

GOLDEN HILLS WIND FARM: WILDLIFE MONITORING AND MITIGATION PLAN **[AUGUST 2008]**

1 This plan describes wildlife monitoring that the certificate holder shall conduct during
2 operation of the Golden Hills Wind Farm (GHWF).¹ The monitoring objectives are to determine
3 whether operation of the facility causes significant fatalities of birds and bats and to determine
4 whether the facility results in a loss of habitat quality. Golden Hills wind power project consists
5 of a number of turbine strings, with up to 267 turbines. Each turbine will likely either be a 1.65
6 MW or 2.5 MW capacity turbine. Hub height of the turbines will be up to approximately 80 (m)
7 tall with a rotor diameter of either 82m (1.65 MW) or 96m (2.5 MW). Up to six permanent
8 meteorological towers will be built. The turbines will be linked by access roads and a 34.5-kV
9 transmission line. The 62-mile long power collection system will be largely underground, but
10 might be overhead in some locations.

11 The certificate holder shall use experienced personnel to manage the monitoring required
12 under this plan and properly trained personnel to conduct the monitoring, subject to approval by
13 the Oregon Department of Energy (Department) as to professional qualifications. For all
14 components of this plan except the Raptor Nesting Surveys and the Wildlife Incident Response
15 and Handling System, the certificate holder shall direct a qualified independent third-party
16 biological monitor, as approved by the Department, to perform monitoring tasks.

17 The Wildlife Monitoring and Mitigation Plan for the GHWF has the following
18 components:

- 19 1) Fatality Monitoring Program including:
 - 20 a) Removal Trials
 - 21 b) Searcher Efficiency Trials
 - 22 c) Fatality Monitoring Search Protocol
 - 23 d) Statistical Analysis
- 24 2) Raptor Nesting Surveys
- 25 3) Avian Use and Behavior Surveys
- 26 4) Wildlife Incident Response and Handling System

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

29 The selection of the mitigation actions that the certificate holder may be required to
30 implement under this plan should allow for flexibility in creating appropriate responses to
31 monitoring results that cannot be known in advance. If the Department determines that
32 mitigation is needed, the certificate holder shall propose appropriate mitigation actions to the
33 Department and shall carry out mitigation actions approved by the Department, subject to review
34 by the Oregon Energy Facility Council (Council).

¹ This plan is incorporated by reference in the site certificate for the BCWF 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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1. Fatality Monitoring

(a) 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

Search Plots

The certificate holder shall conduct fatality monitoring within search plots. The certificate holder, in consultation with the Oregon Department of Fish and Wildlife (ODFW), will select search plots based on a systematic sampling design that ensures the selected search plots are representative of the habitat 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 and ODFW before beginning fatality monitoring at the facility. The certificate holder will use the same search plots for each search conducted during each monitoring year. During the second monitoring year, new search plots will be selected from the turbines not sampled during the first monitoring year.

Sample Size

The sample size for fatality monitoring is the number of turbines searched per monitoring year. The certificate holder shall conduct fatality monitoring during the each monitoring year in search plots at 1/3 of the turbines. If fewer than 150 turbines are built, GHWF shall monitor a minimum of 50 turbines.

As described in Exhibit B of the ASC, GHWF may choose a combination of smaller turbines with rotor diameter of 82 meters, or larger turbines with rotor diameter greater than 82 meters. If the final design of GHWF includes both large and small turbines, then GHWF shall, before beginning fatality monitoring, consult with an independent expert with experience in statistical analysis of avian fatality data to determine whether it would be possible to design a 50-turbine sample with a sufficient number of turbines in each size class to allow statistical comparison of fatality rates for all birds as a group. GHWF shall submit the expert's written analysis to the Department. If the analysis shows that a comparison study is possible and if the Department approves, GHWF shall sample the appropriate number of turbines in each class and conduct the comparison study. GHWF may choose to sample more than 50 turbines in a each monitoring year, if a larger sample size would allow the comparison study to be done.

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1
2 Scheduling and Sampling Frequency

3 Fatality monitoring will begin upon the commencement of commercial operation of the
4 facility.

5 The first fatality monitoring year will commence on the first day of the month following
6 the commercial operation date of the facility and will conclude twelve months later (for example,
7 if commercial operation begins in October of 2008, the monitoring year will commence on
8 November 1, 2008, and conclude on October 31, 2009). Subsequent monitoring years will follow
9 the same schedule (for example, the second monitoring year would begin November 1 of the
10 year in which monitoring is performed, and conclude October 31 of the following year)

11 In each monitoring year, the certificate holder shall conduct fatality-monitoring searches
12 at the rates of frequency shown below. Over the course of one monitoring year, the certificate
13 holder would conduct 16 searches², 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)

14 Duration of Fatality Monitoring

15 GHWF shall perform one complete monitoring cycle during its first full year of
16 operation. At the end of the first year of monitoring, GHWF will report the results for joint
17 evaluation by ODOE, GHWF and ODFW. In the evaluation, results for GHWF will be
18 compared with the threshold table in section 1(g) of this plan, and with analogous fatality
19 monitoring results for Klondike III, Biglow Canyon, Combine Hills, Nine Canyon, Hopkins
20 Ridge and, if available, Leaning Juniper. Fatality monitoring results from other wind power
21 facilities in the Columbia Basin may also be included, if available. If fatality results for the first
22 year of monitoring at GHWF do not exceed any of the thresholds of concern and are within the
23 range of all results from the facilities listed above, then GHWF will perform its second year of
24 monitoring in year 5 of operations.

25 Otherwise, GHWF shall propose additional mitigation within 6 months, for ODOE and
26 ODFW review. Alternately, GHWF may opt to perform a second year of fatality monitoring
27 immediately if it believes that the results of year 1 monitoring were anomalous. If GHWF takes
28 this option, then it will still perform the monitoring in year 5 of operations described above.

29 Meteorological Towers

30 The facility will most likely use non-guyed meteorological towers. Non-guyed towers are
31 known to cause little if any bird and bat mortality. Therefore, monitoring will not occur at non-
32 guyed meteorological towers. If the meteorological towers are guyed, the certificate holder shall
33 search all towers on the same monitoring schedule as fatality monitoring. The certificate holder

² GHWF may omit the searches on some turbines, if searches are not possible due to safety reasons .

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1 will use circular search plots. The radius of the circular search plots will extend a minimum of 5
2 meters beyond the most distant guy wire anchor point.

3 (b) Removal Trials

4 The objective of the removal trials is to estimate the length of time avian and bat
5 carcasses remain in the search area. Carcass removal studies will be conducted during each
6 season in the vicinity of the search plots. Estimates of carcass removal rates will be used to
7 adjust carcass counts for removal bias. "Carcass removal" is the disappearance of a carcass from
8 the search area due to predation, scavenging or other means such as farming activity. Removal
9 rates will be estimated by size class, habitat and season.

10 During the first year, the certificate holder shall conduct carcass removal trials within
11 each of the seasons defined above during the years in which fatality monitoring occurs. During
12 the first year in which fatality monitoring occurs, trials will occur in at least eight different
13 calendar weeks in a year, with at least one calendar week between starting dates. Trials will be
14 spread throughout the year to incorporate the effects of varying weather, farming practices and
15 scavenger densities. At least two trials will be started in each season. Each trial will use at least 6
16 carcasses. For each trial, 3 small bird carcasses and 3 large bird carcasses will be distributed in
17 cultivated agriculture habitat and 3 small bird carcasses and 3 large bird carcasses will be
18 distributed in non-cultivated habitat (grassland/shrub-steppe and CRP). In a year, approximately
19 48 carcasses will be placed in cultivated agriculture and 48 carcasses in non-cultivated
20 grassland/shrub-steppe and CRP for a total of about 96 trial carcasses. The number of removal
21 trials may be adjusted up or down during the second year of fatality monitoring, subject to
22 approval by the Department, if the certificate holder can demonstrate that the calculation of
23 fatality rates will continue to have statistical validity with the new sample size.

24 The "small bird" size class will use carcasses of house sparrows, starlings, commercially
25 available game bird chicks or legally obtained native birds to simulate passerines. The "large
26 bird" size class will use carcasses of raptors provided by agencies, commercially available adult
27 game birds or cryptically colored chickens to simulate raptors, game birds and waterfowl. If
28 fresh bat carcasses are available, they may also be used.

29 To avoid confusion with turbine-related fatalities, planted carcasses will not be placed in
30 fatality monitoring search plots. Planted carcasses will be placed in the vicinity of search plots
31 but not so near as to attract scavengers to the search plots. The planted carcasses will be located
32 randomly within the carcass removal trial plots.

33 Carcasses will be placed in a variety of postures to simulate a range of conditions. For
34 example, birds will be: 1) placed in an exposed posture (e.g., thrown over the shoulder), 2)
35 hidden to simulate a crippled bird (e.g., placed beneath a shrub or tuft of grass) and, 3) partially
36 hidden. Trial carcasses will be marked discreetly for recognition by searchers and other
37 personnel. Trial carcasses will be left at the location until the end of the carcass removal trial.

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

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1 (c) Searcher Efficiency Trials

2 The objective of searcher efficiency trials is to estimate the percentage of bird and bat
3 fatalities that searchers are able to find. The certificate holder shall conduct searcher efficiency
4 trials on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated
5 agriculture habitat types. Searcher efficiency will be estimated by size class, habitat type and
6 season. Estimates of searcher efficiency will be used to adjust carcass counts for detection bias.

7 Searcher efficiency trials will be conducted in each season as defined above, during the
8 years in which the fatality monitoring occurs. Trials will be spread throughout the year to
9 incorporate the effects of varying weather, farming practices and scavenger densities. At least
10 two trials will be conducted in each season. Each trial will use about 12 carcasses, although the
11 number will be variable so that the searcher will not know the total number of trial carcasses
12 being used in any trial. For each trial, both small bird and large bird carcasses will be used in
13 about equal numbers. “Small bird” and “large bird” size classes and carcass selection are as
14 described above for the removal trials. An equal proportion of the trial carcasses will be
15 distributed in cultivated agriculture habitat and in non-cultivated habitat (grassland/shrub steppe
16 and CRP). In a year, about 48 carcasses will be placed in cultivated agriculture and about 48 in
17 non-cultivated grassland/shrub steppe and CRP for a total of about 96 trial carcasses. The
18 number of searcher efficiency trials may be reduced to one per season during the second year of
19 fatality monitoring, subject to approval by the Department, if the certificate holder can
20 demonstrate that the calculation of fatality rates will continue to have statistical validity with the
21 reduced sample size.

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

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

30 Searcher efficiency trials will be spread over the entire season to incorporate effects of
31 varying weather and vegetation growth. Carcasses will be placed in a variety of postures to
32 simulate a range of conditions. For example, birds will be: 1) placed in an exposed posture
33 (thrown over the shoulder), 2) hidden to simulate a crippled bird and 3) partially hidden.

34 Each non-domestic carcass will be discreetly marked so that it can be identified as an
35 efficiency trial carcass after it is found. The number and location of the efficiency trial carcasses
36 found during the carcass search will be recorded. The number of efficiency trial carcasses
37 available for detection during each trial will be determined immediately after the trial by the
38 person responsible for distributing the carcasses.

39 If new searchers are brought into the search team, additional detection trials will be
40 conducted to ensure that detection rates incorporate searcher differences. If GHWF does not
41 perform a second year of monitoring until the 5th year of operation, then searcher efficiency and
42 removal trials shall be repeated to ensure that the removal and detection rates used to estimate

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1 overall fatalities account for new searchers and changed predation or scavenger behavior
2 patterns.

3 (d) Coordination with the other Wind Projects

4 It is anticipated that other wind projects in Sherman County may be monitored at the
5 same time that Golden Hills is monitored. If these projects are permitted through EFSEC, they
6 will require similar wildlife monitoring. Subject to the approval of both certificate holders and
7 the Department, the number of trials at each site and the number of trial carcasses used at each
8 site can be reduced by combining the removal data and efficiency data from multiple facilities, if
9 the certificate holder can demonstrate that the calculation of fatality rates will continue to have
10 statistical validity for both facilities and that combining the data will not affect any other
11 requirements of the monitoring plans for either facility.

12 (e) Fatality Monitoring Search Protocol

13 The objective of fatality monitoring is to estimate the number of bird and bat fatalities
14 that are attributable to facility operation and associated variances. The certificate holder shall
15 conduct fatality monitoring using standardized carcass searches.

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

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

27 Personnel trained in proper search techniques (“the searchers”) will conduct the carcass
28 searches by walking parallel transects within the search plots.³ Transects will be initially set at 6
29 meters apart in the area to be searched. A searcher will walk at a rate of about 45 to 60 meters
30 per minute along each transect searching both sides out to three meters for casualties. Search area
31 and speed may be adjusted by habitat type after evaluation of the first searcher efficiency trial.
32 The searchers will record the condition of each carcass found, using the following condition
33 categories:

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

³ Where search plots are adjacent, the search area may be rectangular.

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- 1 ▪ Feather Spot – 10 or more feathers at one location indicating predation or scavenging
2 or 2 or more primary feathers

3 All carcasses (avian and bat) found during the standardized carcass searches will be
4 photographed as found, recorded and labeled with a unique number. Distance from observer to
5 the carcass will be measured (to the nearest 0.25 meters), as will the perpendicular distance from
6 the transect line to the carcass. Each carcass will be bagged and frozen for future reference and
7 possible necropsy. A copy of the data sheet for each carcass will be kept with the carcass at all
8 times. For each carcass found, searchers will record species, sex and age when possible, date and
9 time collected, location, condition (e.g., intact, scavenged, feather spot) and any comments that
10 may indicate cause of death. Searchers will map the find on a detailed map of the search area
11 showing the location of the wind turbines and associated facilities such as power lines. The
12 certificate holder shall coordinate collection of state endangered, threatened, sensitive or other
13 state protected species with ODFW. The certificate holder shall coordinate collection of
14 federally-listed endangered or threatened species and Migratory Bird Treaty Act protected avian
15 species with the U.S. Fish and Wildlife Service (USFWS). The certificate holder shall obtain
16 appropriate collection permits from ODFW and USFWS.

17 The searchers might discover carcasses incidental to formal carcass searches (e.g., while
18 driving within the project area). For each incidentally discovered carcass, the searcher shall
19 identify, photograph, record data and collect the carcass as would be done for carcasses within
20 the formal search sample during scheduled searches

21 If the incidentally discovered carcass is found within a formal search plot, the fatality
22 data will be included in the calculation of fatality rates. If the incidentally discovered carcass is
23 found outside a formal search plot, the data will be reported separately.

24 The certificate holder shall coordinate collection of incidentally discovered state
25 endangered, threatened, sensitive or other state protected species with ODFW. The certificate
26 holder shall coordinate collection of incidentally discovered federally-listed endangered or
27 threatened species and Migratory Bird Treaty Act protected avian species with the USFWS.

28 The certificate holder shall develop and follow a protocol for handling injured birds. Any
29 injured native birds found on the facility site will be carefully captured by a trained project
30 biologist or technician and transported to Jean Cypher (wildlife rehabilitator) in The Dalles, the
31 Blue Mountain Wildlife Rehabilitation Center in Pendleton or the Audubon Bird Care Center in
32 Portland in a timely fashion.⁴ The certificate holder shall pay costs, if any are charged, for time
33 and expenses related to care and rehabilitation of injured native birds found on the site, unless
34 the cause of injury is clearly demonstrated to be unrelated to the facility operations.

35 (f) Statistical Methods for Fatality Estimates

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

- 37 (1) The observed number of carcasses found during standardized searches during the two
38 monitoring years for which the cause of death is attributed to the facility.⁵

⁴ The people and centers listed here may be changed with Department approval.

⁵ If a different cause of death is not apparent, the fatality will be attributed to facility operation.

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- 1 (2) Searcher efficiency expressed as the proportion of planted carcasses found by
2 searchers.
- 3 (3) Non-removal rates expressed as the estimated average probability a carcass is
4 expected to remain in the study area and be available for detection by the searchers
5 during the entire survey period.

6 Definition of Variables

7 The following variables are used in the equations below:

8 c_i the number of carcasses detected at plot i for the study period of interest (e.g., one
9 year) for which the cause of death is either unknown or is attributed to the facility

10 n the number of search plots

11 k the number of turbines searched (includes the turbines centered within each
12 search plot and a proportion of the number of turbines adjacent to search plots to
13 account for the effect of adjacent turbines on the 90-meter search plot buffer area)

14 \bar{c} the average number of carcasses observed per turbine per year

15 s the number of carcasses used in removal trials

16 s_c the number of carcasses in removal trials that remain in the study area after 40
17 days

18 se standard error (square of the sample variance of the mean)

19 t_i the time (days) a carcass remains in the study area before it is removed

20 \bar{t} the average time (days) a carcass remains in the study area before it is removed

21 d the total number of carcasses placed in searcher efficiency trials

22 p the estimated proportion of detectable carcasses found by searchers

23 I the average interval between searches in days

24 $\hat{\pi}$ the estimated probability that a carcass is both available to be found during a
25 search and is found

26 \bar{m}_t the estimated annual average number of fatalities per turbine per year, adjusted
27 for removal and observer detection bias

28 C nameplate energy output of turbine in megawatts (MW)

29 Observed Number of Carcasses

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

31
$$\bar{c} = \frac{\sum_{i=1}^n c_i}{k} . \tag{1}$$

32 Estimation of Carcass Removal

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

$$4 \quad \bar{t} = \frac{\sum_{i=1}^s t_i}{s - s_c} . \quad (2)$$

5 This estimator is the maximum likelihood estimator assuming the removal times follow an
6 exponential distribution and there is right-censoring of data. Any trial carcasses still remaining at
7 40 days are collected, yielding censored observations at 40 days. If all trial carcasses are
8 removed before the end of the trial, then s_c is 0, and \bar{t} is just the arithmetic average of the
9 removal times. Removal rates will be estimated by carcass size (small and large) and season.

10 Estimation of Observer Detection Rates

11 Observer detection rates (i.e., searcher efficiency rates) are expressed as p , the proportion
12 of trial carcasses that are detected by searchers. Observer detection rates will be estimated by
13 carcass size and season.

14 Estimation of Facility-Related Fatality Rates

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

$$16 \quad m_t = \frac{\bar{c}}{\hat{\pi}} , \quad (3)$$

17 where $\hat{\pi}$ includes adjustments for both carcass removal (from scavenging and other means) and
18 observer detection bias assuming that the carcass removal times t_i follow an exponential
19 distribution unless a different assumption about carcass removal is made with the approval of the
20 Department. Under these assumptions, this detection probability is estimated by:

$$21 \quad \hat{\pi} = \frac{\bar{t} \cdot p}{I} \cdot \left[\frac{\exp\left(\frac{I}{\bar{t}}\right) - 1}{\exp\left(\frac{I}{\bar{t}}\right) - 1 + p} \right] . \quad (4)$$

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

$$23 \quad m = \frac{m_t}{C} . \quad (5)$$

24 The certificate holder shall calculate fatality estimates for: (1) all birds, (2) small birds,
25 (3) large birds, (4) raptors, (5) target grassland birds, (6) nocturnal avian migrants, 7) avian State
26 Sensitive Species listed under OAR 635-100-0040, and 8) bats. The final reported estimates of
27 m , associated standard errors and 90% confidence intervals will be calculated using
28 bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for
29 calculating point estimates, variances and confidence intervals for complicated test statistics. For
30 each iteration of the bootstrap, the plots will be sampled with replacement, trial carcasses will be
31 sampled with replacement and \bar{c} , \bar{t} , p , $\hat{\pi}$ and m will be calculated. A total of 5,000 bootstrap
32 iterations will be used. The reported estimates will be the means of the 5,000 bootstrap estimates.
33 The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th

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1 and upper 95th percentiles of the 5000 bootstrap estimates are estimates of the lower limit and
 2 upper limit of 90% confidence intervals.

3 Nocturnal Migrant and Bat Fatalities

4 Differences in observed nocturnal avian migrant and bat fatality rates for lit turbines,
 5 unlit turbines that are adjacent to lit turbines, and unlit turbines that are not adjacent to lit
 6 turbines will be compared graphically and statistically.

7 (g) Mitigation

8 Mitigation may be appropriate if analysis of the fatality data collected after the first
 9 monitoring year shows fatality rates for avian species that exceed a threshold of concern. For the
 10 purpose of determining whether a threshold has been exceeded, the certificate holder shall
 11 calculate the average annual fatality rates for the species groups after the initial two years of
 12 monitoring. Based on current knowledge of the species that are likely to use the habitat in the
 13 area of the facility, the following thresholds apply to the GHWF:

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
Target grassland birds (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.)	0.20
Bat species as a group	2.50
Guyed Meteorological Tower Mortality	
Raptor T&E species and raptor species of special concern, as a group (Swainson’s hawk, ferruginous hawk, golden eagle and burrowing owl; bald eagle, peregrine falcon, and any other federal threatened or endangered raptor species)	0.20/ guyed tower
Avian State Sensitive Species listed under OAR 635-100-0040 (Excluding raptors)	0.20/ guyed tower

14 Before the end of the first monitoring year, GHWF shall form a technical advisory
 15 committee (TAC) that will include at least GHWF, ODOE and ODFW. Other stakeholders, such
 16 as USFWS, may also serve on the TAC. The TAC shall consider the fatality monitoring results
 17 from Klondike III, Biglow Canyon, Nine Canyon, Leaning Juniper, Hopkins Ridge, Combine
 18 Hills, and other wind projects in Sherman County if available, and determine if the thresholds
 19 should be adjusted.

20 In addition, mitigation may be appropriate if fatality rates for individual species
 21 (especially State Sensitive Species) are higher than expected and at a level of biological concern.
 22 If the data show that a threshold of concern for a species group has been exceeded or that the
 23 fatality rate for any individual species is at a level of biological concern, mitigation shall be
 24 required if the Department determines that mitigation is appropriate based on analysis of the data

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1 and any other significant information available at the time. If mitigation is appropriate, the
2 certificate holder, in consultation with ODFW, shall propose mitigation measures designed to
3 benefit the affected species. This may take into consideration whether mitigation required or
4 provided for other impacts, such as raptor nesting or grassland bird displacement, would also
5 benefit the affected species.

6 The certificate holder shall implement mitigation as approved by the Council. The
7 Department may recommend additional, targeted data collection if the need for mitigation is
8 unclear based on the information available at the time. The certificate holder shall implement
9 such data collection as approved by the Council.

10 Mitigation shall be designed to benefit the affected species group. Mitigation may
11 include, but is not limited to, protection of nesting habitat for the affected group of native species
12 through a conservation easement or similar agreement. Tracts of land that are intact and
13 functional for wildlife are preferable to degraded habitat areas. Preference should be given to
14 protection of land that would otherwise be subject to development or use that would diminish the
15 wildlife value of the land. In addition, mitigation measures might include: enhancement of the
16 protected tract by weed removal and control; increasing the diversity of native grasses and forbs;
17 planting sagebrush or other shrubs; constructing and maintaining artificial nest structures for
18 raptors; reducing cattle grazing; improving wildfire response; and local research that would aid
19 in understanding more about the species and conservation needs.

20 If the threshold for bats species as a group is exceeded, the certificate holder shall
21 contribute to Bat Conservation International or to a Pacific Northwest bat conservation group
22 (\$10,000 per year for three years) to fund new or ongoing research in the Pacific Northwest to
23 better understand impacts to the bat species impacted by the facility and to develop possible
24 ways to reduce impacts to the affected species.

25 In addition, mitigation may be appropriate if fatality rates for a State Sensitive bat species
26 listed under OAR 635-100-0040 are higher than expected and at a level of concern. If the data
27 show that a threshold of concern for a species group has been exceeded or that the fatality rate
28 for any individual species is at a level of concern, mitigation shall be required if the Department
29 determines that mitigation is appropriate based on analysis of the data and any other significant
30 information available at the time. If mitigation is appropriate, the certificate holder, in
31 consultation with ODFW, shall propose mitigation measures designed to benefit the affected
32 species. The certificate holder shall implement mitigation as approved by the Council.

2. Raptor Nest Surveys

33 The objectives of raptor nest surveys are to estimate the size of the local breeding
34 populations of tree or other above-ground-nesting raptor species in the vicinity of the facility and
35 to determine whether operation of the facility results in a reduction of nesting activity or nesting
36 success in the local populations of the following raptor species: Swainson's hawk, ferruginous
37 hawk and golden eagle. The certificate holder shall direct a qualified biologist, approved by the
38 Department, to conduct the raptor nest surveys. The certificate holder may select other qualified
39 biologists to conduct the raptor nest surveys, subject to Department approval.

(a) Survey Protocol

41 For the species listed above, aerial and ground surveys will be used to gather nest success
42 data on active nests, nests with young and young fledged. The certificate holder will share the

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1 data with state and federal biologists. The certificate holder shall conduct two years of post-
2 construction raptor nest surveys for the completed facility during the sensitive nesting and
3 breeding season. One year of post-construction surveys will be done in the first nesting season
4 after construction is completed. The second year of post-construction surveys will be done at a
5 time recommended by the certificate holder and approved by the Department. The certificate
6 holder may collaborate with other certificate holders in the vicinity of the facility in the
7 development of useful information about future impacts on raptor nesting activity and nesting
8 success.

9 Prior to the raptor nesting surveys, the certificate holder shall review the locations of
10 known raptor nests based on the GHWF, the Biglow Canyon Wind Farm and Klondike Wind
11 Project pre-construction surveys as well as any nest survey data collected after construction. All
12 known nest sites and any new nests observed within the GCWF site and within two miles of the
13 GHWF site will be given identification numbers. Nest locations will be recorded on U.S.
14 Geological Survey 7.5-minute quadrangle maps. Global positioning system coordinates will be
15 recorded for each nest and integrated with the baseline database. Locations of inactive nests will
16 also be recorded as they may become occupied during future years.

17 During each raptor nesting monitoring year, the certificate holder shall conduct a
18 minimum of one helicopter survey in late May or early June within the GHWF site and a 2-mile
19 zone around the turbines to determine nest occupancy. Determining nest occupancy will likely
20 require two visits to each nest: The second visit may be done by air or by ground as appropriate.
21 For occupied nests of the species identified above, the certificate holder shall determine nesting
22 success by a minimum of one ground visit to determine species, number of young and nesting
23 success. "Nesting success" means that the young have successfully fledged (the young are
24 independent of the core nest site). Nests that cannot be monitored due to the landowner denying
25 access will be checked from a distance where feasible.

26 (b) Mitigation

27 The certificate holder shall analyze the raptor nesting data collected after two monitoring
28 years to determine whether a reduction in either nesting success or nest use has occurred in the
29 vicinity of the GHWF. If the analysis indicates a reduction in nesting success by Swainson's
30 hawk, ferruginous hawk or golden eagle within two miles of the facility (including the area
31 within the GHWF site), then the certificate holder shall propose appropriate mitigation and shall
32 implement mitigation as approved by the Council. At a minimum, if the analysis shows that any
33 of these species has abandoned a nest territory within the facility site or within ½ mile of the
34 facility site, or has not fledged any young over the two survey years within the facility site or
35 within ½ mile of the facility site, the certificate holder shall assume the abandonment or
36 unsuccessful fledging is the result of the facility unless another cause can be demonstrated
37 convincingly. If the GHWF facility and the Klondike III facility are both required to provide
38 mitigation for the same nest, the two certificate holders shall coordinate the required mitigation
39 with the approval of the Department.

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

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1 If the analysis shows that mitigation is appropriate, the certificate holder shall propose
2 mitigation for the affected species in consultation with the Department and ODFW, and shall
3 implement mitigation as approved by the Council. Mitigation should be designed to benefit the
4 affected species or contribute to overall scientific knowledge and understanding of what causes
5 nest abandonment or nest failure. Mitigation may be designed to proceed in phases over several
6 years. It may include, but is not limited to, additional raptor nest monitoring, protection of
7 natural nest sites from human disturbance or cattle activity (preferably within the general area of
8 the facility), or participation in research projects designed to improve scientific understanding of
9 the needs of the affected species. Mitigation may take into consideration whether mitigation
10 required or provided for other impacts, such as fatality impacts or grassland bird displacement,
11 would also benefit the raptor species whose nesting success was adversely affected.

12 (c) Long-term Raptor Nest Monitoring and Mitigation

13 In addition to the two years of post-construction raptor nest surveys described in
14 subsection (a), GHWF shall conduct long-term raptor nest surveys at five year intervals for the
15 life of the facility. GHWF shall conduct the first long-term raptor nest survey in the ninth year
16 after construction is completed. In conducting long-term surveys, GHWF shall follow the same
17 survey protocols as described above in subsection (a) unless GHWF proposes an alternative
18 protocol that is approved by the Department. In developing an alternative protocol, GHWF shall
19 consult with ODFW.

20 GHWF shall analyze the raptor nesting data collected after each year of long-term raptor
21 nest surveys to determine whether a reduction in either nesting success or nest use has occurred
22 in the vicinity of the GHWF. If the analysis indicates a reduction in nesting success or nest use
23 by Swainson's hawks, golden eagles, or ferruginous hawks within the facility site or within 2
24 miles of the site, then GHWF shall propose appropriate mitigation for the affected species as
25 described in subsection (b) and shall implement mitigation as approved by the Council. At a
26 minimum, if the analysis shows that any raptors of these species have abandoned a nest territory
27 within the facility site or within ½ mile of the facility site or has not fledged any young within
28 that same area, GHWF shall assume the abandonment or unsuccessful fledging is due to
29 operation of the facility unless another cause can be demonstrated convincingly.

30 Any reduction in nesting success or nest use could be due to operation of the GHWF
31 facility, operation of another wind facility in the vicinity or some other cause. GHWF shall
32 attribute the reduction to operation of GHWF if the wind turbine closest to the affected nest site
33 is a GHWF turbine unless GHWF demonstrates, and the Department agrees, that the reduction
34 was due to a different cause.

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

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3. Avian Use and Behavior Surveys

1 Searchers will also record bird species observed and their behavior relative to turbine
2 locations before or after each standardized carcass search (as described in Section 1(e) above).
3 Observations will be recorded during 5-minute surveys at each turbine sampled during the
4 fatality monitoring program, using standard variable circular plot point count survey methods.
5 Collection and recording of these additional observations of live birds will be carried out in a
6 manner that does not distract searchers from carrying out the standardized carcass searches.

7 All of these avian use and behavior data, as well as raptor and waterfowl mortality
8 observed at the turbines near these stations, will be used to understand direct and indirect impacts
9 of the GHWF facility on raptors, waterfowl and other avian species. The certificate holder shall
10 include an analysis of this data in the reports described in Section 5.

4. GHWF Wildlife Incident Response and Handling System

11 The Wildlife Incident Response and Handling System is a monitoring program set up for
12 responding to and handling avian and bat casualties found by construction and maintenance
13 personnel during construction and operation of the facility. This monitoring program includes the
14 initial response, the handling and the reporting of bird and bat carcasses discovered incidental to
15 construction and maintenance operations (“incidental finds”). Construction and maintenance
16 personnel will be trained in the methods needed to carry out this program.

17 All carcasses discovered by construction or maintenance personnel will be photographed,
18 recorded and collected.

19 If construction or maintenance personnel find carcasses within the plots for protocol
20 searches, they will notify a qualified biologist, as approved by the Department, who will collect
21 the carcasses. The fatality data will be included in the calculation of fatality rates.

22 If construction or maintenance personnel discover incidental finds that are not within
23 plots for fatality monitoring protocol searches, they will notify a qualified biologist, as approved
24 by the Department, and the carcass will be collected by a carcass-handling permittee (a person
25 who is listed on state and federal scientific or salvage collection permits). Data for these
26 incidental finds will be reported separately from standardized fatality monitoring data.

27 The certificate holder shall coordinate collection of state endangered, threatened,
28 sensitive or other state protected species with ODFW. The certificate holder shall coordinate
29 collection of federally-listed endangered or threatened species and Migratory Bird Treaty Act
30 protected avian species with the USFWS.

5. Data Reporting

31 The certificate holder will report the monitoring data and analysis to the Department.
32 Monitoring data include fatality monitoring program data, raptor nest survey data, avian use and
33 behavior survey data and data on incidental finds by fatality searchers and GHWF personnel.
34 The report may be included in the annual report required under OAR 345-026-0080 or may be
35 submitted as a separate document at the same time the annual report is submitted. In addition, the
36 certificate holder shall provide to the Department any data or record generated in carrying out
37 this monitoring plan upon request by the Department.

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1 The certificate holder shall immediately notify USFWS and ODFW, respectively, in the
2 event that any federal or state endangered or threatened species are killed or injured on the
3 facility site.

4 The public will have an opportunity to receive information about monitoring results and
5 to offer comment. Within 30 days after receiving the annual report of monitoring results, the
6 Department will make the report available to the public on its website and will specify a time in
7 which the public may submit comments to the Department.⁶

6. Amendment of the Plan

8 This Wildlife Monitoring and Mitigation Plan may be amended from time to time by
9 agreement of the certificate holder and the Council. Such amendments may be made without
10 amendment of the site certificate. The Council authorizes the Department to agree to
11 amendments to this plan and to mitigation actions that may be required under this plan. The
12 Department shall notify the Council of all amendments and mitigation actions, and the Council
13 retains the authority to approve, reject or modify any amendment of this plan or mitigation action
14 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.