

Helix Wind Power Facility: Wildlife Monitoring and Mitigation Plan

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

5 The certificate holder shall use experienced and properly trained personnel (the
6 “investigators”) to conduct the monitoring required under this plan. The professional
7 qualifications of the investigators are subject to approval by the Oregon Department of Energy
8 (Department). For all components of this plan except the Wildlife Reporting and Handling
9 System, the certificate holder shall hire independent third-party investigators (not employees of
10 the certificate holder) to perform monitoring tasks. The monitoring will be performed in a
11 manner that minimizes agricultural crop loss and interference with agricultural and ranching
12 activities.

13 The Wildlife Monitoring and Mitigation Plan for the HWPF has the following
14 components:

- 15 1) Fatality monitoring program including:
 - 16 a) Removal trials
 - 17 b) Searcher efficiency trials
 - 18 c) Fatality search protocol
 - 19 d) Statistical analysis
- 20 2) Washington ground squirrel colony assessment
- 21 3) Raptor nest monitoring
- 22 4) Grassland bird study
- 23 5) Wildlife Reporting and Handling System

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

30 1. Fatality Monitoring

31 (a) Definitions and Methods

32 Seasons

33 This plan uses the following dates for defining seasons:

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

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Season	Dates (Duration)
Spring	March 16 to May 15 (2 months)
Summer	May 16 to August 15 (3 months)
Fall Migration	August 16 to October 31 (2 ½ months)
Winter	November 1 to March 15 (4 ½ months)

Schedule

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

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

Season	Frequency (Total Number)
Spring	2 searches per month (4 searches)
Summer	1 search per month (3 searches)
Fall	2 searches per month (5 searches)
Winter	1 search per month (4 searches)

Duration of Fatality Monitoring

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

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

Search Plots

The investigators shall conduct fatality monitoring within search plots. The certificate holder, in consultation with the investigators and the ODFW, shall select search plots based on a systematic sampling design that ensures that the plots are representative of the habitat conditions in different parts of the site.

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1 Each search plot will contain one turbine. Search plots will be square or circular. Circular
2 search plots will be centered on the turbine location and will have a radius equal to the maximum
3 blade tip height of the turbine contained within the plot. “Maximum blade tip height” is the
4 turbine hub-height plus one-half the rotor diameter. Square search plots will be of sufficient size
5 to contain a circular search plot as described above. The certificate holder shall provide maps of
6 the search plots to the Department before beginning fatality monitoring at the facility. The
7 investigators shall use the same search plots for each search conducted during a single
8 monitoring year.

9 Sample Size

10 The sample size for fatality monitoring is the number of turbines searched per monitoring
11 year. The certificate holder shall conduct fatality monitoring during each monitoring year in
12 search plots at one-third of the turbines that are built or 15 turbines, whichever is greater.

13 (b) Removal Trials

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

18 The investigators shall conduct carcass removal trials within each of the seasons defined
19 above during the first year of fatality monitoring. For each trial, the investigators shall use 10 to
20 15 carcasses of small- and large-bodied species. Trial carcasses shall be placed at least 1,000 feet
21 from any search plots and distributed proportionately within habitat categories and subtypes
22 similar to the search plots.

23 Subject to the approval of the Department, the investigators may reduce the number of
24 removal trials and the number of trial carcasses during any subsequent year of fatality monitoring
25 based on a comparison of the removal data from the first year at the HWPF to published removal
26 data from nearby wind energy facilities.

27 The investigators shall use game birds or other legal sources of avian species as test
28 carcasses for the removal trials, and the investigators may use carcasses found in fatality
29 monitoring searches. The investigators shall select species with the same coloration and size
30 attributes as species found within the site boundary. If suitable trial carcasses are available, trials
31 during the fall season will include several small brown birds to simulate bat carcasses. Legally
32 obtained bat carcasses will be used if available.

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

39 An approximate schedule for assessing removal status is once daily for the first 4 days,
40 and on days 7, 10, 14, 21, 28 and 35. This schedule may be adjusted depending on actual carcass
41 removal rates, weather conditions and coordination with the other survey work. The condition of

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1 scavenged carcasses will be documented during each assessment, and at the end of the trial all
2 traces of the carcasses will be removed from the site. Scavenger or other activity could result in
3 complete removal of all traces of a carcass in a location or distribution of feathers and carcass
4 parts to several locations. This distribution will not constitute removal if evidence of the carcass
5 remains within an area similar in size to a search plot and if the evidence would be discernable to
6 a searcher during a normal survey.

7 Before beginning removal trials for any subsequent year of fatality monitoring, the
8 certificate holder shall report the results of the first year removal trials to the Department and
9 ODFW. In the report, the certificate holder shall analyze whether four removal trials per year, as
10 described above, provided sufficient data to accurately estimate adjustment factors for carcass
11 removal. The number of removal trials for any subsequent year of fatality monitoring may be
12 adjusted up or down, subject to the approval of the Department.

13 (c) Searcher Efficiency Trials

14 The objective of searcher efficiency trials is to estimate the percentage of bird and bat
15 fatalities that searchers are able to find. The certificate holder shall conduct searcher efficiency
16 trials on the fatality monitoring search plots in both grassland/shrub-steppe and cultivated
17 agriculture habitat types. A pooled estimate of searcher efficiency will be used to adjust carcass
18 counts for detection bias.

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

26 For each trial, the investigators shall use small- and large-bodied species. The
27 investigators shall use game birds or other legal sources of avian species as test carcasses for the
28 efficiency trials, and the investigators may use carcasses found in fatality monitoring searches.
29 The investigators shall select species with the same coloration and size attributes as species
30 found within the site boundary. If suitable test carcasses are available, trials during the fall
31 season will include several small brown birds to simulate bat carcasses. Legally obtained bat
32 carcasses will be used if available. The investigators shall mark the test carcasses to differentiate
33 them from other carcasses that might be found within the search plot and shall use methods
34 similar to those used to mark removal test carcasses as long as the procedure is sufficiently
35 discreet and does not increase carcass visibility.

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

42 Efficiency trials will be spread over the entire season to incorporate effects of varying
43 weather and vegetation growth. Carcasses will be placed in a variety of postures to simulate a

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1 range of conditions. For example, birds will be: (1) placed in an exposed posture (thrown over
2 the shoulder), (2) hidden to simulate a crippled bird or (3) partially hidden.

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

7 If new searchers are brought into the search team, additional searcher efficiency trials
8 will be conducted to ensure that detection rates incorporate searcher differences. The certificate
9 holder shall include a discussion of any changes in search personnel and any additional detection
10 trials in the reporting required under Section 6 of this plan.

11 Before beginning searcher efficiency trials for any subsequent year of fatality monitoring,
12 the certificate holder shall report the results of the first year efficiency trials to the Department
13 and ODFW. In the report, the certificate holder shall analyze whether the efficiency trials as
14 described above provided sufficient data to accurately estimate adjustment factors for searcher
15 efficiency. The number of searcher efficiency trials for any subsequent year of fatality
16 monitoring may be adjusted up or down, subject to the approval of the Department.

17 (d) Fatality Monitoring Search Protocol

18 The objective of fatality monitoring is to estimate the number of bird and bat fatalities
19 that are attributable to facility operation as an indicator of the impact of the facility on habitat
20 quality. The goal of bird and bat fatality monitoring is to estimate fatality rates and associated
21 variances. The certificate holder shall conduct fatality monitoring using standardized carcass
22 searches according to the schedule described above.

23 Personnel trained in proper search techniques (“the searchers”) will conduct the carcass
24 searches by walking parallel transects approximately 20 feet (6 meters) apart within the search
25 plots. A searcher will walk at a rate of approximately 148 to 197 feet (45 to 60 meters) per
26 minute along each transect, searching both sides out to 10 feet (3 meters) for casualties. Search
27 area and speed may be adjusted by habitat type after evaluation of the first searcher efficiency
28 trial.

29 Searchers shall flag all avian or bat carcasses discovered. Carcasses are defined as a
30 complete carcass or body part, 10 or more feathers or three or more primary feathers in one
31 location. When parts of carcasses and feathers from the same species are found within a search
32 plot, searchers shall make note of the relative positions and assess whether or not these are from
33 the same fatality.

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

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

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

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

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

29 (e) Incidental Finds and Injured Birds

30 The searchers might discover carcasses incidental to formal carcass searches (e.g., while
31 driving within the project area). For each incidentally discovered carcass, the searcher shall
32 identify, photograph, record data and collect the carcass as would be done for carcasses within
33 the formal search sample during scheduled searches. If the incidentally discovered carcass is
34 found within a formal search plot, the fatality data will be included in the calculation of fatality
35 rates. If the incidentally discovered carcass is found outside a formal search plot, the data will be
36 reported separately. The certificate holder shall coordinate collection of incidentally discovered
37 state endangered, threatened, sensitive or other state protected species with ODFW. The
38 certificate holder shall coordinate collection of incidentally discovered federally listed
39 endangered or threatened species and Migratory Bird Treaty Act protected avian species with the
40 USFWS.

41 The certificate holder shall develop and follow a protocol for handling injured birds. Any
42 injured native birds found on the facility site will be carefully captured by a trained project
43 biologist or technician and transported to a qualified rehabilitation specialist approved by the

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1 Department.² The certificate holder shall pay costs, if any, charged for time and expenses related
2 to care and rehabilitation of injured native birds found on the site, unless the cause of injury is
3 clearly demonstrated to be unrelated to the facility operations.

4 (f) Statistical Methods for Fatality Estimates³

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

6 (1) The observed number of carcasses found during standardized searches during the
7 two monitoring years for which the cause of death is attributed to the facility.⁴

8 (2) Searcher efficiency expressed as the proportion of planted carcasses found by
9 searchers.

10 (3) Removal rates expressed as the estimated average probability a carcass is expected
11 to remain in the study area and be available for detection by the searchers during
12 the entire survey period.

13 Definition of Variables

14 The following variables are used in the equations below:

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

17 n the number of search plots

18 k the number of turbines searched (includes the turbines centered within each
19 search plot and a proportion of the number of turbines adjacent to search plots to
20 account for the effect of adjacent turbines on the search plot buffer area)

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

22 s the number of carcasses used in removal trials

23 s_c the number of carcasses in removal trials that remain in the study area after 40
24 days

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

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

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

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

29 p the estimated proportion of detectable carcasses found by searchers

30 I the average interval between searches in days

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

³ These statistical methods derive from the *Draft Avian and Bat Monitoring Plan for the Stateline Wind Project*, January 10, 2001 (prepared by FPL Energy, WEST Inc., and Northwest Wildlife Consultants). The present form of the description of statistical methods is based on revisions by the Council in the *Klondike III Wildlife Monitoring and Mitigation Plan*, June 30, 2006.

⁴ If a different cause of death is not apparent, the fatality will be attributed to facility operation.

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- 1 $\hat{\pi}$ the estimated probability that a carcass is both available to be found during a
2 search and is found
- 3 m_t the estimated annual average number of fatalities per turbine per year, adjusted
4 for removal and observer detection bias
- 5 C nameplate energy output of turbine in megawatts (MW)

6 Observed Number of Carcasses

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

8
$$\bar{c} = \frac{\sum_{i=1}^n c_i}{k} . \quad (1)$$

9 Estimation of Carcass Removal

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

13
$$\bar{t} = \frac{\sum_{i=1}^s t_i}{s - s_c} . \quad (2)$$

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

20 Estimation of Observer Detection Rates

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

24 Estimation of Facility-Related Fatality Rates

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

26
$$m_t = \frac{\bar{c}}{\hat{\pi}} , \quad (3)$$

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

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

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

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

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

Nocturnal Migrant and Bat Fatalities

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

(g) Mitigation

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

Mitigation may be appropriate if fatality rates exceed a “threshold of concern.”⁶ For the purpose of determining whether a threshold has been exceeded, the certificate holder shall calculate the average annual fatality rates for species groups after each year of monitoring. Based on current knowledge of the species that are likely to use the habitat in the area of the facility, the following thresholds apply to the HWPF:

⁵ Manly, B.F.J., *Randomization, Bootstrap and Monte Carlo Methods in Biology* (2nd edition, 1997, Chapman and Hall, New York), p. 399.

⁶ The Council adopted “thresholds of concern” for raptors, grassland species, and state sensitive avian species in the Final Order on the Application for the Klondike III Wind Project (June 30, 2006) and for bats in the Final Order on the Application for the Biglow Canyon Wind Farm (June 30, 2006). As explained in the Klondike III order: “Although the threshold numbers provide a rough measure for deciding whether the Council should be concerned about observed fatality rates, the thresholds have a very limited scientific basis. The exceeding of a threshold, by itself, would not be a scientific indicator that operation of the facility would result in range-wide population level declines of any of the species affected. The thresholds are provided in the Wildlife Monitoring and Mitigation Plan to guide consideration of additional mitigation based on two years of monitoring data.”

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Species Group	Threshold of Concern (fatalities per MW per year)
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 federally listed threatened or endangered raptor species)	0.06
Grassland species (all native bird species that rely on grassland habitat and are either resident species occurring year-round or species that nest in the area, excluding horned lark, burrowing owl, and northern harrier)	0.59
State Sensitive avian species listed under OAR 635-100-0040 (excluding raptors listed above)	0.2
Bat species as a group	2.5

1 The certificate holder may form a technical advisory committee (TAC), which may
2 include members selected by the certificate holder, the Department, ODFW, the USFWS and
3 other stakeholders. Based on consideration of the available fatality monitoring results from
4 Stateline, Vansycle, Combine Hills, Nine Canyon, Leaning Juniper, Klondike II and III, Big
5 Horn, White Creek, Hopkins Ridge, Wild Horse and Biglow Canyon, the TAC may make
6 recommendations to the Council for adjustments to the thresholds listed in the table above.

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

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

22 The certificate holder shall design mitigation to benefit the affected species group.
23 Mitigation may include, but is not limited to, protection of nesting habitat for the affected group
24 of native species through a conservation easement or similar agreement. Tracts of land that are
25 intact and functional for wildlife are preferable to degraded habitat areas. Preference should be
26 given to protection of land that would otherwise be subject to development or use that would
27 diminish the wildlife value of the land. In addition, mitigation measures might include:
28 enhancement of a protected tract that is degraded by weed removal and control; increasing the
29 diversity of native grasses and forbs; planting sagebrush or other shrubs; constructing and
30 maintaining artificial nest structures for raptors; improving wildfire response; and conducting or

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1 making a contribution to research that will aid in understanding more about the affected species
2 and its conservation needs in the region.

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

11 2. Washington Ground Squirrel Assessment

12 The objective of the Washington ground squirrel (WGS) assessment is to update the
13 activity status of the historic colony within and near the site boundary, which will aid in
14 furthering the scientific knowledge of the species in the general area. The data collected as part
15 of the HWPF WMMP will complement other data collected in the region and will contribute
16 information towards understanding WGS persistence in the HWPF project area. The data will
17 help document patterns and overall population trends for this species in the region. In general,
18 WGS colonies may expand or contract, and the density of the colonies may fluctuate as well,
19 over the survey years as land use by the landowner, rainfall and vegetation affect the species.
20 Based on data collected before facility components are installed, the investigator shall assess
21 natural area of use fluctuation.

22 The survey area is defined as the historic colony and a 785-foot buffer around the historic
23 site (limited to areas within the HWPF lease boundary).⁷ A qualified professional biologist
24 (investigator) will assess the status of that portion of the WGS historic colony within the survey
25 area. The investigator shall assess the status of the WGS historic colony during the season when
26 WGS are active (approximately mid-March through May) beginning in the first active period
27 after the effective date of the site certificate for the HWPF and before the start of construction.
28 The status of the WGS historic colony will be assessed within the survey area annually thereafter
29 through the second year after the turbines closest to the WGS survey area become commercially
30 operational.

31 During each assessment, the investigator shall monitor WGS activity to determine the
32 extent of WGS use. Standard methods will be used to document the current status and extent of
33 the historic colony, as well as any active burrows found within the survey area but outside the
34 historic colony. The investigator shall record and map indicators of the level of use (such as
35 density of burrows in the colony and the presence of natal burrows and young individuals). Maps
36 will be prepared showing the 2004 historic colony, the location of the individual WGS observed
37 in 2008 and any active sites identified prior to construction. During each assessment, the
38 investigator shall examine the surroundings for evidence of project-caused conditions that might
39 increase soil erosion or result in a decline in vegetation quality, which might adversely affect the
40 WGS historic colony and suitable habitat. In addition, the investigator will record notes on

⁷ The site certificate application for the Helix Wind Power Facility included a baseline assessment of WGS areas of use (see Attachments P-6 and P-8 of the Application for Site Certificate).

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1 predator activity (such as coyotes, badgers) and landowner activities within the survey area.
2 Maps and survey results will be provided to the Department as part of the annual reporting.

3. Raptor Nest Monitoring

4 The objectives of raptor nest surveys are: (1) to estimate the size of the local breeding
5 populations of raptor species that nest on the ground or aboveground in trees or other
6 aboveground nest locations in the vicinity of the facility, and (2) to determine whether operation
7 of the facility results in a reduction of nesting activity or nesting success in the local populations
8 of the following raptor species: Swainson’s hawk, ferruginous hawk and burrowing owl.

9 The certificate holder shall conduct short-term and long-term monitoring. The certificate
10 holder’s qualified investigators will use aerial and ground surveys to evaluate nest success by
11 gathering data on active nests, on nests with young and on young fledged. The investigators will
12 analyze the data as described in Section 3(c) and will share the data with state and federal
13 biologists.

14 (a) Short-Term Monitoring

15 Short-term monitoring will be done in two monitoring seasons. The first monitoring
16 season will be in the first raptor nesting season after completion of construction of the facility.
17 The second monitoring season will be in the fourth year after construction is completed. The
18 certificate holder shall provide a summary of the first-year results in the monitoring report
19 described in Section 6. After the second monitoring season, the investigators will analyze two
20 years of data compared to the baseline data.⁸

21 During each monitoring season, the investigators will conduct a minimum of one aerial
22 and one ground survey for raptor nests in late May or early June and additional surveys as
23 described in this section. The survey area is the area within the facility site and a 2-mile buffer
24 zone around the site. Nests outside the leased project boundary will be checked from an
25 appropriate distance where feasible, depending on permission from the landowner for access.

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

31 Determining nest *occupancy* will likely require at least two visits to each nest. For
32 occupied nests, the certificate holder will determine nesting *success* by a minimum of one
33 ground visit to determine species, number of young and young fledged. “Nesting success” means
34 that the young have successfully fledged (the young are independent of the core nest site).

35 (b) Long-Term Monitoring

36 In addition to the two years of post-construction raptor nest surveys described above, the
37 certificate holder will conduct long-term raptor nest surveys at 5-year intervals for the life of the

⁸ Baseline raptor nest survey data was collected in 2008 as described in the site certificate application and may be supplemented by pre-construction raptor nest surveys within a half-mile of the transmission line as required by the site certificate.

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1 facility.⁹ Investigators will conduct the first long-term raptor nest survey in the raptor nesting
2 season of the ninth year after construction is completed and will repeat the survey at 5-year
3 intervals thereafter. In conducting long-term surveys, the investigators will follow the same
4 survey protocols as described above in Section 3(a) unless the investigators propose alternative
5 protocols that are approved by the Department. In developing an alternative protocol, the
6 investigators will consult with ODFW and will take into consideration other monitoring
7 conducted in adjacent areas. The investigators will analyze the data and report after each year of
8 long-term raptor nest surveys.

9 (c) Analysis

10 The investigators will analyze the raptor nesting data to determine whether a reduction in
11 either nesting success or nest use has occurred in the survey area. If the analysis indicates a
12 reduction in nesting success or nest use by Swainson's hawks, ferruginous hawks or burrowing
13 owls, then the certificate holder will propose appropriate mitigation for the affected species as
14 described in Section 3(d) and will implement mitigation as approved by the Department, subject
15 to review by the Council.

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

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

29 (d) Mitigation

30 If the analysis shows a reduction in nesting success or nest use, the certificate holder shall
31 implement mitigation if the Department determines that mitigation is appropriate. The certificate
32 holder will propose mitigation for the affected species in consultation with the Department and
33 ODFW and will implement mitigation as approved by the Council. In proposing appropriate
34 mitigation, the certificate holder will advise the Department whether any other wind project in
35 the area is obligated to provide mitigation for a reduction in raptor nesting success at the same
36 nest site. Mitigation should be designed to benefit the affected species or contribute to overall
37 scientific knowledge and understanding of what causes nest abandonment or nest failure.
38 Mitigation may be designed to proceed in phases over several years. It may include, but is not
39 limited to, additional raptor nest monitoring, protection of natural nest sites from human
40 disturbance or cattle activity (preferably within the general area of the facility) or participation in

⁹ As used in this plan, "life of the facility" means continuously until the facility site is restored and the site certificate is terminated in accordance with OAR 345-027-0110.

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1 research projects designed to improve scientific understanding of the needs of the affected
2 species. Mitigation may take into consideration whether mitigation required or provided for other
3 impacts, such as fatality impacts or grassland bird displacement, would also benefit the raptor
4 species whose nesting success was adversely affected.

5 4. Grassland Bird Study

6 The objective of the grassland bird study is to gain a better understanding of grassland
7 bird distribution in the area and to examine whether construction and operation activities have
8 displacement effects on grassland birds. A grassland bird displacement study was conducted at
9 the Stateline Wind Project adjacent to the proposed HWPF to estimate displacement impacts, if
10 any, to grassland nesting songbirds adjacent to wind turbine strings. Also nearby, a similar study
11 was conducted at the smaller project, Combine Hills, employing the paired-plot approach.¹⁰ For
12 the present grassland bird study, the investigator will incorporate the Stateline linear transect data
13 collection method.

14 Stateline Study Methods

15 For the Stateline study, detections of grasshopper sparrows, long-billed curlews and other
16 grassland/steppe avian species that were either seen or heard were recorded on standard data
17 forms. The approximate distance along the transect was recorded for each detection, and the
18 habitat type was recorded for each 50-meter segment of the transect (six segments). A gradient
19 analysis was used to determine the relationship between density of grassland/steppe avian
20 species and distance from turbines.¹¹ A gradient analysis assesses whether a significant or a
21 biologically substantial relationship exists between distance from project structures and avian
22 abundance or use of the area. The differences between grassland bird use during the post-
23 construction period (2006) and pre-construction period (2001) were calculated for each 50-meter
24 segment away from the turbines. The averages of these differences for each 50-meter segment
25 were compared using *t*-tests and 95 percent confidence intervals. Results were presented in the
26 *Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003*¹² and the
27 *Stateline Wind Project Wildlife Monitoring Annual Report, January – December 2006*.¹³

28 Helix Study Methods

29 The Helix grassland bird study methodology includes a pre-construction baseline survey
30 and a 2-year, post-construction evaluation of grassland bird use at the facility. Prior to
31 construction, the certificate holder's investigator (a qualified professional biological firm) shall
32 establish a baseline of grassland birds within the site boundary by conducting point counts and
33 transect surveys within the study area described below. After construction, the investigator shall
34 repeat the surveys in the first year after construction is completed and the fourth year after
35 construction is completed. The timing of the second survey year may be modified in consultation

¹⁰ Young, Jr., D.P., J.D. Jeffrey, W.P. Erickson, K. Bay, K. Kronner, B. Gritski, and J. Baker, *Combine Hills Turbine Ranch Wildlife Monitoring First Annual Report, February 2004-February 2005* (2006). Technical report prepared for Eurus Energy America Corporation, Umatilla County, and the Combine Hills Technical Advisory Committee.

¹¹ Morrison, M. L., W. M. Block, M. D. Strickland, and W. L. Kendall, *Wildlife study design* (2001, Springer-Verlag, Inc., New York, NY).

¹² Western EcoSystems Technology (WEST) and Northwest Wildlife Consultants (NWC), *Stateline Wind Project Wildlife Monitoring Final Report, July 2001 – December 2003* (December 2004).

¹³ WEST and NWC, *Stateline Wind Project Wildlife Monitoring Annual Report, January – December 2006* (September 4, 2007).

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1 with ODFW and subject to approval by the Department based on the restoration of grassland
2 cover in areas disturbed during facility construction. As was done for Stateline, the investigator
3 shall calculate the differences between grassland bird use during the pre-construction period and
4 post-construction period for the each 300-meter linear transect and for each 50-meter transect
5 segment away from the turbines. The averages of these differences for each 50-meter segment
6 shall be compared using *t*-tests and 95 percent confidence intervals.

7 For the purpose of determining displacement impacts, the certificate holder shall
8 calculate the averages of these differences after 2 years of post-construction studies. Results from
9 the point count surveys (methods described below) will be useful for updating the spring 2003
10 passerine use information.¹⁴ These data may aid in understanding grassland bird species presence
11 at the facility in areas not studied with the transect method, especially if unpredictable alterations
12 occur in the transect habitat between the baseline period and the last post-construction transect
13 survey.

14 (a) Study Area

15 The study area is located within the facility site boundary or within adjacent leased land
16 and covers approximately one-third to one-half of the area within the HWPF site boundary
17 (excluding the 230-kV transmission line corridor). There are two primary areas within the study
18 area, and these areas consist of mature Conservation Reserve Program (CRP) grassland and some
19 smaller areas of native perennial grassland. The presence of grasshopper sparrows (a State
20 Sensitive Species) has been recorded in each of these areas, and the species is expected to be
21 observed during the baseline survey.

22 The two areas would have a minimum of six 300-meter transects. The habitat is primarily
23 planted CRP grassland that is approximately 8 years in age or maturity, along with native
24 perennial bunchgrass (bluebunch wheatgrass and Sandberg's bluegrass). The habitat is not highly
25 variable and is representative of a large portion of the remainder of the HWPF site, excluding the
26 croplands.

27 The two areas were selected based on a variety of factors. The areas are somewhat
28 removed from human activity (except low-volume traffic and farm equipment use on facility
29 access roads). They contain a relatively large area of grassland cover known to be used during
30 the breeding season by a few native grassland birds, including grasshopper sparrows. In addition,
31 based on a recent (mid-2008) conversation with the landowner, CRP and native grasslands in
32 these areas are likely to remain intact and no livestock grazing is planned.

33 (b) Survey Protocol

34 Baseline Surveys

35 Prior to construction, the investigator shall establish a baseline of grassland birds within
36 the study areas. The investigator will conduct passerine point counts at four specific locations
37 within the facility site. In addition, the investigator will conduct linear walking transect surveys
38 between May 1 and June 15 in 50-meter transect segments perpendicular to turbines to
39 complement the previously conducted transect surveys employed at Stateline Wind Project.

¹⁴ Details on previous avian point counts are provided in Table 1 of *Baseline Use at the Proposed Scenic Vista Wind Project, Oregon, Winter 2002-Spring 2003* (ABR, Inc.; WEST, Inc.; and NWC, Inc., September 2004).

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Post-Construction Transect Surveys

The investigator will conduct grassland bird surveys along transects within the study area. Transect surveys will be completed between sunrise and 5 hours after sunrise, consistent with standard protocols used nationwide. Surveys will not be conducted when wind and weather conditions are likely to hamper the investigators' ability to detect whatever birds are present. The transect surveys will be conducted between May 1 and June 15, as was done at Stateline, in the first and fourth year after construction is completed.

Surveyors will walk each transect and record all birds observed within 100 meters on each side of the observer, giving the transect an effective width of 200 meters. Each 300-meter transect will be divided into six 50-meter segments in order to differentiate between avian use at various distances from the turbines and the areas of construction disturbance.

Surveyors will collect the following data associated with bird detections: species and number, distance from observer to bird, age and sex, behavior and habitat. Date, time and weather variables will also be recorded. Abundant common species that fly readily in the surveyor's presence will be tracked visually to avoid double counting. Surveyors will collect data on special status grassland bird species.¹⁵ For all special status grassland bird species observed, the surveyors will record the number of observations of these species and their GPS locations or estimated distance and direction from the surveyor's position on the transect line. Special status grassland bird species that fly readily in the surveyor's presence will be tracked visually to attempt to determine defended territories and to limit potential double-counting of individuals. Surveyors will record notes on the general location and behavior of special status grassland bird species (for example, defensive responses, nesting, staging, courtship and non-breeders foraging in loose groups). The investigator shall plot the locations of all detections of special status grassland bird species on a map. The data will provide information on the location of special status grassland bird species at distances near and far from turbines and other facilities.

Post-Construction Point Counts

Surveyors will conduct small bird point counts in the first and fourth year after construction is completed. The small bird point count surveys focus on smaller birds utilizing CRP and native grasslands, such as the grasshopper sparrows. These surveys will complement the large-plot point count surveys conducted at three of the five plots surveyed in spring of 2003 at the proposed Scenic Vista Project (two plots were in a wheat field; the other three plots will be referred to herein as the "2003 study plots"). The post-construction point counts will augment the sensitive wildlife species pedestrian transects conducted in CRP fields in 2008, for building a knowledge base of bird use information for the facility site.¹⁶

Weekly 10-minute point counts will be conducted at the 2003 study plots between mid-March and mid-May. All birds observed will be recorded but the focus will be passerines within

¹⁵ "Special status grassland bird species" include grasshopper sparrows, long billed curlews, savannah sparrows, State and federal threatened and endangered grassland bird species, State Sensitive grassland bird species and Oregon Conservation Strategy grassland bird species.

¹⁶ The 2008 survey is described in NWC, *Helix Power Facility: 2008 Biological Investigations* (HWPF Site Certificate Application, Attachment P-8).

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1 a 100-meter radius of the plot center. Standard survey methodologies will be employed (morning
2 surveys on days without challenging weather conditions, etc.).¹⁷

3 Surveyors will collect the following data associated with bird detections: species and
4 number, distance from observer to bird, age and sex, behavior and habitat. Date, time and
5 weather variables will also be recorded. Abundant common species that fly readily in the
6 surveyor's presence will be tracked visually to avoid double counting. Horned lark observations
7 will be totaled for each survey area completed in one survey day. Surveyors will collect data on
8 the special status grassland bird species. For all special status grassland bird species observed,
9 the surveyors will record the number of observations of these species and their GPS locations.
10 Special status grassland bird species that fly readily in the surveyor's presence will be tracked
11 visually to attempt to determine defended territories and to limit potential double-counting of
12 individuals. Surveyors will record notes on the general location and behavior of special status
13 grassland bird species (for example, defensive responses, nesting, staging, courtship and non-
14 breeders foraging in loose groups). The investigator shall plot the locations of all detections of
15 special status grassland bird species on a map. The data will provide information on the location
16 of special status grassland bird species at distances near and far from turbines and other facilities.

17 (c) Data Analysis and Reporting

18 After the first post-construction survey year, the certificate holder shall submit a
19 preliminary summary report to the Department. After the second post-construction survey year,
20 the certificate holder shall submit a comprehensive final report to the Department. The certificate
21 holder shall submit maps for each survey year, showing the small bird survey plots and transects
22 walked, as well as specific areas of use by special status grassland bird species. The certificate
23 holder shall include other wildlife observations in the reports. The reports shall also include a
24 description of vegetation quality and structure compared to pre-construction conditions as
25 described in the application for site certificate. The reports should include notes on any changes
26 in land use by the landowner or due to wildfire influences and grazing. The reports should
27 describe any areas of intense vegetation impact.

28 5. Ongoing Reporting and Handling of Wildlife Injuries and Fatalities

29 The certificate holder will implement an ongoing monitoring program for avian and bat
30 casualties found during operation of the facility. The certificate holder will train facility
31 personnel in the methods and practices needed to carry out this program. Facility personnel shall
32 monitor the areas around all facility structures that may present a collision risk to avian and bat
33 species, including turbine towers, meteorological towers, aboveground transmission lines,
34 substations and field workshops. The monitoring program will include initial response, handling,
35 and reporting of bird and bat carcasses discovered incidental to maintenance operations
36 ("incidental finds"). Maintenance personnel will follow the certificate holder's protocol for
37 handling injured birds as described in Section 1(d).

38 All avian and bat carcasses discovered by maintenance personnel will be photographed
39 and data will be recorded as would be done for carcasses within the formal search sample during

¹⁷ Standard survey methods are described, for example in Ralph, C.J., G.R. Guepel, P. Pyle, T.E. Martin, and D.F. DeSante, *Handbook of field methods for monitoring landbirds*, USDA Forest Service General Technical Report, PSW-GTR-144, Albany, California (1993).

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1 scheduled searches as described in Section 1(d). Maintenance personnel will notify a project
2 biologist of incidental finds. The project biologist must be a qualified independent professional
3 biologist who is not an employee of the certificate holder. The project biologist (or the project
4 biologist's experienced wildlife technician) will collect the carcass or will instruct maintenance
5 personnel to have an onsite carcass-handling permittee collect the carcass. The certificate
6 holder's onsite carcass-handling permittee must be a person who is listed on state and federal
7 scientific or salvage collection permits and who is available to process (collect) the find on the
8 day it is discovered. The find must be processed on the same day it is discovered. The certificate
9 holder shall coordinate collection of state endangered, threatened, sensitive, or other state-
10 protected species with ODFW. The certificate holder shall coordinate collection of federally
11 listed endangered or threatened species and Migratory Bird Treaty Act protected avian species
12 with the USFWS.

13 During the years in which fatality monitoring occurs, if there are incidental finds outside
14 the search plots for the fatality monitoring searches, the data will be reported separately from
15 fatality monitoring data. Data on incidental finds within search plots will be included in the
16 calculation of fatality rates.

17 The Department may determine that mitigation is appropriate if avian or bat fatalities are
18 higher than expected and at a level of biological concern. If the Department determines that
19 mitigation is appropriate, the certificate holder, in consultation with the Department and ODFW,
20 shall propose mitigation measures designed to benefit the affected species. The certificate holder
21 shall implement mitigation as approved by the Department, subject to review by the Council.

22 **6. Data Reporting**

23 The certificate holder will report wildlife monitoring data and analysis to the Department.
24 The certificate holder shall notify USFWS and ODFW immediately if any federal or state
25 endangered or threatened species are killed or injured on the facility site. The certificate holder
26 shall report fatality monitoring program data, WGS colony assessment information, raptor nest
27 monitoring data, data and analysis from the grassland bird study and data on avian and bat
28 casualties found by facility personnel. The certificate holder may include the reporting of
29 wildlife monitoring data and analysis in the annual report required under OAR 345-026-0080 or
30 submit this information as a separate document at the same time the annual report is submitted.
31 In addition, the certificate holder shall provide to the Department any data or records generated
32 by the investigators in carrying out this monitoring plan upon request by the Department.

33 **7. Amendment of the Plan**

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