

Comment Response Matrix

Draft Summary Report on Peer Review of Eagle Fatality Model

Comment #	The comment refers to the following location in the document:				Comment	Action Taken to Address the Comment
	Chapter	Section	Page	Paragraph		
1	All				In the appropriate location, please included a section that states what data was provided for the review (i.e. for the model, for the 1000 turbine and 90 turbine sites); that we held a Webinar on January 18 at 12:30-3:30 pm (mountain time) to explain model and datasets for 1000 and 90 turbine sites. Lastly, please incorporate the Webinar slides into a stand-alone appendix.	Data provided is added at end of Section 1.0. Webinar information added in Section 2.2 with Webinar slides and minutes added as Appendix D.
2	ES		1	2	This comes up several times. The Service investigates cumulative effects in a separate analysis that is discussed in the ECPG. It might be helpful for the reviewer to clarify whether there is some specific way of incorporating these effects at a site-specific modeling scale	Based on comments below from Reviewer 4 re: "cumulative effects" on a landscape/regional scale, and comments from the Service re: the purpose of the model, the discussion of cumulative effects in the summary report have been removed. Removed 'cumulative' from the sentence. With regard to non-linear effects, they are relevant if the site ends up killing certain types of eagles (territorial eagles, for instance, or non-territorial ones) and you could get strange behavior in the real population. I think incorporating age structure and seasonality into the model would be a good start, although tough with the data as collected.
3	ES		1	3	This comment gives us pause since our model does not predict or attempt to predict effects on populations. Nor do we believe to have made that claim. So we feel this comment is simply not applicable.	Removed 'and the ability to accurately determine the effects of fatalities on eagle populations' from the sentence.
4	ES		1	4	"any given site?" what site?	Changed 'the site' to 'a site'
5	ES		1	4	Stratifying by wind speeds is an interesting proposition but maybe beyond our ability and may create additional variability. For example, would the reviewers recommend surveyors collect wind speeds at the survey point once, or during each observation or try to estimate wind speeds at the location of the eagle (e.g., surveyor in valley, eagle on rim top)?	Probably 4 categories would be sufficient (calm, light, stiff, gale) and could be estimated by the surveyors. This can be accomplished with the right kind of telemetry data too.
6	ES		1	4	It may be difficult to determine whether an eagle is a resident or migrant. Do the reviewers have "easy" methods to determine status?	Yes, this is a laborious task for sure and unfortunately there are no quick/easy methods for this. It would require migration surveys in the spring and fall, along with summer surveys to confirm territory occupancy by resident breeders. Aging the eagles may help.
7	ES		1	4	How might these be incorporated into the modeling framework?	Reviewer 4 feels that construction and monitoring could have negative impacts on eagle behavior, although this wouldn't necessarily contribute to likelihood of collisions with turbines unless it lowered eagle minutes. The reviewer did not suggest a way in which changes in eagle behavior could be incorporated into the modeling framework but effects could be seen by a decrease in eagle minutes (if eagles were disturbed and emigrated away from the site. Collecting data on eagle behavior and the effects of construction would be even more difficult to collect than determining if an eagle was a resident or a migrant (see comment 6). See Pearce-Higgins citation.

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8	ES		1	4	The model presented was meant for individual sites, so we are unclear how such an omission can be stated. FWS is approaching this independent of the collision model.	Reviewer 4 is concerned with cumulative effects on a landscape/regional scale, and as stated by the USFWS the intention of the model is to predict effects only at each individual site. Therefore, this comment has been removed from the summary report. However, Reviewer 4 felt that cumulative effects were important for FWS to consider in decision making.
9	ES		2	1	Is this what the reviewer meant, or did they mean to say: "Consequences are only dependent on density?"	Edited to clarify. This is accurate as written. The problem is that killing an adult eagle has different demographic impacts than does killing a subadult. Not all eagles are the same from a demographic standpoint. Yet the model assumes they are. Likewise, 100 minutes by one eagle is considered as similarly risky as 1 minute by 100 eagles. Same amount of time, but I would worry much more about the second scenario than the first scenario.
10	ES		2	1	Are they suggesting these are independent of each other? Because our whole premise is that there is a correlation.	Independent events in the statistical sense only, but both with a common intensity. This may not be a useful premise – see Ferrer et al. 2012 JAE for a useful paper on the relationship between pre construction surveys and actual mortality.
11	ES		2	3	Does the reviewer's comment relate specifically to a Poisson posterior for fatalities? Our model, as presented, results in a gamma posterior for F. Need clarification	The gamma posterior for a single year leads to an estimate of the specified percentile. But the corresponding percentile for a 5 year period is NOT found by multiplying the percentile from a 1 year period by 5. You actually need to run the model for a 5 year period.
12	ES		2	4	For what project? 1000? or 90? Or are they suggesting for the model?	Edited to make more general summary. Original summary pertained to 1000 Turbine Project.
13	ES		2	4	Are there data / papers available to support this opinion?	See Reviewer 2 individual comments. It is reasonable to assume that juvenile birds will be 'floaters' (non-breeding, non-territorial) and will behave differently throughout the seasons (i.e. not foraging for nestlings) and therefore will have different collision probabilities. In Norway and in California, there has been particularly high mortality of pre-adult birds. This would be beneficial to a population (when compared to mortality of adult birds). Lie Dahl 2012 describes impacts on reproductive output, which partially gets to this. Hunt's work at Altamont also references particular risk to subadult eagles.
14	ES		2	4	Rather than say we should not have applied the model (suggests our model is wrong), is it more accurate to say the available data are not adequate for the model? We are not seeking a change if the reviewer feels the way it reads, however we do not want this statement construed any other way than what it was intended to clearly articulate.	Edited to better reflect Reviewer's comments.
15	ES		3		Recognize this is a summary statement....but as written, doesn't help.	Structure the document by clearly describing the likelihood and then the priors etc. See individual reviewer's comments for more details. Some additional language added to clarify in this bullet.
16	ES		3		Not certain we understand. Is there a way to clarify?	Random circular plots (point counts) should be conducted outside of known breeding territories to account for non-breeding eagles that may be in the area and at risk of collision.

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17	ES		3		Is the reviewer claiming “mass mortality” is possible for eagles? If so, request they add a qualifier to define “mass” i.e. 3 birds at once?	I stated that there are reports of bird mass mortality in the literature, and these events were associated with inclement weather. It would be more clear to state: the current model may not capture important temporal variation in mortality rates if mortality rates do rise (or fall) significantly during certain weather patterns. [Also see comments below – I agree that this temporal variation is captured in the collision prior to the extent that the previous studies are representative of future collision risk.] Bullet clarified.
18	ES		3		If this isn't more clear in the individual full comments – or elsewhere -, we request more detail here.	At the moment, all of the exposure data is pooled and the total eagle exposure minutes is modeled as a Poisson distribution. By pooling this data, you lose information to assess if the Poisson distribution is appropriate. For example, if E1 and E2 are the exposure minutes from two point count surveys, then you should model E1 ~Poisson (n1 lambda) and E2~Poisson (n2 lambda) rather than (E=E1+E2 ~ Poisson ((n1+n2)lambda). The end result is the same, but now you can use E1 and E2 to assess if the Poisson distribution is appropriate by, for example, testing if the variance(E1,E2) matches the mean. Similarly, model EACH years fatalities as separate components rather than just the sum of fatalities over two years. Note: This is explained further in other comments.
19	ES		3		If not done otherwise, can the reviewer please expand – in the appropriate location within the document -on why they feel this is advantageous (and some discussion of what may need to be considered when pooling across habitats?	See individual reviewer's comments. Reviewer 2 was thinking along the lines the lines of $p(m) = p(m t)p(t)$ where $p(m)$ is probability of mortality, $p(m t)$ is a hazard function that gives the probability of mortality during an incursion into the wind farm of duration t , and $p(t)$ is the distribution of incursion times. Here $p(m)$ is conditioned on there being an incursion, so one would also need to model the probability of incursion. Of course there may be no way to build a prior for this using available data. It might have to be modeled making simple assumptions about movement. I am not suggesting that this is a necessary step, so it can be disregarded.
20	ES		3		We are confused by this point. There is an implicit prior on fatality estimates, but the only way to affect this is to alter the priors on collision and exposure.	It is assumed that the fatality records will be exact. But presumably, the number of fatalities is extrapolated from the detected fatalities to account for scavenger removal. This extrapolation process needs to be modeled as well.
21	2				There are a number of edits under this section to the actual text. Given this section is in reference to fact and not peer reviewer comment, we made changes to improve accuracy. If you disagree, please do not hesitate to contact us.	Grammatical/typographical edits accepted throughout report.
22	2	2.2	5	1	It is still possible, but made more difficult and challenging by the lack of ability to require consistency.	Changed to "currently difficult"
23	2	2.2.2	7	1	Did the reviewers make any assumptions? For example, did the reviewers assume all turbines were in operation during all day light hours?	We simply used the code as presented by the service which used all daylight hours less 3%(?) for downtime?
24	2	2.3	7	1	What does this mean? We can assume what “increased daylight hours” means, but we would rather have this defined. Particularly, since on page 8 the highlight text speaks to dusk, but with different daylight hours.	I think we then included the 3% downtime and then a bit more to include before/after sunrise/sunset. I didn't pick the number – one of the other reviewers suggested we increase this number. Added some clarifying language.
25	2	2.3	8		Please check this number	Corrected number and language in paragraph.

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26	2	2.3	8		Table 1. Should probably be clear that this are annual estimates.	Corrected in both Table 1 and 2
27	2	2.4			We can change daylight hours to include twilight. Can the reviewer provided citations on eagle activity at those times of the day?	See Reviewer 2 individual comments.
28	3	3			This is problematic since it appears a number of times for the different reviewers. In our mind, "No response" means the reviewer didn't address. Why? Is it because the reviewer has no specific expertise? No basis to evaluate? Needed clarification of the question? Whatever the case – unless they flat didn't respond – we would like a more clear statement as to why "no response."	Note: This comment is repeated in a number of places but only included in this spreadsheet once. Sentence added to Section 3.0 to clarify what No Response means.
29	3	3.1	10		Question 2, Reviewer 4. Is the reviewer aware of new literature on collisions with wind turbines by eagles? We are aware of newer papers, but they are on species other than eagles.	Additional citations provided at the end of Reviewer 4 comments.
30	3	3.1	11		Question 3, Reviewer 1. Please clarify	See responses to earlier comments about modeling individual point count records. With the individual point count records, you now have information to assess the Poisson assumptions.
31	3	3.1	11		Question 3, Reviewer 2. At this time, we cannot require applicants to collect data to support such stratification. Pooling of unstratified data results in larger variances and more uncertainty, so the approach we use to deal with that uncertainty is how we've addressed this for the present. Having said that, is the reviewer willing to comment as to whether our approach is justifiable given these limitations or if it is not scientifically supportable? If not, we appreciate their valuable insights as written.	Pooling of the unstratified data can be appropriate if the data collected are sufficient to account for the variance across those strata. I understand that increasing the variance and decreasing the CI is the technique used by the Service to account for pooling data and this is appropriate for some circumstances, but not all. The approach is perfectly justifiable when the data are numerous and have good coverage of the project area (e.g., the 90 turbine project with 30% coverage). I do feel that the approach is not justifiable in such circumstances as the 1000 turbine project, in which the data cannot be assumed to provide representative coverage of any strata (time, area, age, etc). As stated in my response, I suggest the Service maintain minimum requirements of data quality in use of this model. While I understand the Service cannot require specific data, the Service is also not required to utilize this model in every circumstance. It would be inappropriate to apply this model in situations where data are insufficient temporally or spatially. Given the lack of published data on age specific collision risk, I find the Service's approach acceptable but trust the adaptive nature of this model allows for the incorporation of such data, should they become available.
32	3	3.1	11		Question 3, Reviewer 4. This is unclear and we request better explanation. Namely, please review the question and are these assumptions valid, or if not, why?	Clarified. See in Reviewer 4 individual comments.
33	3	3.1	12		Question 5, Reviewer 2. Can reviewer provide suggestions?	See Reviewer 2 individual comments.
34	3	3.1	12		Question 5, Reviewer 2. These sentences appear to conflict. Please clarify.	Edited to clarify.
35	3	3.1	12		Question 5, Reviewer 3. Waiting or weighting?	Waiting. No change.
36	3	3.1	12		Question 5, Reviewer 3. Duration of the human or eagle visit?	Eagle visit. Clarified.

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37	3	3.1	12		Question 6. Three reviewers responded, two of which provided actual cites. Please have the two that provided cites respond to the remainder of the question and reviewer 4 respond with cites(s) and why incorporation of the ideas would improve the model.	Reviewer 3 did address 2nd portion of question. Reviewer 2 clarification added. Reviewer 4 clarification added.
38	3	3.1	13		Question 7, Reviewer 2. Additional perspective on the minimum data we should be recommending would be helpful if the Reviewer can further elaborate.	Edited sentence to better match the expanded comments in Appendix B.
39	3	3.1	13		Question 7, Reviewer 2. Some discussion for what size range the Reviewer believes the model is appropriate for would be helpful.	Edited sentence to better match the expanded comments in Appendix B.
40	3	3.1	13		Question 7, Reviewer 3. Inclement weather and visibility should already be factored into the collision prior, because the wind facilities upon which the prior is based probably had inclement weather and low visibility. Also, it is unclear what is a "mass mortality" event. Could the reviewer clarify these points?	Good point: to the extent that the prior studies are representative of future collision risk, including weather events, then the model should reasonably capture this temporal variation. I did not factor in that the prior intends to capture holistically the integrated collision risk from previously studied sites. It could of course be the case that the prior studies are not representative, but there is little one can do about that. I am therefore in agreement and feel the model does take this into account, at least as far as can be done with the available information. The term "mass mortality" was simply poor word choice, I really just mean elevated risk. Sentence edited to clarify.
41	3	3.2	15		Question 2, Reviewer 4. What is reasonable to extrapolate from such a dataset? Also, more generally, what if eagle use is just naturally highly variable (low occurrence rate presents challenges)?	The current data set can not be used to interpret intra-seasonal variability because there is too much variation in the amount of time spent collecting data. It might be reasonable to clump all data together and make some broad statements, but those broad statements would be driven by certain times of year and would be probably incorrect when more useful data were collected. There are severe limitations of extrapolation with such an inherently variable data set. Although one could combine the data set to ignore seasonality, that would be really a bad idea, since the available data indicate STRONG seasonality. I think there are substantial limitations to what could be extrapolated from the current dataset.
42	3	3.2	15		Question 4, Reviewer 2. Is that a valid assumption?	Yes, this is a valid assumption for golden eagles in the West.
43	3	3.3	17		Question 3, Reviewer 2. Can the reviewer be more specific in terms of time relative to sunrise or sunset? This is a helpful comment and added clarity will help us.	Civil twilight as defined by NOAA
44	4	Rev 2	19	1	Does the reviewer have suggestions on how we might accomplish this recommendation?	See individual comments.
45	4	Rev 2	19	1	How would the Reviewer recommend determining some of these factors in an unmarked population?	See individual comments.
46	4	Rev 2	19	2	We believe to understand the Reviewer comment, but some clarification on this point would be helpful.	See individual comments.
47	4	Rev 4	20	2	Does this reviewer hold this recommendation despite their review of Appendix H of the Eagle Conservation Plan Guidance V2 Technical appendices?	Appendix F? If so, that helps. However, some type of model for cumulative effects is really important.

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48	4	Rev 4	20	2	Not a problem for the model framework, but do both eagle biologists on the review panel agree that dawn/dusk are more appropriate than sunrise/sunset?	Dawn/dusk is better, although not perfect.
49	4	Rev 4	20	2	Suggestions?	More even data collection year round, get CVs down to 5-10% of mean. That is a good target for the consultants!
50	5	5.0	21	2	Is the reviewer assuming that the construction of the wind facility may reduce eagle fatalities because eagles will avoid the area after the facility is built?	No, more that construction may negatively impact eagles and that should be considered in the models.
51					We recommend that the information for the January 18, 2 2013 webinar between AMEC and its reviewer panel and the Service be included in the Summary Report in an Appendix. This should include a copy of the Power Point presentation the Service distributed for the webinar and a copy of the final edited notes from this webinar. This addition will provide context to other future reviewers of the Report since this webinar, and even specific slides from it, are referenced multiple times in the Reviewer comments.	Included in Appendix D.
52	A				Appendix A presently lacks any page numbers so these should be added in.	Added.
53	A				The figures provided in Appendix A should all get a descriptive label and a Figure number.	Added Figure #s and labels.
54	A				The font size and formatting for the text preceding each of the graphs (Figures) is inconsistent in Appendix A (the first 4 use a larger size font and the last 6 use a much smaller size font). This should be corrected by using the same font size and formatting for this text throughout Appendix A. The larger font size with wider spacing to the text (used for the first 4 Figures) is our preferred style here.	Unfortunately, I can not change this as this output was provided by the reviewers as pdfs.

Comment Response Matrix - Reviewer 1 Responses

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1	All				There are a number of grammatical/typographic corrected throughout.	Edits accepted. Introduction section edits are incorporated into Section 1 for all reviewer's responses.
2	2				What does a No Response mean? Did the reviewer not consider this question? Or did the reviewer consider this question but did not find any problems with the science used by the Service?	Repeated multiple times but only entered here once. See response in summary report. No response indicates reviewer did not consider themselves qualified to respond.
3	2	2.2	8	1	Question 2 response. But would this take an adjustment of the inner workings of the model to accomplish this?	There is some slight code adjustment – rather than entering the radius, why not step back and enter area?

Comment Response Matrix - Reviewer 2 Responses

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1	All				There are a number of grammatical/typographic corrected throughout.	Edits accepted. Introduction section edits are incorporated into Section 1 for all reviewer's responses.
2	2				What does a No Response mean? Did the reviewer not consider this question? Or did the reviewer consider this question but did not find any problems with the science used by the Service?	Repeated multiple times but only entered here once. See response in summary report. No response indicates reviewer did not consider themselves qualified to respond.
3	2	2.1	2		Question 1 response. Does the reviewer have any recommendations on strata? And when/where does the strata begin and end?	The start/end dates are somewhat dependent on latitude. The seasonal strata I would suggest would be based on nesting and migration. For example, nesting season should be defined near mid Feb – Aug to capture the time periods associated with undulating flights and increased hunting efforts. Spring Migration is typically Mar-Apr and fall migration is Oct-Nov. Wintering Dec-Feb. Spatial strata should be defined by habitat type (e.g., ag, fields, riparian, forested, cliff).
4	2	2.1	3		Question 3 response. I would appreciate any data this reviewer can provide on relative movements by eagles during twilight periods. PTT-tagged eagles show little movement over this ~ hour, but this reviewer probably has better data. If we were to adjust the model to allow for movements over the twilight period, it would be good to know if such movements are at the same rate as movements at other times of the day, or at lower rates (as PTT data would suggest).	I just reviewed our data from adult breeders and found about 72-100% of the twilight hours had movements during the breeding season. The percentage seems to drop a little during the winter months, but it's still in the realm of 50%.
5	2	2.1	3		Question 3 response. Is this in reference to the non-operational period for the Thousand Turbine Project? If so, adjusting the daylight hours (e.g., *0.97 to account for 3% inactivity) is an easy way to incorporate this information into the model. Otherwise, we do not know which turbines will be off-line and when. If the statement refers to something else, then please explain what is meant by this.	We are on the same page. My comment was not to change the methodology of inactivity, just to make sure it is clearly stated.
6	2	2.1	4	1	Question 3 response. Because we cannot require project applicants to provide data stratified according to these factors under the current regulation, is it this reviewer's opinion that no meaningful estimate of the fatality rate can be generated until the regulation is revised in 2015? In other words, is the approach we are forced to use in most cases (essentially aggregating data over these strata with the result being estimates with larger variances than would be the case with stratification, and then using the 80 CI of that distribution as the "working" fatality estimate) not scientifically supportable?	My concern here is that there is not an objective way to quantify the quality of the data. If the data are insufficient in capturing the variability across the project area or seasons, then yes, I feel that no meaningful estimate of the fatality rate can be achieved. The problem I see here is not the model, but rather the lack of a safeguard for inadequate datasets. I agree with lowering the CI limit to account for the uncertainty of combining strata, but there needs to be a clear minimum requirement of survey effort that corresponds to the project area size and the variability within. As a drastic example, use of the model would not be appropriate for a project that did 4 surveys over the course of the year. To this end, I appreciated the wording by the Service that surveys should cover at least 30% of the project area, etc. But these types of guidelines are not incorporated because the Service cannot require it. My opinion is that even though the Service cannot require it, datasets that do not meet these minimums should not be used in this model. From my understanding, the Service is also not required to run this model for every dataset.

Comment Response Matrix - Reviewer 2 Responses

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7	2	2.1	4	2	Question 3 response. Define this and all other acronyms used in the Report the first time they are used.	Corrected throughout document.
8	2	2.1	4	2	Question 3 response. OK, so is this the recommendation for moving forward with the kinds of data we are getting now?	Yes, modified text slightly.
9	2	2.1	6	1	Question 5 response. Could the reviewer prioritize a list of possible strata to include in the data collection? For example, season (how many "seasons"), age, others?	1. Seasons: Breeding (mid Feb-Sept), Fall Migration (Oct-Nov), Winter (Dec-mid Feb) 2. Habitat Strata (forest, Riparian, Ag, Fields) 3. Age
10	2	2.1	6	3	Question 5 response. Can the reviewer provide citations to support this? Two are provided on page 2, but there the reviewer seemed to be less certain, stating the studies suggest the possibility of age differences. The reviewer also recognized the lack of peer-reviewed studies. Also, if we assume juveniles represent a relatively constant proportion of the population, and that it is fairly uniform across project locations, the priors should already account for both adult and juvenile fatalities. Is this true?	True; this is more of an assumption based on knowledge of eagle biology since there are a lack of definitive studies. The assumption about priors would hold true if seasonal strata were employed.
11	2	2.1	6	3	Question 5 response. Is this reviewer aware of data that show younger eagles are at greater relative risk than adults? We have not been able to discern an age effect that isn't explained by the relative abundance of the different age classes, though data we have to work with are sparse.	See response above.

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12	2	2.1	6	4	Question 6 response. Please respond to 2nd half of the question.	This paper builds upon the collision risk model by Whitfield and Madders by incorporating both habitat quality and nest locations; two pieces missing from the current model. This risk model has utility limited to the breeding season, but if seasonal strata are incorporated, this can strengthen the model by better assigning risk for eagles nesting in and around the project area.
13	2	2.1	6	5	Question 7 response. Additional perspective on the minimum data we should be recommending would be helpful if the Reviewer can further elaborate.	I'd suggest the service adopts a minimum set of criterion for surveys to be included. This minimum can be based on survey method suggested guidelines already published by the Service.
14	2	2.1	7	1	Question 7 response. How could be the model be modified to accomplish this?	What I meant was that I see the results of this model being used to inform total eagle take and population level effects in conjunction with other studies currently underway by the Service (i.e., the West surveys).
15	2	2.1	7	1	What size range does the Reviewer believes is appropriate for the model?	The model can be appropriate for any size project, if the survey data that feed the model are adequate. This leads directly back to the minimum data requirements (e.g., 30% coverage and multiple years) that cover both temporal and spatial strata adequately.
16	2	2.2	7		Question 1 response. In the context of this sentence clarify what the "it" is that is being violated.	"It" refers to the dataset feeding the model.
17	2	2.2	7		Question 1 response. I realize this may be a policy question not suited to the reviewers, but I'd be curious if this reviewer has any thoughts as to a scientifically valid approach to use to generate a fatality estimate for this project with the data provided?	I do not believe an accurate fatality estimate can be produced for this project with the data provided. I think the data are too few and don't adequately cover the strata to satisfy the assumption of uniform risk across the study area.
18	2	2.2	7		Question 2 response. Define this acronym.	TTP = Thousand Turbine Project
19	2	2.2	8	2	Question 2 response. We asserted this in the first version of the Eagle Conservation Plan Guidance, and we were challenged to produce peer-reviewed science to support the assumption by the peer-review panel that reviewed that document. We could find no published data, and changed this to a hypothesized risk. Is the reviewer aware of peer-reviewed studies that support this point?	Agreed that there are no published papers correlating flight types with collision risk. That is true for any flight type. Survey methodology should be such that these flights are mapped, which would then be incorporated in the model. This would be accomplished if enough surveys were conducted in Feb-March during courtship. The current draft has this listed as winter, when fewer surveys are done. This may be fixed is the correct seasonal strata were incorporated with a suggested increase in surveys during courtship.
20	2	2.2	8	3	Question 2 response. Is this the same as inactive?	Yes
21	2	2.2	8	4	Question 3 response. Please clarify whether it is the model that is suspect or rather that the use of the model in the context of this project is suspect because model assumptions are violated by using existing project data.	Correct, the model is not suspect, but rather the outcome based on the dataset used.
22	2	2.2	9	2	Question 4 response. Is that a valid assumption?	Yes, this is a valid assumption for golden eagles in the West.
23	2	2.3	10	1	Question 3 response. Can the reviewer be more specific in terms of time relative to sunrise or sunset? This is a helpful comment and added clarity will help us.	Civil Twilight. This is a specific time that is delineated by NOAA and other such agencies. It has to do with when you can see, not when the sun crests the horizon.
24	3		10	2	Can the statisticians on the review panel comment on this suggestion. I like the idea and would appreciate their feedback as well.	Both statisticians responded that as data quality increases the CI decreases, so there is a built-in incentive for increasing data quality.
25	3		11	2	Does this amount to a suggestion that post-construction monitoring include monitoring of eagle exposure after start-up in addition to fatality monitoring?	Correct. If eagle movements change due to the windmills (as suggested in the literature), then it would be good to monitor risk after the turbines are up.

Comment Response Matrix - Reviewer 3 Responses
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1	All				There are a number of grammatical/typographic corrected throughout.	Edits accepted. Introduction section edits are incorporated into Section 1 for all reviewer's responses.
2	2				What does a No Response mean? Did the reviewer not consider this question? Or did the reviewer consider this question but did not find any problems with the science used by the Service?	Repeated multiple times but only entered here once. See response in summary report. No response indicates reviewer did not consider themselves qualified to respond.
3	2	2.1	2		Question 5 response. We could certainly explore this further; however, I am not clear how this information would be incorporated into the model. If the reviewer feels strongly about this recommendation, could the reviewer describe this in greater detail and provide an example of data, code, runs, etc.?	<p>I emphasize "possible" because although I think my suggestion could lead to a "better" (or at least more interesting to me) model, that will depend crucially on the quantity and quality of data available. There is no point in developing it if you can't get a sensible result out.</p> <p>My thought was along the lines of $p(m) = p(m t) p(t i) p(i)$ where $p(m)$ is probability of mortality, $p(m t)$ is probability of mortality given visit of duration t, $p(t i)$ is the probability of visit of duration t given an incursion, and $p(i)$ is the probability of incursion. Some of these may of course involve additional unlisted parameters. This is a quick and dirty outline of the idea.</p> <p>I'd be interested developing this model further, especially if it proved useful in management. Given my time limitations, I would not likely be able to work on it without some support.</p>
4	2	2.1	3		Question 7 response. If we expect eagles will fly infrequently during (big) storms, high-wind events and low visibility, would that change the reviewers statement? Also, does the reviewer expect "mass mortality" events for eagles to occur? And how would you define "mass mortality" for eagles? Inclement weather and visibility should already to factored into the collision prior, because the wind facilities upon which the prior is based probably had inclement weather and low visibility.	<p>It is unlikely that there would be a sufficient concentration of eagles to produce a mass mortality event (100's or 1000's of individuals) in any single area. I suppose one might encounter very rarely a "perfect storm" that created high risk over a very large area involving a large number of birds eg a regional weather disturbance during migration. This is really just speculation and does not need to be included here.</p> <p>The point made that prior results are likely to include periods of bad weather is a good one. I agree that this issue is to some extent already dealt with in the model through the specification of the collision prior.</p> <p>My comment is largely about temporal variation in risk. If eagles do not fly during inclement weather and reduce their risk during these periods, that would also influence the outcome. Again, to the extent this is captured in the prior, the model is sufficient.</p>

Comment Response Matrix - Reviewer 4 Responses
Draft Summary Report on Peer Review of Eagle Fatality Model

Comment #	The comment refers to the following location in the document:				Comment	Action Taken to Address the Comment
	Chapter	Section	Page	Paragraph		
1	All				There are a number of grammatical/typographic corrected throughout.	Edits accepted. Introduction section edits are incorporated into Section 1 for all reviewer's responses.
2	2				What does a No Response mean? Did the reviewer not consider this question? Or did the reviewer consider this question but did not find any problems with the science used by the Service?	Repeated multiple times but only entered here once. See response in summary report. No response indicates reviewer did not consider themselves qualified to respond.
3					Note the "Reviewer #" label at the upper right hand corner in this comment file should be replaced with "Reviewer 4"	Corrected.
4	2	2.1	3	1	Question 3 response. Is there a more realistic approach? Perhaps winter mortality could be less important to the local area population, but the size of the effect would be difficult to determine.	The way to evaluate these effects is through simulation modeling
5	2	2.1	3	2	Question 3 response. Would it be appropriate to separate data into seasonal strata to address this concern?	This would help and be an improvement. Note that the current data collected by the consultants are inadequate to handle these types of analyses (too much inter-seasonal variation in data quality).
6	2	2.1	3	2	Question 3 response. Determining which birds are breeders and non-territorial may be difficult and beyond the scope of most consultants. Any recommendations from the reviewer how to incorporate this into the model?	In theory it should be possible for a good consultant to identify local territorial adults and then to evaluate whether or not the birds observed are those adults or are younger birds. Certainly it should be reasonable to separate HY eagles from others. In some cases it ought to be reasonable to expect separation of subadults and adults and that would provide lots of information.
7	2	2.1	3	4	Question 3 response. It appears this is based on an assumption that eagles behave like coyotes. Does the reviewer have data to support this point?	It is certainly the case that replacement of raptors is usually fast, because the floater pool is usually larger than the pool of territorial adults. Thus, replacement should be fast. Ian Newton has some good examples of this in his book "Population Ecology of Raptors" (I'm thinking specifically of his examples with PEFA) and also Miguel Ferrer has published some good work from Spain on floater population of Imperial and Bonelli's eagles. In those cases, replacement is fast and subadults breed when populations are small or declining. My sense is that if there is an area with good habitat but high mortality (e.g., a nest near a wind facility) that site could easily become a population sink for eagles and that would be bad.
8	2	2.1	4	1	Question 3 response. Another question is whether the presence of the wind facility will reduce eagle activity post-construction and whether this will then influence the fatality estimate. Does the reviewer have any thoughts on this aspect?	Something along those lines has occurred in Norway, at Smola, although largely because the eagles were all killed and thus there were fewer eagles using the space (territories became less good once turbines were in place). See Lie Dahl et al. 2012. Reduced breeding success in white-tailed sea eagles at Smola windfarm, western Norway, is caused by mortality and displacement. Biological Conservation 145: 79-85.
9	2	2.1	4	7	Question 6 response. Please provide citations and address 2nd half of the question.	The paper I reference is cited above: Goodrich & Buskirk, Cons. Bio 1995, 9(6):1357-1364. As to including the ideas – they would help the model because they would better represent the true population dynamics at this site. This gets to the assumptions I mention above.

Comment Response Matrix - Reviewer 4 Responses
Draft Summary Report on Peer Review of Eagle Fatality Model

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	Chapter	Section	Page	Paragraph		
10	2	2.1	5	1	Question 7 response. Does the reviewer have any suggestions of peer-reviewed literature towards completing this type of analysis?	<p>I'm not an expert on this type of Bayesian analysis but sensitivity analysis is common in the literature. Hal Caswell's book (Matrix Population Models) and Morris and Doak (Quantitative Conservation Biology) should both have some info on this. The essential idea of sensitivity analysis is to run the model thousands of times making small changes in key parameters. You can then evaluate what small changes have the largest impacts on model outcomes and use that to guide both future data collection and subsequent analyses and model runs. Two papers with sensitivity analyses: Katzner, T., E.J. Milner-Gulland and E. Bragin. 2007. Using modeling to improve monitoring of structured populations: are we collecting the right data? Conservation Biology 21(1): 241-252.</p> <p>Katzner, T., E. Bragin and E.J. Milner-Gulland. 2006. Modelling populations of long lived birds of prey for conservation: a study of Imperial Eagles (Aquila heliaca) in Kazakhstan. Biological Conservation 132: 322-335.</p>
11	2	2.2	7	2	What is reasonable to extrapolate from such a dataset? Also, more generally, what if eagle use is just naturally highly variable (low occurrence rate presents challenges)?	<p>The current data set can not be used to interpret intra-seasonal variability because there is too much variation in the amount of time spent collecting data. It might be reasonable to clump all data together and make some broad statements, but those broad statements would be driven by certain times of year and would be probably incorrect when more useful data were collected.</p> <p>Even if eagle use is highly variable, there should not be such variation in number of minutes sampled. This is a massive wind project and there is a burden of proof on the consultants to show that it won't cause harm. The burden is therefore on them to collect data in a useful manner.</p>
12	2	2.2	7	3	Question 3 response. Any specific peer-reviewed papers that USFWS should follow in conducting this analysis?	These are noted above in comment #10.
13	2	2.2	7	5	Question 4 response. FWS would appreciate any comment this reviewer might have on the approach outlined in Appendix F, recognizing it is a placeholder while better data and models are developed.	<p>Appendix F is a step in the right direction. I'm pretty sure that using the BCRs as a starting point is probably not the best way to do things (although I think the Service recognizes this and is trying to improve on this approach). Appendix F could be improved if demographic structure and types of birds killed were considered – adults, subs, juveniles, etc.</p> <p>In this case, I think the 1000 turbine project may eat up a great deal of the 5% of annual production that would be allowed locally.</p>