

# Stateline Wind Project: Oregon Wildlife Monitoring Plan

[Revised June 20, 2005]

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1 This plan describes wildlife monitoring the certificate holder shall conduct during  
2 operation<sup>1</sup> of the Stateline Wind Project facility in Oregon. 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. This plan addresses the facility as  
5 permitted under the Oregon site certificate, as amended.

6 The Stateline Wind Project facility<sup>2</sup> consists of:

- 7 • Stateline 1: no more than 127 wind turbines, four meteorological (met) towers  
8 and other related or supporting facilities as described in the Final Order on the  
9 site certificate application (September 14, 2001).<sup>3</sup>
- 10 • Stateline 2: no more than 60 wind turbines, two met towers and other related or  
11 supporting facilities as described in the Final Order on Site Certificate  
12 Amendment #1.
- 13 • Stateline 3: no more than 279 wind turbines, 13 met towers, a substation,  
14 approximately 17 miles of aboveground 34.5-kV transmission line,  
15 approximately 8.5 miles of aboveground 115-kV or 230-kV transmission line,  
16 and other related or supporting facilities as described in the Final Order on  
17 Amendment #2.

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

22 The certificate holder shall use properly trained personnel to conduct this monitoring,  
23 subject to approval by the Department of Energy as to professional qualifications. For all  
24 monitoring except FPL's Wildlife Response and Reporting System (described below), the  
25 certificate holder shall hire an independent third party (not employees of the certificate holder) to  
26 perform monitoring tasks.

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

- 29 1) Fatality monitoring program involving:
  - 30 a) Removal trials
  - 31 b) Searcher efficiency trials

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

<sup>2</sup> As used herein "facility" includes Stateline 1, 2 and 3.

<sup>3</sup> The Final Order authorized construction of 127 turbines. However, only 126 were actually built. The Final Order described the four Stateline 1 permanent met towers as "guyed masts set in concrete foundations" (Final Order page 12). However, the certificate holder now plans to use unguyed, concrete met towers for both Stateline 1 and 2. Nevertheless, if any permanent guyed met towers are used, the certificate holder shall comply with the provisions in this plan that address guyed met towers.

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- 1 c) Standardized carcass searches
- 2 2) Established monitoring transect searches
- 3 3) Raptor nesting surveys
- 4 4) Burrowing owl surveys
- 5 5) FPL's Stateline Wind Project Wildlife Response and Reporting System

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

8 **1. Definitions and Methods**

9 Seasons

10 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

11 Search Plot Selection

12 The certificate holder shall conduct standardized carcass searches within search plots.  
13 The certificate holder, in consultation with the Oregon Department of Fish and Wildlife  
14 (ODFW), shall select search plots based on a systematic sampling design (in general, every other  
15 plot is sampled in a monitoring year). Turbine strings will be broken into rectangular search plots  
16 that contain two to four turbines each. The edge of plots will be no closer than 63 meters from  
17 the nearest turbine or, if guyed meteorological (met) towers are used, no closer than 63 meters  
18 from the nearest guyed met tower. The certificate holder shall provide maps of the search plots to  
19 the Department of Energy before beginning fatality monitoring at the facility. The certificate  
20 holder shall use the same search plots for each search conducted during a monitoring year.

21 Scheduling and Sampling Frequency

22 The certificate holder will begin monitoring in Oregon upon the beginning of operation  
23 of the facility. For Stateline 1, the first "monitoring year" commenced January 1, 2002. For  
24 Stateline 2, the first monitoring year will commence January 1, 2003. For Stateline 3, the first  
25 monitoring year will commence January 1, 2008.

26 Within each monitoring year for Stateline 1 and 2, the certificate holder will conduct  
27 standardized carcass searches at the rates of frequency shown below. Over the course of one  
28 monitoring year, the certificate holder would conduct 16 searches. The total number of searches  
29 per season is based on applying the rate to the number of months in the season (as defined  
30 above).

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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)

1 For Stateline 3, the certificate holder shall conduct 9 searches, beginning approximately  
2 March 15. Subsequent searches shall be done approximately the 15<sup>th</sup> of each month, ending on  
3 November 15.

### 4 Sample Size for Standardized Carcass Searches

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

9 The determination of the sample size is based primarily on the expected precision in the  
10 fatality estimates for the entire Stateline Wind Project in Oregon and Washington.

11 Stateline 1 sample size: The certificate holder shall search a minimum of 123  
12 turbines during the first monitoring year, of which at least 63 are in Oregon. The  
13 certificate holder shall search a minimum of 123 turbines during the second monitoring  
14 year, of which at least 63 are in Oregon. Over the first two monitoring years, all 126  
15 Oregon turbines will be searched for at least 12 months. In addition, if guyed met towers  
16 are used, all permanent guyed met towers will be searched during each monitoring year.

17 Stateline 2 sample size: The certificate holder shall search a minimum of 30  
18 turbines in 2003. The certificate holder shall search a minimum of 15 turbines in 2006.  
19 The certificate holder shall select the 15 turbines in consultation with ODFW and the  
20 Department of Energy. In addition, if guyed met towers are used, all permanent guyed  
21 met towers will be searched during each year of fatality monitoring.

22 Stateline 3 sample size: The certificate holder shall search 56 turbines in 2008.  
23 The certificate holder shall select the turbines in consultation with ODFW and the  
24 Department of Energy from the following turbine strings: BG-A, D-A, D-C, D-D, G-A,  
25 G-B, SH-A, SH-B, SH-C, V-A, WAY-A, WAY-B and WAY-C. If fewer than 56 turbines  
26 in these strings are built by December 31, 2007, then the certificate holder shall search all  
27 turbines in these strings that are built.

### 28 Duration of Fatality Monitoring

29 Stateline 1: The certificate holder may terminate fatality monitoring of Stateline 1  
30 turbines on December 31, 2003, subject to the approval of the Department of Energy.

31 Stateline 2: The certificate holder may terminate the fatality monitoring of  
32 Stateline 2 turbines after completing two monitoring years of those turbines, subject to  
33 the approval of the Department of Energy.

34 Stateline 3: The certificate holder may terminate the fatality monitoring of  
35 Stateline 3 turbines after completing one monitoring year, subject to the approval of the  
36 Department of Energy.

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1 For both Stateline 1 and Stateline 2, the certificate holder shall use a worst-case analysis  
2 to resolve any uncertainty in the results based on the first two years of data and to determine  
3 whether the first two years of data indicate that mitigation is required.<sup>4</sup> In lieu of approving the  
4 termination of the fatality monitoring program for either Stateline 1 or Stateline 2 after two  
5 years, the Department of Energy may require additional, targeted monitoring if the first two  
6 years of data indicate the potential for unexpected impacts of a type that cannot be resolved  
7 appropriately by worst-case analysis and appropriate mitigation.

8 For Stateline 3, the certificate holder shall use a worst-case analysis to resolve any  
9 uncertainty in the results and to determine whether mitigation is required. In lieu of approving  
10 the termination of the fatality monitoring program for Stateline 3 after one year, the Department  
11 of Energy may require additional, targeted monitoring if the data indicate the potential for  
12 unexpected impacts of a type that cannot be resolved appropriately by worst-case analysis and  
13 appropriate mitigation.

14 **2. Removal Trials**

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

20 The certificate holder shall conduct carcass removal trials within each of the seasons  
21 defined above for Stateline 1 and 2 in those years in which the certificate holder performs fatality  
22 monitoring. This monitoring plan does not require removal trials for Stateline 3. Planted  
23 carcasses will not be placed in the carcass search plots because they might be confused with  
24 wind turbine-related fatalities, especially if they have been scavenged. Planted carcasses will be  
25 placed in the vicinity of search plots but not so near as to attract scavengers to the search plots  
26 themselves. The planted carcasses will be located randomly within the carcass removal trial  
27 plots.

28 Each season, approximately 10 carcasses of birds of two size classes (20 total carcasses)  
29 will be distributed in each of two habitat types (grassland/shrub-steppe and cultivated  
30 agriculture).<sup>5</sup> The total number of trial carcasses may vary. Small carcasses (e.g., house  
31 sparrows, starlings, commercially available game bird chicks) will simulate passerines and large  
32 carcasses (e.g., raptor carcasses provided by agencies, commercially available adult game birds  
33 or cryptically colored chickens) will simulate large birds such as raptors, game birds and  
34 waterfowl. If fresh bat carcasses are available, they may also be used.

35 The certificate holder shall conduct ten removal trials per monitoring year: two in the  
36 spring season, three in summer, two in fall and three in winter.<sup>6</sup> In each trial in the spring and  
37 fall, at least five carcasses from each size class (10 total carcasses) will be placed in each of the  
38 two habitat types. In each trial in the summer and winter, at least three carcasses from each size

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<sup>4</sup> The certificate holder shall make this determination separately for Stateline 1 and 2; that is, based on two years of data on the Stateline 1 turbines and, separately, based on two years of data on the Stateline 2 turbines.

<sup>5</sup> This means that approximately 160 trial carcasses would be used in carcass removal trials during one monitoring year.

<sup>6</sup> For Stateline 1 and Stateline 2 monitoring years.

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1 class (6 total carcasses) will be placed in each of the two habitat types. Trials will be spread  
2 throughout the year to incorporate the effects of varying weather, climatic conditions, farming  
3 practices and scavenger densities.

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

8 It is expected that carcasses will be checked as follows, although actual intervals may  
9 vary. Carcasses will be checked for a period of 40 days to determine removal rates. They will be  
10 checked every day for the first 4 days, and then on day 7, day 10, day 14, day 20, day 30 and day  
11 40. This schedule may vary depending on weather and coordination with the other survey work.  
12 At the end of the 40-day period, the trial carcasses will be removed. Trial carcasses will be  
13 marked discreetly (markers to be determined) for recognition by searchers and other personnel.  
14 Trial carcasses will be left at the location until the end of the carcass removal trial. The entire  
15 carcass may be marked with a substance that fluoresces under a black light as some carcasses  
16 may be reduced to feather spots.

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

20 **3. Searcher Efficiency Trials**

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

23 The certificate holder shall conduct searcher efficiency trials in the same area in which  
24 carcass searches occur in both grassland/shrub-steppe and cultivated agriculture habitat types.  
25 Trials will be conducted in each season for Stateline 1 and 2 in those years in which the  
26 certificate holder performs fatality monitoring. The certificate holder will conduct searcher  
27 efficiency trials for Stateline 3 during the spring, summer and fall seasons. Searcher efficiency  
28 will be estimated by habitat type and season. Estimates of searcher efficiency will be used to  
29 adjust the number of carcasses found, correcting for detection bias.

30 Each season, approximately 10 carcasses of birds of two size classes (20 total carcasses)  
31 will be distributed in each of two habitat types (grassland/shrub-steppe and cultivated  
32 agriculture).<sup>7</sup> The certificate holder shall conduct ten searcher efficiency trials per monitoring  
33 year for Stateline 1 and 2: two in the spring season, three in summer, two in fall and three in  
34 winter.<sup>8</sup> In each trial in the spring and fall, at least five carcasses from each size class (10 total  
35 carcasses) will be placed in each of the two habitat types. In each trial in the summer and winter,  
36 at least three carcasses from each size class (6 total carcasses) will be placed in each of the two  
37 habitat types. For Stateline 3, the certificate holder shall conduct searcher efficiency trials as  
38 described in this paragraph, except for the winter season.

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<sup>7</sup> This means that approximately 160 trial carcasses would be used in searcher efficiency trials during one monitoring year.

<sup>8</sup> For Stateline 1 and Stateline 2 monitoring years.

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

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

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

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

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

#### 21 4. Standardized Carcass Searches

22 The objective of the standardized carcass searches (“fatality monitoring”) is to estimate  
23 the number of bird and bat fatalities that are attributable to facility operation. The goal of bird  
24 and bat fatality monitoring is to obtain a precise estimate of the fatality rate and associated  
25 variances.

26 On an annual basis, the certificate holder shall report an estimate of fatalities in six  
27 categories: 1) all birds, 2) small birds, 3) large birds, 4) raptors, 5) bats and 6) grassland birds.  
28 The certificate holder shall base these estimates on search data from the entire Stateline Wind  
29 Project in Oregon and Washington. In addition, the certificate holder shall report fatalities of  
30 Washington ground squirrels observed during the carcass searches and shall record and  
31 document detections of Washington ground squirrels (scat, holes and live detections).

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

39 The certificate holder shall conduct two years of fatality monitoring for Stateline 1 area  
40 and two years of fatality monitoring for Stateline 2.<sup>9</sup> For Stateline 3, the certificate holder shall

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<sup>9</sup> Years may run concurrently.

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1 conduct three seasons (spring, summer and fall) of fatality monitoring. If analysis of the fatality  
2 data collected after any two monitoring years<sup>10</sup> indicates that a significant impact on wildlife and  
3 wildlife habitat has occurred, the certificate holder shall implement appropriate mitigation,  
4 subject to the approval of the Department of Energy. Mitigation is discussed in Section 12  
5 below.

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

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

- 17       ▪ Intact – a carcass that is completely intact, is not badly decomposed and shows no  
18       sign of being fed upon by a predator or scavenger
- 19       ▪ Scavenged – an entire carcass that shows signs of being fed upon by a predator or  
20       scavenger, or portions of a carcass in one location (e.g., wings, skeletal remains,  
21       legs, pieces of skin, etc.)
- 22       ▪ Feather Spot – 10 or more feathers at one location indicating predation or  
23       scavenging

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

36 The searchers might discover carcasses incidental to formal carcass searches (e.g., while  
37 driving within the project area). If the incidentally discovered carcasses are found at turbines that  
38 are not part of the formal search sample, the searchers will identify, photograph and collect the  
39 carcasses as is done for carcasses within the formal search sample during scheduled searches. If  
40 the incidentally discovered carcasses are within the formal search plots, the searchers will leave  
41 the carcasses undisturbed, unless the carcass is a state or federally threatened or endangered

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<sup>10</sup> After three seasons (spring, summer and fall) for Stateline 3.

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1 species. The certificate holder shall coordinate collection of state endangered, threatened or  
2 protected species with ODFW. The certificate holder shall coordinate collection of federal  
3 endangered, threatened or protected species with the USFWS. The searchers will record the  
4 location of all incidentally discovered carcasses or injured birds on a detailed map of the study  
5 area showing the location of wind turbines and associated facilities such as power lines and met  
6 towers. Any injured native birds found will be carefully captured by a trained Project Biologist  
7 or technician and transported to Blue Mountain Wildlife Center in Pendleton in a timely fashion.  
8 The certificate holder shall follow a protocol for handling injured birds that has been developed  
9 with Lynn Thompkins of Blue Mountain Wildlife.

10 **5. Established Monitoring Transect Surveys**

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

14 Stateline 1 transects: The certificate holder has established 20 transects  
15 perpendicular to the turbine strings in non-agricultural grassland steppe and CRP  
16 habitats.<sup>11</sup>

17 Stateline 2 transects: No additional transects could be established because the  
18 turbine strings are located in cultivated land.

19 Stateline 3 transects: The certificate holder shall establish six new transects (four  
20 on turbine strings BG-A, BG-B or BG-C, and two on turbine string G-B).<sup>12</sup>

21 The transects will be a maximum of 1000 feet (300 meters) long, but, if no alternative  
22 exists, some transects may be shorter due to access problems or a change of habitat type from  
23 non-agricultural habitats to cultivated agricultural habitats. The certificate holder will provide to  
24 the Department of Energy a map or other clear indication of locations where landowners refuse  
25 access and a map of the locations of the established monitoring transects before beginning the  
26 monitoring transect surveys for Stateline 1.

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

32 Three searches will be conducted between mid-April and late June. The searches will  
33 occur at times spread throughout the period, and the same timing of searches will be used for  
34 each monitoring year. Observers will record observations of grassland/steppe avian species  
35 within 50 m on either side of the transect. Numbers of individual birds (if possible to determine)  
36 for each species will be recorded for each transect. Observers will map the locations where

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<sup>11</sup> The original Oregon Wildlife Monitoring Plan (9/14/01) required the certificate holder to survey 24 transects that had been established before construction of Stateline 1. However, due to changes in project layout between the initial monitoring plan and the final layout as shown in the site certificate and changes in habitat due to landowner uses, the number of suitable transects for this survey has been reduced to 20.

<sup>12</sup> Transects on turbine strings BG-A, BG-B and BG-C were surveyed in 2001 or 2002. In 2003, the certificate holder shall conduct pre-construction surveys of all six transects that will be used for post-construction surveys.

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1 individual birds are first observed. During each transect search, observers will record detections  
2 of Washington ground squirrels (scat, holes and live detections).

3         The certificate holder shall conduct a gradient analysis, using regression analysis or other  
4 appropriate statistical methods, to determine the relationship between density of grassland/steppe  
5 avian species and distance from turbines. A “gradient analysis” means an analysis that assesses  
6 whether a significant or a biologically substantial relationship exists between distance from  
7 project structures and abundance or use of the area.

8         The certificate holder shall conduct post-construction established transect surveys on the  
9 20 Stateline 1 transects in 2002 and 2006. If any Stateline 3 turbines are built, the certificate  
10 holder shall conduct an additional year of transect surveys on the 20 Stateline 1 transects and  
11 shall survey the six Stateline 3 turbines in 2010. The Department of Energy may require a second  
12 year of transect surveys on the Stateline 3 transects if first-year data suggest effects inconsistent  
13 with the results of the Stateline 1 transect surveys.

14         Based on the results of the Stateline 1 and Stateline 3 transect surveys, the certificate  
15 holder shall determine whether the gradient analysis indicates that the energy facility structures  
16 are causing reduced wildlife use of nearby habitat. If the analysis indicates any displacement of  
17 grassland/steppe avian species has occurred, the certificate holder shall implement appropriate  
18 mitigation, subject to the approval of the Department of Energy. If the gradient analysis suggests  
19 that displacement has occurred but lacks statistical power, the certificate holder shall make the  
20 worst-case assumption that displacement has occurred to the extent demonstrated in available  
21 scientific literature (Leddy et al. 1999) and shall mitigate accordingly. Such mitigation may  
22 include the enhancement of an amount of habitat necessary to support the estimated number of  
23 grasshopper sparrows and other grassland nesting passerines displaced by the wind turbines and  
24 the protection of that enhanced habitat for the life of the facility. The certificate holder shall  
25 estimate the displacement effect and distance using the gradient analysis described above.

26         The Department of Energy may require additional, targeted surveys if the data from  
27 transect surveys indicate the potential for unexpected impacts of a type that cannot be resolved  
28 appropriately by worst-case analysis and appropriate mitigation.

29 **6. Raptor Nest Surveys**

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

35         Aerial and ground surveys will be used to gather nest success statistics on active nests,  
36 nests with young and young fledged. The certificate holder will share the data with state and  
37 federal biologists.

38         During each survey year, the certificate holder shall conduct at least one helicopter  
39 survey and additional surveys as described in this section. All nests will be given identification  
40 numbers, and nest locations will be recorded on U.S. Geological Survey 7.5-minute quadrangle  
41 maps. Global positioning system coordinates will be recorded for each nest. Locations of  
42 inactive nests will also be recorded as they may become occupied during future years. All new

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1 nests not previously mapped, whether active or inactive, will be given an identification number  
2 and their locations (coordinates) will be recorded. Ground surveys are subject to access.

3 For Stateline 1, the certificate holder conducted aerial surveys between May 5 and 17,  
4 2002, and between June 8 and 28, 2002. Surveys were conducted within a 5-mile buffer of the  
5 Stateline 1 turbines. In addition, active ferruginous hawk and Swainson's hawk nests within two  
6 miles of Stateline 1 turbines were surveyed from the ground to determine nesting success.

7 In 2003, the certificate holder shall conduct an aerial survey within a 2-mile buffer of  
8 Stateline 1 and 2 turbines to determine nest occupancy. In addition, the certificate holder shall  
9 conduct a minimum of one ground survey to determine species, number of young and nesting  
10 success. "Nesting success" means that the young have successfully fledged (the young are  
11 independent of the core nest site). In the ground surveys, the certificate holder shall target  
12 Swainson's hawk and ferruginous hawk nests and any nests of the target raptor species not  
13 observed during the aerial survey.

14 In 2006, the certificate holder shall conduct an aerial survey to determine nest occupancy  
15 and a minimum of one ground survey to determine species, number of young and nesting  
16 success. The survey area will be within a 2-mile buffer around Stateline 2 turbines. However, if  
17 any Stateline 3 turbines are built, the survey area will cover a 2-mile buffer around all Stateline  
18 1, 2 and 3 turbines. In the ground surveys, the certificate holder shall target Swainson's hawk  
19 and ferruginous hawk nests and any nests of the target raptor species not observed during the  
20 aerial survey.

21 In 2010, if any Stateline 3 turbines are built, the certificate holder shall conduct an aerial  
22 survey within a 2-mile buffer of Stateline 1, 2 and 3 turbines to determine nest occupancy by  
23 ferruginous hawks. In addition, the certificate holder shall conduct a minimum of one ground  
24 survey of ferruginous hawk nests to determine number of young and nesting success.

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

30 If analysis of the raptor nesting data indicates any reduction in nesting success by the  
31 target raptor species within two miles of the facility, the certificate holder shall implement  
32 appropriate mitigation, subject to the approval of the Department of Energy. At a minimum, if  
33 the surveys reveal that a target raptor species has abandoned a nest or territory within ½ mile of  
34 the facility, or has not fledged any young over any two survey years, the certificate holder shall  
35 assume the abandonment or unsuccessful fledging is the result of the project unless another cause  
36 can be demonstrated conclusively. Based on that assumption, the certificate holder shall  
37 implement appropriate mitigation. In addition, if the data indicate clear evidence of displacement  
38 or disturbance of target raptor nesting species between ½ mile and 2 miles from the facility, the  
39 certificate holder shall implement appropriate mitigation.

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

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

7 **7. Burrowing Owl Surveys**

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

11           Given the expected small sample size of active burrowing owl nests within 1000 feet of  
12 the facility, impacts may have to be judged based on trends in the data, results from other wind  
13 energy facility monitoring studies and literature on what is known regarding the populations in  
14 the region. No burrowing owls were observed within 1000 feet of the proposed Stateline 1  
15 turbines during the 2001 spring pre-construction surveys. Therefore, there is no ability to make  
16 any statistical or descriptive inferences on burrowing owl displacement or disturbance impacts to  
17 burrowing owls in Oregon.

18           For Stateline 1 and 2 facilities, the certificate holder shall conduct burrowing owl surveys  
19 during the breeding season within suitable grassland habitat in association with the fatality  
20 monitoring described above in section 4. For each monitoring year, the certificate holder shall  
21 conduct a minimum of two surveys for burrowing owls to obtain estimates of burrowing owl nest  
22 density near the turbines. For these surveys, the certificate holder shall follow a protocol  
23 developed in consultation with ODFW. Taped burrowing owl vocalizations will be played to  
24 enhance the ability to detect burrowing owls. Two historic nest sites within the Oregon project  
25 area will be checked for use. The burrow and an adjacent 100 meters will be surveyed for sign of  
26 activity and alternate nest sites. Based on the results of these surveys after any two years<sup>13</sup> and  
27 data from the standardized carcass searches, the Department of Energy may require the  
28 certificate holder to conduct additional burrowing owl nest surveys or other related surveys (e.g.,  
29 radio-tagging owls) or to provide mitigation. During the burrowing owl surveys, observers shall  
30 record and document detections of Washington ground squirrels (scat, holes and live detections).

31           For Stateline 3 facilities, the certificate holder shall conduct a burrowing owl survey in  
32 2008 for known active or historic burrowing owl nests and any newly discovered nests within  
33 1000 feet of the Stateline 3 wind turbines.

34 **8. Avian Use Surveys**

35           During each standardized carcass search, as described in section 4 above, observers will  
36 record birds detected in a ten-minute period at approximately one-third of the turbines within the  
37 carcass search plots (e.g., one point count station per carcass search plot which may consist of two  
38 to four turbines) using standard variable circular plot point count survey methods. Additional  
39 observations of species of concern will be made if observed during the carcass searches, but

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<sup>13</sup> For Stateline 1 or 2.

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1 collecting this information is secondary to the actual searching for carcasses so the searchers are not  
2 distracted from their main task of finding carcasses.

3 For Stateline 3, observers shall record observations of birds perching on aboveground  
4 transmission line conductors and support structures in the vicinity of the turbines being searched.  
5 Observers shall document number of perching birds observed, species, location and whether the  
6 perching was on a pole or a conductor. Observers shall report any fatalities observed below or near  
7 transmission lines.

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

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

14 This system has been in place at the Vansycle project since early 2000, and a similar  
15 system is in place for Stateline 1 and Stateline 2. Construction and maintenance personnel will be  
16 trained in the methods. This monitoring program includes both reporting of carcasses discovered  
17 incidental to construction and maintenance operations ("incidental finds") and reporting of  
18 carcasses discovered under a standardized search protocol for an area within approximately 50  
19 meters of the turbines, measured from the base of the tower ("protocol searches").

20 For Stateline 1, a sample of approximately 45 turbines not included in the standardized  
21 carcass searches will be chosen to be included in protocol searches in each Stateline 1  
22 monitoring year. The certificate holder shall select this sample from the overall Stateline Wind  
23 Project in Oregon and Washington, with at least 13 of the sampled turbines located in Oregon.

24 For Stateline 2, the certificate holder shall select a sample of seven Stateline 2 turbines  
25 not included in the standardized carcass searches to include in protocol searches in each Stateline  
26 2 monitoring year.

27 For Stateline 3, the certificate holder shall select a sample of approximately 15 percent of  
28 the Stateline 3 turbines that are built by December 31, 2007, and that are not included in the  
29 standardized carcass searches.

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

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**10. Statistical Analysis Methods for Fatality Data**

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

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

Definition of Variables

The following variables are used in the equations below:

$c_i$	the number of carcasses detected at plot $i$ for the study period of interest <sup>14</sup> for which the cause of death is either unknown or is attributed to the facility
$n$	the number of search plots
$k$	the number of turbines searched (includes the turbines centered within each search plot and a proportion of the number of turbines adjacent to search plots to account for the effect of adjacent turbines on the 63-meter search plot buffer area)
$\bar{c}$	the average number of carcasses observed per turbine per year
$s$	the number of carcasses used in removal trials
$s_c$	the number of carcasses in removal trials that remain in the study area after 40 days
$se$	standard error (square of the sample variance of the mean)
$t_i$	the time (days) a carcass remains in the study area before it is removed
$\bar{t}$	the average time (days) a carcass remains in the study area before it is removed
$d$	the total number of carcasses placed in searcher efficiency trials
$p$	the estimated proportion of detectable carcasses found by searchers
$I$	the interval between searches in days
$\hat{\pi}_i$	the estimated probability that a carcass is both available to be found during a search and is found ( $i = 1$ and $2$ ; two estimators)
$m_i$	the estimated annual average number of fatalities per turbine per year, adjusted for removal and observer detection bias ( $i = 1$ and $2$ ; two estimators)

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<sup>14</sup> The study period is one year, except for fatality monitoring of Stateline 3 turbines. For Stateline 3, the study period includes only the spring, summer and fall seasons.

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1           Observed Number of Carcasses

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

4           
$$\bar{c} = \frac{\sum_{i=1}^n c_i}{k}$$

5           The final estimate of  $\bar{c}$  and its standard error are to be calculated using bootstrapping  
6 (Manly *et al.* 1997<sup>15</sup>). Bootstrapping is a computer simulation technique that is useful for  
7 calculating point estimates, variances and confidence intervals for complicated test statistics. The  
8 certificate holder shall calculate the mean of at least 5000 bootstrap estimates. The standard  
9 deviation of the bootstrap estimates of  $\bar{c}$  is the estimated standard error of  $\bar{c}$  (that is,  $se(\bar{c})$ ).

10           Estimation of Carcass Removal

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

14           
$$\bar{t} = \frac{\sum_{i=1}^s t_i}{s - s_c}$$

15           This estimator is the maximum likelihood estimator assuming that the removal times  
16 follow an exponential distribution and that there is right-censoring of data. Any trial carcasses  
17 still remaining at 40 days are collected, yielding censored observations at 40 days. If all trial  
18 carcasses are removed before the end of the trial, then  $s_c$  is 0, and  $\bar{t}$  is just the arithmetic average  
19 of the removal times.

20           The certificate holder shall use bootstrapping to calculate the final estimate of  $\bar{t}$ , the  
21 estimated standard error and 90% confidence limits. At least 5000 bootstrap iterations will be  
22 used. The standard deviation of the bootstrap estimates of  $\bar{t}$  is the estimated standard error of  
23  $\bar{t}$  (that is,  $se(\bar{t})$ ). Removal rates will be estimated by major habitat, carcass size (large and  
24 small) and season.

25           Estimation of Searcher Efficiency

26           Searcher efficiency rates (that is, the rate of observer detection) are expressed as  $p$ , the  
27 proportion of trial carcasses that are detected by searchers. The standard error (square of variance  
28 of mean) and 90% confidence limits will be calculated by bootstrapping. At least 5000 bootstrap  
29 iterations will be used. Observer detection rates will be estimated by major habitat, carcass size  
30 and season.

31           Estimation of Total Number of Facility-Related Fatalities

32           The certificate holder shall provide two estimators for the mean number of fatalities per  
33 turbine per year. Both estimators adjust the observed number of fatalities by dividing the  
34 number of observed carcasses by an estimate of the probability that a carcass is available to be

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<sup>15</sup> Manly, B.F.J., *Randomization, Bootstrap and Monte Carlo Methods in Biology* (2<sup>nd</sup> edition), Chapman and Hall, New York (1997).

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1 picked up during a fatality search (i.e, the probability the carcass is not removed by a scavenger)  
2 and is observed (the probability of detection).

3 The first estimator of total number of annual facility-related fatalities ( $m_1$ ) is calculated  
4 by:

$$5 \quad m_1 = \frac{\bar{c}}{\hat{\pi}_1}$$

6 where

$$7 \quad \hat{\pi}_1 = \begin{cases} \frac{\bar{t} * p}{I} & \text{if } I > \bar{t} \\ p & \text{if } I \leq \bar{t} \end{cases}$$

8 This first estimator appears to provide an underestimate of true mortality when the  
9 interval between searches is similar to the mean carcass removal time. For this reason, the  
10 certificate holder shall calculate the mean number of fatalities per turbine per year<sup>16</sup> using a  
11 second estimator, as follows:

$$12 \quad m_2 = \frac{\bar{c}}{\hat{\pi}_2} \text{ where } \hat{\pi}_2 \text{ includes adjustments for both observer detection and scavenging bias}$$

13 and assuming that the carcass removal times  $t_i$  follow an exponential distribution.

14 This second estimator does not underestimate true mortality when the mean removal time  
15 is similar to or larger than the interval between searches. This estimator will be used when  
16 comparisons are made to determine if mitigation should be implemented as described in Section  
17 12.

18 The certificate holder shall calculate this estimate separately for each of five categories:  
19 1) all birds, 2) small birds, 3) large birds, 4) raptors, 5) bats and 6) grassland birds.<sup>17</sup> Estimates  
20 will be provided separately for turbines and any permanent guyed met towers. The certificate  
21 holder shall calculate the “all birds” estimate and the “small birds” estimate for all species and,  
22 separately, for only those species protected by law. Modifications to these estimates will be made  
23 to incorporate the varying search efforts by season (monthly in winter and summer, twice  
24 monthly in fall and spring). In addition, the certificate holder shall estimate the number of  
25 facility-related fatalities separately for turbines that are located on land that does not support  
26 grassland steppe or low shrub/shrub steppe habitat and for turbines that are located on land that  
27 does support grassland steppe or low shrub/shrub steppe habitat. Additional modifications may  
28 be made, subject to approval by the Department of Energy.

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<sup>16</sup> In the case of Stateline 3, the calculation would be the mean number of fatalities per turbine during the study period (spring, summer and fall seasons). This will also be expressed as the mean number of fatalities per turbine per year for comparison purposes by assuming the Stateline 1 and 2 winter fatality rates apply to the Stateline 3 sampled turbines.

<sup>17</sup> Grassland nesting species include grasshopper sparrow, savannah sparrow, vesper sparrow, short-eared owl, burrowing owl, northern harrier, horned lark, western meadowlark, long-billed curlew, ring-necked pheasant, Hungarian partridge, chukar partridge, California quail and any other resident grassland nesting bird species that is found in the area.

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

4           **11. Data Reporting**

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

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

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

18           **12. Mitigation**

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

26           *Grassland Nesting Species*

27           Grassland nesting species include grasshopper sparrow, savannah sparrow, vesper  
28 sparrow, short-eared owl, burrowing owl, northern harrier, horned lark, western meadowlark,  
29 long-billed curlew, ring-necked pheasant, Hungarian partridge, chukar partridge, California quail  
30 and any other resident grassland nesting bird species that is found in the area. The certificate  
31 holder shall determine significant impact to grassland nesting species based on the fatality  
32 monitoring program discussed above. The certificate holder shall calculate the average annual  
33 fatality rate separately for turbines and, if permanent guyed met towers are used, for permanent  
34 guyed met towers. If the average annual fatality rate<sup>18</sup> is greater than 1.25 fatalities per turbine or  
35 guyed met tower per year for all species combined or if the average annual fatality rate is greater  
36 than 0.5 fatalities per turbine or guyed met tower per year for a single grassland nesting bird  
37 species, then the certificate holder shall assume that a significant impact on habitat has occurred  
38 and shall implement appropriate mitigation. The certificate holder shall include in this estimate  
39 any grassland nesting species fatality that is observed, even if it is observed during the non-  
40 nesting period. The certificate holder shall include in the estimate all carcasses unidentified as to

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<sup>18</sup> The “average annual fatality rate” is the average of the two annual estimates of fatalities.

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1 species and for which there is no evidence to rule out the carcass as one of the grassland species  
2 listed above.

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

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

22 Raptors

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

29 To mitigate for a significant impact on raptor habitat, the certificate holder shall provide  
30 funding to fence draw bottom areas. The certificate holder shall fence draw bottom areas within  
31 the facility site or up to 15 miles away within Oregon. The objective of fencing is to retain or  
32 establish recruitment of deciduous trees for future raptor nesting. The certificate holder shall  
33 include funding for annual monitoring and maintenance of the fencing for the life of the facility.  
34 For each raptor fatality above the mitigation threshold, the linear length of fencing, at a  
35 minimum, shall be sufficient to fence 1,000 feet of draw bottom<sup>19</sup> that has trees or the potential  
36 to grow trees. If no suitable nesting structures are present in the fenced areas, the certificate  
37 holder shall plant 10 trees in each fenced area.

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

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<sup>19</sup> The fenced area would be about 50 feet wide for most intermittent streams in the area.

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### Other Bird Species and Bats

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

### **13. Amendment of the Plan**

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