility causes significant fatalities of birds and bats and to determine
4 whether the facility results in a loss of habitat quality.

5 The certificate holder shall use experienced and properly trained personnel (the
6 “investigators”) to conduct the monitoring required under this plan. The professional
7 qualifications of the investigators are subject to approval by the Oregon Department of Energy
8 (Department). For all components of this plan except the Wildlife Reporting and Handling
9 System, the certificate holder shall hire independent third party investigators (not employees of
10 the certificate holder) to perform monitoring tasks.

11 The *Wildlife Monitoring and Mitigation Plan* for the MWPF has the following
12 components:

- 13 1) Fatality monitoring program including:
 - 14 a) Removal trials
 - 15 b) Searcher efficiency trials
 - 16 c) Fatality search protocol
 - 17 d) Statistical analysis
- 18 2) Raptor nesting surveys
- 19 3) Washington ground squirrel surveys
- 20 4) Wildlife Reporting and Handling System

21 Based on the results of the monitoring programs, mitigation of significant impacts may be
22 required. The selection of the mitigation actions should allow for flexibility in creating
23 appropriate responses to monitoring results that cannot be known in advance. If the Department
24 determines that mitigation is needed, the certificate holder shall propose appropriate mitigation
25 actions to the Department and shall carry out mitigation actions approved by the Department,
26 subject to review by the Oregon Energy Facility Council (Council).

27 1. Fatality Monitoring

28 (a) Definitions and Methods

29 Seasons

30 This plan uses the following dates for defining seasons:

¹ This plan is incorporated by reference in the site certificate for the MWPF and must be understood in that context. It is not a “stand-alone” document. This plan does not contain all mitigation required of the certificate holder.

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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

Search Plots

The investigators shall conduct fatality monitoring within search plots. The certificate holder, in consultation with the Oregon Department of Fish and Wildlife (ODFW), shall select search plots based on a systematic sampling design that ensures that the selected search plots are representative of the habitat conditions in different parts of the site. Each search plot will contain one turbine. Search plots will be square or circular. Circular search plots will be centered on the turbine location and will have a radius equal to the maximum blade tip height of the turbine contained within the plot. "Maximum blade tip height" is the turbine hub-height plus one-half the rotor diameter. Square search plots will be of sufficient size to contain a circular search plot as described above. The certificate holder shall provide maps of the search plots to the Department before beginning fatality monitoring at the facility. The certificate holder shall use the same search plots for each search conducted during a monitoring year.

Scheduling

Fatality monitoring will begin one month after commencement of commercial operation of the facility. Subsequent monitoring years will follow the same schedule (beginning in the same calendar month in the subsequent monitoring year).

In each monitoring year, the investigators shall conduct fatality monitoring searches at the rates of frequency shown below. Over the course of one monitoring year, the investigators will conduct 16 searches, as follows:

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

The sample size for fatality monitoring is the number of turbines searched per monitoring year. The investigators shall conduct fatality monitoring during each monitoring year in search plots at one-third of the turbines that are built or 50 turbines, whichever is greater. If fewer than 50 turbines are built, the certificate holder shall search all turbines.

As described in the site certificate, the certificate holder may choose to build the MWPF using turbine types in two size classes:

- Small: turbines having a rotor diameter of 82 meters or less
- Large: turbines having a rotor diameter greater than 82 meters

If the final design of the MWPF includes both small and large turbines, the certificate holder shall consult with an independent expert with experience in statistical analysis of avian

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1 fatality data to determine whether it would be possible to design a turbine sample with a
2 sufficient number of turbines in each size class to allow a statistical comparison of fatality rates
3 for all birds as a group. The certificate holder shall submit the expert's written analysis to the
4 Department. If the expert's analysis shows that a comparison study is possible and if the
5 Department approves, the certificate holder shall sample the appropriate number of turbines in
6 each class and conduct the comparison study. The certificate holder may choose to sample more
7 than 50 turbines in each monitoring year, if a larger sample size would allow the comparison
8 study to be done.

9 Duration of Fatality Monitoring

10 The investigators shall perform one complete monitoring cycle during the first full year
11 of facility operation (Year 1). At the end of the first year of monitoring, the certificate holder will
12 report the results for joint evaluation by the Department, the certificate holder and ODFW. In the
13 evaluation, the certificate holder shall compare the results for the MWPF with the thresholds of
14 concern described in Section 1(g) of this plan and with comparable data from other wind power
15 facilities in the Columbia Basin, as available. If the fatality rates for the first year of monitoring
16 at the MWPF do not exceed any of the thresholds of concern and are within the range of the
17 fatality rates found at other wind power facilities in the region, then the investigators will
18 perform a second year of monitoring in Year 5 of operations.

19 If fatality rates for the first year of monitoring at the MWPF exceed any of the thresholds
20 of concern or exceed the range of fatality rates found at other wind power facilities in the region,
21 the certificate holder shall propose additional mitigation for Department and ODFW review
22 within 6 months after reporting the fatality rates to the Department. Alternatively, the certificate
23 holder may opt to conduct a second year of fatality monitoring immediately if the certificate
24 holder believes that the results of Year 1 monitoring were anomalous. If the certificate holder
25 takes this option, the investigators still must perform the monitoring in Year 5 of operations as
26 described above.

27 (b) Removal Trials

28 The objective of the removal trials is to estimate the length of time avian and bat
29 carcasses remain in the search area. Estimates of carcass removal rates will be used to adjust
30 carcass counts for removal bias. "Carcass removal" is the disappearance of a carcass from the
31 search area due to predation, scavenging or other means such as farming activity.

32 The investigators shall conduct carcass removal trials within each of the seasons defined
33 above during the first year of fatality monitoring. For each trial, the investigators shall use 10 to
34 15 carcasses of small- and large-bodied species. Trial carcasses shall be placed at least 1,000 feet
35 from any search plots and distributed proportionately within habitat categories and subtypes
36 similar to the search plots.

37 After the first year of fatality monitoring, the investigators may reduce the number of
38 removal trials and the number of removal trial carcasses during any subsequent year of fatality
39 monitoring, subject to the approval of the Department. The investigators must show that the
40 reduction is justified based on a comparison of the first year removal data with published
41 removal data from nearby wind energy facilities.

42 The investigators shall use game birds or other legal sources of avian species as test
43 carcasses for the removal trials, and the investigators may use carcasses found in fatality

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1 monitoring searches. The investigators shall select species with the same coloration and size
2 attributes as species found within the site boundary. If suitable trial carcasses are available, trials
3 during the fall season will include several small brown birds to simulate bat carcasses. Legally
4 obtained bat carcasses will be used if available.

5 Trial carcasses will be marked discreetly for recognition by searchers and other
6 personnel. Carcasses will be placed in a variety of postures to simulate a range of conditions. For
7 example, birds will be: (1) placed in an exposed posture (e.g., thrown over the shoulder), (2)
8 hidden to simulate a crippled bird (e.g., placed beneath a shrub or tuft of grass) or (3) partially
9 hidden. The trial carcasses will be placed randomly within the carcass removal trial plots. Trial
10 carcasses will be left in place until the end of the carcass removal trial.

11 An approximate schedule for assessing removal status is once daily for the first 4 days,
12 and on days 7, 10, 14, 21, 28 and 35. This schedule may be adjusted depending on actual carcass
13 removal rates, weather conditions and coordination with the other survey work. The condition of
14 scavenged carcasses will be documented during each assessment, and at the end of the trial all
15 traces of the carcasses will be removed from the site. Scavenger or other activity could result in
16 complete removal of all traces of a carcass in a location or distribution of feathers and carcass
17 parts to several locations. This distribution will not constitute removal if evidence of the carcass
18 remains within an area similar in size to a search plot and if the evidence would be discernable to
19 a searcher during a normal survey.

20 Before beginning removal trials for any subsequent year of fatality monitoring, the
21 certificate holder shall report the results of the first year removal trials to the Department and
22 ODFW. In the report, the certificate holder shall analyze whether four removal trials per year, as
23 described above, provide sufficient data to accurately estimate adjustment factors for carcass
24 removal. The number of removal trials may be adjusted up or down, subject to the approval of
25 the Department.

26 (c) Searcher Efficiency Trials

27 The objective of searcher efficiency trials is to estimate the percentage of bird and bat
28 fatalities that searchers are able to find. The investigators shall conduct searcher efficiency trials
29 on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated agriculture
30 habitat types. A pooled estimate of searcher efficiency will be used to adjust carcass counts for
31 detection bias.

32 The investigators shall conduct searcher efficiency trials within each of the seasons
33 defined above during the years in which the fatality monitoring occurs. Each trial will involve
34 approximately 4 to 15 carcasses. The searchers will not be notified of carcass placement or test
35 dates. The investigators shall vary the number of trials per season and the number of carcasses
36 per trial so that the searchers will not know the total number of trial carcasses being used in any
37 trial. In total, approximately 80 carcasses will be used per year, or approximately 15 to 25 per
38 season.

39 For each trial, the investigators shall use small- and large-bodied species. The
40 investigators shall use game birds or other legal sources of avian species as test carcasses for the
41 efficiency trials, and the investigators may use carcasses found in fatality monitoring searches.
42 The investigators shall select species with the same coloration and size attributes as species
43 found within the site boundary. If suitable test carcasses are available, trials during the fall

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1 season will include several small brown birds to simulate bat carcasses. Legally obtained bat
2 carcasses will be used if available. The investigators shall mark the test carcasses to differentiate
3 them from other carcasses that might be found within the search plot and shall use methods
4 similar to those used to mark removal test carcasses as long as the procedure is sufficiently
5 discreet and does not increase carcass visibility.

6 The certificate holder shall distribute trial carcasses in varied habitat in rough proportion
7 to the habitat types within the facility site. On the day of a standardized fatality monitoring
8 search (described below) but before the beginning of the search, investigators will place
9 efficiency trial carcasses randomly within search plots (one to three trial carcasses per search
10 plot) within areas to be searched. If scavengers appear attracted by placement of carcasses, the
11 carcasses will be distributed before dawn.

12 Efficiency trials will be spread over the entire season to incorporate effects of varying
13 weather and vegetation growth. Carcasses will be placed in a variety of postures to simulate a
14 range of conditions. For example, birds will be: (1) placed in an exposed posture (thrown over
15 the shoulder), (2) hidden to simulate a crippled bird or (3) partially hidden.

16 The number and location of the efficiency trial carcasses found during the carcass search
17 will be recorded. The number of efficiency trial carcasses available for detection during each
18 trial will be determined immediately after the trial by the person responsible for distributing the
19 carcasses. Following plot searches, all traces of test carcasses will be removed from the site.

20 If new searchers are brought into the search team, additional searcher efficiency trials
21 will be conducted to ensure that detection rates incorporate searcher differences. The certificate
22 holder shall include a discussion of any changes in search personnel and any additional detection
23 trials in the reporting required under Section 5 of this plan.

24 Before beginning searcher efficiency trials for any subsequent year of fatality monitoring,
25 the certificate holder shall report the results of the first year efficiency trials to the Department
26 and ODFW. In the report, the certificate holder shall analyze whether the efficiency trials as
27 described above provide sufficient data to accurately estimate adjustment factors for searcher
28 efficiency. The number of searcher efficiency trials for any subsequent year of fatality
29 monitoring may be adjusted up or down, subject to the approval of the Department.

30 (d) Fatality Monitoring Search Protocol

31 The objective fatality monitoring is to estimate the number of bird and bat fatalities that
32 are attributable to facility operation as an indicator of the impact of the facility on habitat quality.
33 The goal of bird and bat fatality monitoring is to estimate fatality rates and associated variances.
34 The investigators shall perform fatality monitoring using standardized carcass searches according
35 to the schedule described above.

36 Personnel trained in proper search techniques (“the searchers”) will conduct the carcass
37 searches by walking parallel transects approximately 6 meters apart within the search plots. A
38 searcher will walk at a rate of approximately 45 to 60 meters per minute along each transect,
39 searching both sides out to 3 meters for casualties. Search area and speed may be adjusted by
40 habitat type after evaluation of the first searcher efficiency trial.

41 Searchers shall flag all avian or bat carcasses discovered. Carcasses are defined as a
42 complete carcass or body part, 10 or more feathers or three or more primary feathers in one

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1 location. When parts of carcasses and feathers from the same species are found within a search
2 plot, searchers shall make note of the relative positions and assess whether or not these are from
3 the same fatality.

4 All carcasses (avian and bat) found during the standardized carcass searches will be
5 photographed, recorded and labeled with a unique number. Searchers shall make note of the
6 nearest two or three structures (turbine, power pole, fence, building or overhead line) and the
7 approximate distance from the carcass to these structures. The species and age of the carcass will
8 be determined when possible. Searchers shall note the extent to which the carcass is intact and
9 estimate time since death. Searchers shall describe all evidence that might assist in determination
10 of cause of death, such as evidence of electrocution, vehicular strike, wire strike, predation or
11 disease. When assessment of the carcass is complete, all traces of it will be removed from the
12 site.

13 Each carcass will be bagged and frozen for future reference and possible necropsy or (if
14 the carcass is fresh and whole) for use in trials. A copy of the data sheet for each carcass will be
15 kept with the carcass at all times. For each carcass found, searchers will record species, sex and
16 age when possible, date and time collected, location, condition (e.g., intact, scavenged, feather
17 spot) and any comments that may indicate cause of death. Searchers will photograph each
18 carcass as found and will map the find on a detailed map of the search area showing the location
19 of the wind turbines and associated facilities. The certificate holder shall coordinate collection of
20 state endangered, threatened, sensitive or other state protected species with ODFW. The
21 certificate holder shall coordinate collection of federally listed endangered or threatened species
22 and Migratory Bird Treaty Act protected avian species with the U.S. Fish and Wildlife Service
23 (USFWS). The certificate holder shall obtain appropriate collection permits from ODFW and
24 USFWS.

25 The investigators shall calculate fatality rates using the statistical methods described in
26 Section (f), except that the investigators may use different notation or methods that are
27 mathematically equivalent with prior approval of the Department. In making these calculations,
28 the investigators may exclude carcass data from the first search of each turbine plot (to eliminate
29 possible counting of carcasses that were present before the turbine was operating).

30 The investigators shall estimate the number of avian and bat fatalities attributable to
31 operation of the facility based on the number of avian and bat fatalities found at the facility site.
32 All carcasses located within areas surveyed, regardless of species, will be recorded and, if
33 possible, a cause of death determined based on blind necropsy results. If a different cause of
34 death is not apparent, the fatality will be attributed to facility operation. The total number of
35 avian and bat fatalities will be estimated by adjusting for removal and searcher efficiency bias.

36 On an annual basis, the certificate holder shall report an estimate of fatalities in eight
37 categories: (1) all birds, (2) small birds, (3) large birds, (4) raptors, (5) grassland birds, (6)
38 nocturnal migrants, (7) state and federally listed threatened and endangered species and State
39 Sensitive Species listed under OAR 635-100-0040 and (8) bats. The certificate holder shall
40 report annual fatality rates on both a per-MW and per-turbine basis.

41 (e) Incidental Finds and Injured Birds

42 The searchers might discover carcasses incidental to formal carcass searches (e.g., while
43 driving within the project area). For each incidentally discovered carcass, the searcher shall

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1 identify, photograph, record data and collect the carcass as would be done for carcasses within
2 the formal search sample during scheduled searches. If the incidentally discovered carcass is
3 found within a formal search plot, the fatality data will be included in the calculation of fatality
4 rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be
5 reported separately. The certificate holder shall coordinate collection of incidentally discovered
6 state endangered, threatened, sensitive or other state protected species with ODFW. The
7 certificate holder shall coordinate collection of incidentally discovered federally-listed
8 endangered or threatened species and Migratory Bird Treaty Act protected avian species with the
9 USFWS.

10 The certificate holder shall develop and follow a protocol for handling injured birds. Any
11 injured native birds found on the facility site will be carefully captured by a trained project
12 biologist or technician and transported to a qualified rehabilitation specialist approved by the
13 Department.² The certificate holder shall pay costs, if any, charged for time and expenses related
14 to care and rehabilitation of injured native birds found on the site, unless the cause of injury is
15 clearly demonstrated to be unrelated to the facility operations.

16 (f) Statistical Methods for Fatality Estimates

17 The estimate of the total number of wind facility-related fatalities is based on:

- 18 (1) The observed number of carcasses found during standardized searches during the
19 two monitoring years for which the cause of death is attributed to the facility.³
- 20 (2) Searcher efficiency expressed as the proportion of planted carcasses found by
21 searchers.
- 22 (3) Removal rates expressed as the estimated average probability a carcass is expected
23 to remain in the study area and be available for detection by the searchers during
24 the entire survey period.

25 Definition of Variables

26 The following variables are used in the equations below:

27	c_i	the number of carcasses detected at plot i for the study period of interest (e.g., one
28		year) for which the cause of death is either unknown or is attributed to the facility
29	n	the number of search plots
30	k	the number of turbines searched (includes the turbines centered within each
31		search plot and a proportion of the number of turbines adjacent to search plots to
32		account for the effect of adjacent turbines on the search plot buffer area)
33	\bar{c}	the average number of carcasses observed per turbine per year
34	s	the number of carcasses used in removal trials
35	s_c	the number of carcasses in removal trials that remain in the study area after 35
36		days

² Approved specialists include Lynn Tompkins (wildlife rehabilitator) of Blue Mountain Wildlife, a wildlife rehabilitation center in Pendleton, and the Audubon Bird Care Center in Portland. The certificate holder must obtain Department approval before using other specialists.

³ If a different cause of death is not apparent, the fatality will be attributed to facility operation.

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1	se	standard error (square of the sample variance of the mean)
2	t_i	the time (days) a carcass remains in the study area before it is removed
3	\bar{t}	the average time (days) a carcass remains in the study area before it is removed
4	d	the total number of carcasses placed in searcher efficiency trials
5	p	the estimated proportion of detectable carcasses found by searchers
6	I	the average interval between searches in days
7	$\hat{\pi}$	the estimated probability that a carcass is both available to be found during a
8		search and is found
9	m_t	the estimated annual average number of fatalities per turbine per year, adjusted
10		for removal and observer detection bias
11	C	nameplate energy output of turbine in megawatts (MW)

12 Observed Number of Carcasses

13 The estimated average number of carcasses (\bar{c}) observed per turbine per year is:

$$14 \quad \bar{c} = \frac{\sum_{i=1}^n c_i}{k} . \quad (1)$$

15 Estimation of Carcass Removal

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

$$18 \quad \bar{t} = \frac{\sum_{i=1}^s t_i}{s - s_c} . \quad (2)$$

19 This estimator is the maximum likelihood estimator assuming the removal times follow an
20 exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at
21 35 days are collected, yielding censored observations at 35 days. If all trial carcasses are
22 removed before the end of the trial, then s_c is 0, and \bar{t} is just the arithmetic average of the
23 removal times. Removal rates will be estimated by carcass size (small and large), habitat type
24 and season.

25 Estimation of Observer Detection Rates

26 Observer detection rates (i.e., searcher efficiency rates) are expressed as p , the proportion
27 of trial carcasses that are detected by searchers. Observer detection rates will be estimated by
28 carcass size, habitat type and season.

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1 Estimation of Facility-Related Fatality Rates

2 The estimated per turbine annual fatality rate (m_t) is calculated by:

3
$$m_t = \frac{\bar{c}}{\hat{\pi}}, \quad (3)$$

4 where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and
5 observer detection bias assuming that the carcass removal times t_i follow an exponential
6 distribution. Under these assumptions, this detection probability is estimated by:

7
$$\hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp \frac{I}{\bar{t}} - 1}{\exp \frac{I}{\bar{t}} - 1 + p} \right]. \quad (4)$$

8 The estimated per MW annual fatality rate (m) is calculated by:

9
$$m = \frac{m_t}{C}. \quad (5)$$

10 The final reported estimates of m , associated standard errors and 90% confidence
11 intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer
12 simulation technique that is useful for calculating point estimates, variances and confidence
13 intervals for complicated test statistics. For each iteration of the bootstrap, the plots will be
14 sampled with replacement, trial carcasses will be sampled with replacement, and \bar{c} , \bar{t} , p , $\hat{\pi}$ and
15 m will be calculated. A total of 5,000 bootstrap iterations will be used. The reported estimates
16 will be the means of the 5,000 bootstrap estimates. The standard deviation of the bootstrap
17 estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 5000
18 bootstrap estimates are estimates of the lower limit and upper limit of 90% confidence intervals.

19 Nocturnal Migrant and Bat Fatalities

20 Differences in observed nocturnal migrant and bat fatality rates for lit turbines, unlit
21 turbines that are adjacent to lit turbines and unlit turbines that are not adjacent to lit turbines will
22 be compared graphically and statistically.

23 (g) Mitigation

24 The certificate holder shall use a worst-case analysis to resolve any uncertainty in the
25 results and to determine whether the data indicate that additional mitigation should be
26 considered. The Department may require additional, targeted monitoring if the data indicate the
27 potential for significant impacts that cannot be addressed by worst-case analysis and appropriate
28 mitigation.

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1 Mitigation may be appropriate if fatality rates exceed a “threshold of concern.”⁴ For the
2 purpose of determining whether a threshold has been exceeded, the certificate holder shall
3 calculate the average annual fatality rates for species groups after each year of monitoring. Based
4 on current knowledge of the species that are likely to use the habitat in the area of the facility, the
5 following thresholds apply to the MWPF:

Species Group	Threshold of Concern (fatalities per MW)
Raptors (All eagles, hawks, falcons and owls, including burrowing owls.)	0.09
Raptor species of special concern (Swainson’s hawk, ferruginous hawk, peregrine falcon, golden eagle, bald eagle, burrowing owl and any federal threatened or endangered raptor species.)	0.06
Grassland species (All native bird species that rely on grassland habitat and are either resident species occurring year round or species that nest in the area, excluding horned lark, burrowing owl and northern harrier.)	0.59
State sensitive avian species listed under OAR 635-100-0040 (Excluding raptors listed above.)	0.2
Bat species as a group	2.5

6 If the data show that a threshold of concern for a species group has been exceeded, the
7 certificate holder shall implement additional mitigation if the Department determines that
8 mitigation is appropriate based on analysis of the data, consultation with ODFW and
9 consideration of any other significant information available at the time. In addition, the
10 Department may determine that mitigation is appropriate if fatality rates for individual avian or
11 bat species (especially State Sensitive Species) are higher than expected and at a level of
12 biological concern. If the Department determines that mitigation is appropriate, the certificate
13 holder, in consultation with the Department and ODFW, shall propose mitigation measures
14 designed to benefit the affected species. This may take into consideration whether the mitigation
15 required or provided in conjunction with raptor nest monitoring, habitat mitigation, or other
16 components of the *Wildlife Monitoring and Mitigation Plan* or *Habitat Mitigation Plan*, would
17 also benefit the affected species.

18 The certificate holder shall implement mitigation as approved by the Department, subject
19 to review by the Council. The Department may recommend additional, targeted data collection if
20 the need for mitigation is unclear based on the information available at the time. The certificate
21 holder shall implement such data collection as approved by the Council.

⁴ The Council adopted “thresholds of concern” for raptors, grassland species, and state sensitive avian species in the Final Order on the Application for the Klondike III Wind Project (June 30, 2006) and for bats in the Final Order on the Application for the Biglow Canyon Wind Farm (June 30, 2006). As explained in the Klondike III order: “Although the threshold numbers provide a rough measure for deciding whether the Council should be concerned about observed fatality rates, the thresholds have a very limited scientific basis. The exceeding of a threshold, by itself, would not be a scientific indicator that operation of the facility would result in range-wide population level declines of any of the species affected. The thresholds are provided in the Wildlife Monitoring and Mitigation Plan to guide consideration of additional mitigation based on two years of monitoring data.”

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1 The certificate holder shall design mitigation to benefit the affected species group.
2 Mitigation may include, but is not limited to, protection of nesting habitat for the affected group
3 of native species through a conservation easement or similar agreement. Tracts of land that are
4 intact and functional for wildlife are preferable to degraded habitat areas. Preference should be
5 given to protection of land that would otherwise be subject to development or use that would
6 diminish the wildlife value of the land. In addition, mitigation measures might include:
7 enhancement of the protected tract by weed removal and control; increasing the diversity of
8 native grasses and forbs; planting sagebrush or other shrubs; constructing and maintaining
9 artificial nest structures for raptors; improving wildfire response; and conducting or making a
10 contribution to research that will aid in understanding more about the affected species and its
11 conservation needs in the region.

12 If the data show that the threshold of concern for bat species as a group has been
13 exceeded, the certificate holder shall implement additional mitigation if the Department
14 determines that mitigation is appropriate based on analysis of the data, consultation with ODFW
15 and consideration of any other significant information available at the time. For example, if the
16 threshold for bat species as a group is exceeded, the certificate holder may contribute to Bat
17 Conservation International or to a Pacific Northwest bat conservation group to fund new or
18 ongoing research in the Pacific Northwest to better understand wind facility impacts to bat
19 species and to develop possible ways to reduce impacts to the affected species.

20 2. Raptor Nest Surveys

21 The objectives of raptor nest surveys are: (1) to estimate the size of the local breeding
22 populations of raptor species that nest on the ground or aboveground in trees or other
23 aboveground nest locations in the vicinity of the facility; and (2) to determine whether operation
24 of the facility results in a reduction of nesting activity or nesting success in the local populations
25 of the following raptor species: Swainson's hawk, golden eagle, ferruginous hawk and burrowing
26 owl.

27 The certificate holder shall conduct short-term and long-term monitoring. The
28 investigators will use aerial and ground surveys to evaluate nest success by gathering data on
29 active nests, on nests with young and on young fledged. The investigators will analyze the data
30 as described in Section 3(c) and will share the data with state and federal biologists.

31 (a) Short-Term Monitoring

32 Short-term monitoring will be done in two monitoring seasons. The first monitoring
33 season will be in the first raptor nesting season after completion of construction of the facility.
34 The second monitoring season will be in the fourth year after construction is completed. The
35 certificate holder shall provide a summary of the first-year results in the monitoring report
36 described in Section 5. After the second monitoring season, the investigators will analyze two
37 years of data compared to the baseline data.

38 For Raptor Species that Nest Aboveground

39 During each monitoring season, the investigators will conduct a minimum of one aerial
40 and one ground survey for raptor nests in late May or early June and additional surveys as
41 described in this section. The survey area is the area within the facility site and a 2-mile buffer
42 zone around the site. For the ground surveys while checking for nesting *success* (conducted

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1 within the facility site and up to a maximum of ½ mile from the facility site), nests outside the
2 leased project boundary will be checked from an appropriate distance where feasible, depending
3 on permission from the landowner for access.

4 All nests discovered during pre-construction surveys and any nests discovered during
5 post-construction surveys, whether active or inactive, will be given identification numbers. Nest
6 locations will be recorded on U.S. Geological Survey 7.5-minute quadrangle maps. Global
7 positioning system (GPS) coordinates will be recorded for each nest. Locations of inactive nests
8 will be recorded because they could become occupied during future years.

9 Determining nest *occupancy* may require one or two visits to each nest. Aerial surveys
10 for nest occupancy will be conducted within the facility site and a 2-mile buffer. For occupied
11 nests, the certificate holder will determine nesting *success* by a minimum of one ground visit to
12 determine the species, number of young and young fledged within the facility site and up to ½
13 mile from the facility site. “Nesting success” means that the young have successfully fledged
14 (the young are independent of the core nest site).

15 For Burrowing Owls

16 If burrowing owl nest sites are discovered, the investigators will monitor them according
17 to the following protocol. This species is not easily detected during aerial raptor nest surveys.
18 The investigators shall record active burrowing owl nest sites in the vicinity of the facility as
19 they are discovered during other wildlife monitoring tasks. Any nests discovered during post-
20 construction surveys, whether active or showing signs of intermittent use by the species, will be
21 given identification numbers. Nest locations will be recorded on U.S. Geological Survey
22 7.5-minute quadrangle maps. Global positioning system coordinates will be recorded for each
23 nest site. Coordinates for ancillary burrows used by one nesting pair or a group of nesting pairs
24 will also be recorded. Locations of inactive nests will be recorded because they could become
25 occupied during future years.

26 The investigators shall conduct burrowing owl monitoring in the same years as the raptor
27 nest surveys described above. For occupied nests, the investigators shall determine nesting
28 *success* by a minimum of one ground visit to determine species, number of young and young
29 fledged. “Nesting success” means that the young have successfully fledged (the young may or
30 may not be independent of the core nest site). Three visits to the nest sites may be necessary to
31 determine outcome. Nests that cannot be monitored due to the landowner denying access will be
32 checked from a distance where feasible.

33 If burrowing owl nests are discovered during the first year of post-construction raptor
34 nest surveys (the first raptor nesting season after construction is completed), the investigators
35 shall monitor those nest locations during the second year of surveys in the fourth year after
36 construction is completed. Thereafter, the investigators shall monitor all known burrowing owl
37 nest locations as a part of the long-term raptor nest monitoring program described in Section 2(b)
38 below.

39 (b) Long-Term Monitoring

40 In addition to the two years of post-construction raptor nest surveys described in Section
41 2(a), the investigators shall conduct long-term raptor nest surveys at 5-year intervals for the life

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1 of the facility.⁵ Investigators will conduct the first long-term raptor nest survey in the raptor
2 nesting season of the ninth year after construction is completed and will repeat the survey at 5-
3 year intervals thereafter. In conducting long-term surveys, the investigators will follow the same
4 survey protocols as described above in Section 2(a) unless the investigators propose alternative
5 protocols that are approved by the Department. In developing an alternative protocol, the
6 investigators will consult with ODFW and will take into consideration other monitoring
7 conducted in adjacent areas. The investigators will analyze the data and report after each year of
8 long-term raptor nest surveys.

9 (c) Analysis

10 The investigators will analyze the raptor nesting data to determine whether a reduction in
11 either nesting success or nest use has occurred in the survey area. If the analysis indicates a
12 reduction in nesting success or nest use by Swainson's hawks, ferruginous hawks or burrowing
13 owls, then the certificate holder will propose appropriate mitigation for the affected species as
14 described in Section 2(d) and will implement mitigation as approved by the Department, subject
15 to review by the Council.

16 Reductions in nesting success or nest use could be due to operation of the MWPF,
17 operation of another wind facility in the vicinity or some other cause. The investigators shall
18 attribute the reduction to operation of the MWPF if the wind turbine closest to the affected nest
19 site is an MWPF turbine, unless the certificate holder demonstrates, and the Department agrees,
20 that the reduction was due to a different cause. At a minimum, if the analysis shows that a
21 Swainson's hawk, ferruginous hawk or burrowing owl has abandoned a nest territory within the
22 facility site or within ½ mile of the facility site or has not fledged any young over two successive
23 surveys within that same area, the investigators will assume the abandonment or unsuccessful
24 fledging is due to operation of the facility unless another cause can be demonstrated
25 convincingly.

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

32 (d) Mitigation

33 If the analysis shows a reduction in nesting success or nest use, the certificate holder shall
34 implement mitigation if the Department determines that mitigation is appropriate. The certificate
35 holder shall propose mitigation for the affected species in consultation with the Department and
36 ODFW and shall implement mitigation as approved by the Council. In proposing appropriate
37 mitigation, the certificate holder shall advise the Department if any other wind project in the area
38 is obligated to provide mitigation for a reduction in raptor nesting success at the same nest site.
39 Mitigation should be designed to benefit the affected species or contribute to overall scientific
40 knowledge and understanding of what causes nest abandonment or nest failure. Mitigation may

⁵ As used in this plan, "life of the facility" means continuously until the facility site is restored and the site certificate is terminated in accordance with OAR 345-027-0110.

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1 be designed to proceed in phases over several years. It may include, but is not limited to,
2 additional raptor nest monitoring, protection of natural nest sites from human disturbance or
3 cattle activity (preferably within the general area of the facility) or participation in research
4 projects designed to improve scientific understanding of the needs of the affected species.
5 Mitigation may take into consideration whether the mitigation required or provided in
6 conjunction with other components of the *Wildlife Monitoring and Mitigation Plan* or *Habitat*
7 *Mitigation Plan* would also benefit the raptor species whose nesting success was adversely
8 affected.

9 **3. Washington ground squirrel surveys**

10 The certificate holder shall conduct long-term post-construction surveys to collect data on
11 Washington ground squirrel (WGS) activity within the site boundary. Qualified professional
12 biologists will monitor the locations within the facility site where WGS were detected in pre-
13 construction surveys (beginning in 2008). The survey area includes the identified burrow areas
14 and the buffer areas within 785 feet in suitable habitat. The investigators will walk standard
15 protocol-level transects twice between late March and late May and record level of use, notes on
16 natal sites, physical extent of the sites and any noticeable land use or habitat changes that may
17 have occurred since the preconstruction survey in 2010. The investigators shall report any new
18 WGS detections.

19 The certificate holder shall conduct surveys during the year following construction and
20 every three years thereafter for the life of the facility. After each survey, the certificate holder
21 shall report the results to ODFW and to the Department and shall include maps of the areas
22 surveyed and detection locations.

23 **4. Wildlife Reporting and Handling System**

24 The Wildlife Reporting and Handling System (WRHS) is a monitoring program to search
25 for and handle avian and bat casualties found by maintenance personnel during operation of the
26 facility. Maintenance personnel will be trained in the methods needed to carry out this program.
27 This monitoring program includes the initial response, handling and reporting of bird and bat
28 carcasses discovered incidental to maintenance operations (“incidental finds”).

29 All avian and bat carcasses discovered by maintenance personnel will be photographed
30 and data will be recorded as would be done for carcasses within the formal search sample during
31 scheduled searches. If maintenance personnel discover incidental finds, the maintenance
32 personnel will notify a project biologist. The project biologist (or the project biologist’s
33 experienced wildlife technician) will collect the carcass or will instruct maintenance personnel to
34 have an on-site carcass handling permittee collect the carcass. The certificate holder’s on-site
35 carcass handling permittee must be a person who is listed on state and federal scientific or
36 salvage collection permits and who is available to process (collect) the find on the day it is
37 discovered. The find must be processed on the same day as it is discovered.

38 During the years in which fatality monitoring occurs, if maintenance personnel discover
39 incidental finds outside the search plots for the fatality monitoring searches, the data will be
40 reported separately from fatality monitoring data. If maintenance personnel discover carcasses
41 within search plots, the data will be included in the calculation of fatality rates. The maintenance
42 personnel will notify a project biologist. The project biologist will collect the carcass or will
43 instruct maintenance personnel to have an on-site carcass handling permittee collect the carcass.

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1 As stated above, the on-site permittee must be available to process the find on the day it is
2 discovered. The certificate holder shall coordinate collection of state endangered, threatened,
3 sensitive or other state protected species with ODFW. The certificate holder shall coordinate
4 collection of federally-listed endangered or threatened species and Migratory Bird Treaty Act
5 protected avian species with the USFWS.

6 **5. Data Reporting**

7 The certificate holder will report wildlife monitoring data and analysis to the Department
8 for each calendar year in which wildlife monitoring occurs. Monitoring data include fatality
9 monitoring program data, raptor nest survey data, WGS survey data, WGS incidental observation
10 and assessment reports, and WRHS data. The certificate holder may include the reporting of
11 wildlife monitoring data and analysis in the annual report required under OAR 345-026-0080 or
12 submit this information as a separate document at the same time the annual report is submitted.
13 In addition, the certificate holder shall provide to the Department any data or record generated in
14 carrying out this monitoring plan upon request by the Department.

15 The certificate holder shall notify USFWS and ODFW immediately if any federal or state
16 endangered or threatened species are killed or injured on the facility site.

17 Within 30 days after receiving the final versions of reports that are required under this
18 plan, the Department will make the reports available to the public on its website and will specify
19 a time in which the public may submit comments to the Department.⁶

20 **6. Amendment of the Plan**

21 This *Wildlife Monitoring and Mitigation Plan* may be amended from time to time by
22 agreement of the certificate holder and the Council. Such amendments may be made without
23 amendment of the site certificate. The Council authorizes the Department to agree to
24 amendments to this plan and to mitigation actions that may be required under this plan. The
25 Department shall notify the Council of all amendments and mitigation actions, and the Council
26 retains the authority to approve, reject or modify any amendment of this plan or mitigation action
27 agreed to by the Department.

⁶ The certificate holder may establish a Technical Advisor Committee (TAC) but is not required to do so. If the certificate holder establishes a TAC, the TAC may offer comments to the Council about the results of the monitoring required under this plan.