United States Department of the Interior

FISH AND WILDLIFE SERVICE
Twin Cities Field Office
4101 American Blvd E.
Bloomington, Minnesota 55425-1665

January 15, 2013

Deborah Pile
Energy Facility Permitting Supervisor
Minnesota Department of Commerce
85 7th Place East, Suite 500
St. Paul, Minnesota 55101

Re: New Era Wind Project
Goodhue County, Minnesota
PUC Docket No. IP6701/WS-08-1233
FWS TAILS #32410-2009-FA-0173

Dear Ms. Pile:

This letter serves to provide the Department of Commerce with the US Fish and Wildlife Service's (the Service) preliminary eagle collision risk estimates for New Era Wind Farm (formally Goodhue Wind). This letter also serves to provide comments on New Era Wind's eagle collision risk model numbers and general comments on New Era Wind's Eagle Conservation Plan (ECP).

Fish and Wildlife Service Preliminary Collision Risk Estimates

The Service has conducted an independent review of New Era's eagle survey data, taking into account multiple factors and uncertainties, such as eagle flight height and behavior, and the potential impacts of additional food sources for eagles, such as livestock carcasses. With regard to observed carcasses in the project area, the Service analyzed New Era Wind's data with and without the presence of livestock carcasses. The Service did not exclude wildlife carcasses, or instances where carcasses were suspected but not confirmed (more detail below). Preliminary collision risk numbers for the New Era Wind project (based on the Service's collision risk model, or FWS model) are listed in the table below. Please note these numbers assume no avoidance or minimization measures, which we expect would lower eagle mortality.

Species	Predicted Collision Rates per year	Predicted Years Between Collisions
Bald Eagle	8.4 -13.8 eagles/yr.	-
Golden Eagle	0.039 - 0.059 eagles/yr.	17-26 years

Please note that this is a preliminary analysis, and these numbers may change as further analysis is conducted. Additionally, for purposes of this preliminary estimate the Service has adopted a "risk-averse" stance on collision risk analysis, which may result in an over-estimation of collision numbers. The Service believes it is better to decrease projected take numbers as post-construction data is made available, rather than try to implement additional conservation measures at a later date to account for unexpected fatalities. A more detailed explanation of this analysis can be found in the attached Appendix A.

Collision risk estimates generated by the Service (FWS model) serve to show a range of collision probabilities, and do not reflect absolute certainty of impact to bald and golden eagles. Additionally, much of the collision risk estimates do not take into consideration avoidance, minimization, and mitigation measures that may be put forth by New Era Wind to lower this take estimate.

The Service has generated an estimate of the level of take the local area eagle population can withstand and still be in compliance with the Service's goal of a stable or increasing eagle population. The Service has estimated that the local area eagle population around the proposed New Era Wind to be approximately 418 bald eagles. The Service uses the range of 1-5 percent of the local area population when considering the relative scale of predicted take for wind projects, which in this instance is 4-20 bald eagles (see Appendix A for details). Because the collision risk estimates generated by the Service (for bald eagles) are well below the upper limit of these numbers, the Service will be able to consider New Era's permit application appropriate for processing.

This does not indicate that New Era will automatically be granted an eagle take permit, rather that the collision risk estimates would not preclude New Era from obtaining an eagle take permit, provided they are able to comply with all avoidance, minimization, mitigation, and monitoring requirements set forth in the permit. These requirements are designed to minimize eagle take to the fullest extent practicable, so that any resulting take is considered unavoidable.

It is important to note that the collision risk estimate generated by the Service is not a goal to reach, but rather represents a "worst-case scenario" that the Service and New Era Wind will strive to never achieve. Please again note also that these estimates are preliminary. The Service will be conducting a full data analysis during the NEPA analysis (National Environmental Policy Act) performed during the permit process. Additionally, post-construction monitoring surveys using actual on-the-ground data will be used to inform and further refine collision risk estimates provided by the Service.

The Service has provided Westwood with the Service's collision risk model and instructional code, as well as providing them with an instructional webinar on how to run the Service's model. This will enable New Era to independently verify the Service's collision risk numbers if they wish. The Service has not independently run the collision risk for the Band Model.

Golden Eagles

General risk for Golden Eagles is low; however, the Service estimates that over the life of the project (30 years), 1.2 - 1.8 golden eagles may be killed. Due to the projected yearly increases in wintering golden eagles in Minnesota, and because there are no permits available for take of golden eagles, the Service encourages New Era to pursue the avoidance and minimization

measures outlined in their ECP to reduce the possibility of golden eagle take. Any take of golden eagles by New Era Wind would be considered a prosecutable federal offense.

Fish and Wildlife Service Comments on New Era's Collision Risk Assessment

Comparison of New Era Wind and the Service's Collision Risk Estimates

The Service's collision risk numbers do not overlap with the numbers generated by New Era Wind, which are estimated at 0.078 - 0.45 bald eagles/year and 0.006 golden eagle/year. The Service would like New Era to include mean (average) and confidence intervals for their collision risk numbers. The Service has not independently verified New Era's numbers using the Band Model. However, upon examination of Table O-1 in Appendix O, the Service expects New Era's collision estimates to be 1.15 eagles/year, not 0.458.

In the data printout from the Band Model provided, these numbers are listed as collisions/year (line 27), but in table O-1 they are represented as collision *rate*. This discrepancy between the provided Band model printout and the summary tables prevents the Service from fully assessing New Era's collision risk modeling. A more thorough explanation of how this number was reached is needed.

In their Appendix O, New Era states that collision rates from 2012 breeding season apply to the 2011-2012 winter. The Service questions why was this assumption made. There are generally fewer eagles present during a breeding season than in winter, when eagles tend to congregate in larger groups.

An additional difference in data analysis is New Era divides the year into four seasons, whereas the Service divides the year into three seasons, to account for the overlap between spring migration and the start of breeding seasons. The Service acknowledges there are many ways to analyze a data set, and will ultimately use the methodologies believed to be the most accurate. However, the Service notes that New Era uses fairly outdated reference material (1975) to define eagle breeding seasons. Eagle populations have expanded (resulting in some behavior modification) since this paper was published, and general warming trends in recent decades have altered eagle breeding season start dates.

Analyzing eagle exposure minutes within the Rotor Swept Height (RSH) vs. eagle exposure minutes within and below the RSH

New Era Wind analyzed their eagle survey data looking at only eagles observed within the rotor swept height (RSH). The Service believes it is more appropriate to look at eagle use both within and below the rotor swept height. The collision risk probability for the FWS model includes a range of collision risk probabilities for all flight heights below 200m. The Service is not aware of any observer bias training New Era has conducted to ensure that observers can consistently and effectively identify RSH of hypothetical turbines. Without such training, it is difficult to determine if the observer is accurately able to assign eagles to within vs. below the RSH.

Finally, although eagles observed below the RSH are not going to be hit immediately by turbine blades, they will likely pass through the RSH when traveling to and from these low altitude flights. See Appendix B for a detailed explanation.

For the basic FWS collision model, in order to appropriately use the current collision probability, eagle use should include all observations of eagle flight below 200 meters. The New Era eagle

observation data were collected such that observations below and above 120 meters could be identified (because the turbine height for New Era is 120m), but there is no way for the Service to distinguish the observations between 120-200 meters and those above 200 meters. Thus, in the model results the Service provides for this report, all eagle flight minutes observed were included. This likely includes some eagle use above 200 meters, which means the estimates may be higher than if the Service could distinguish between eagle flight above or below 200 meters.

Given the choice of overestimating eagle risk by including all eagle minutes or underestimating it by excluding observations between 120 and 200 meters, the Service opted for the former because it is more consistent with the general policy to be risk-averse so as to lessen the risk of underestimating eagle fatalities.

An alternative that the Service explored is to extrapolate the eagle use below 200m to the 80 additional meters between 120-200 meters. The Service examined running the model with estimating exposure below 200 meters both ways. When looking at only eagle minutes within and below 120m and extrapolating for the missing 80m, the resulting predicted fatalities were found to be even higher than when all eagle minutes were included. This suggests that eagle minutes above 120m is less than those below 200m, and that using all of the eagle minutes observed more accurately describes eagle use above 120 meters. Numbers included in the analysis for this report include the estimates found by including all eagle minutes.

Appendix A includes the details for the various model runs. The Service has not independently verified New Era's collision risk numbers for the Band Model, but notes that there are assumptions implicit to all modeling approaches (including the Service's model and the Band model used by New Era). To date, there is no collision risk model proven to accurately and precisely predict collisions at wind facilities.

New Era Wind's data analysis of 100m plots vs. 800m plots

The Service appreciates the inclusion of all data in New Era Wind's data analysis, including the separation of eagle numbers that may have been influenced by artificial food sources (e.g. carcasses).

New Era Wind also presents data from both 800-meter and 100-meter survey plots, stating:

> Exposure minutes were also estimated for smaller 100-meter radius plots around each turbine location. The smaller plots may provide a more accurate picture of habitat-driven eagle movements near turbines, as the larger 800-m plots may encompass habitat features nearly 1-mile from the nearest turbine. (p. 45)

New Era also states:

> We believe a more accurate representation of natural conditions once the Project becomes operational is the Band et al. (2007) collision risk modeling done with 100-meter turbine-centered survey plots, which yielded an estimated take of 0.078 eagles per year (or one eagle every 12.8 years). (p. 61)

While the Service appreciates that New Era is providing all data sets, the Service disagrees that Analyzing the eagle use (exposure) observed as part of an 800m plot count as multiple 100m plots is not advisable for several reasons: it assumes the observer has the ability to record the data to such a fine scale without significant error or bias, it reduces the survey area, it

intentionally excludes eagle use observed in the areas between the 100m plots, and (the way that it is being used in Westwood's analysis) it artificially increases survey effort credited. The Service believes 800 meter plots are a more accurate representation of eagle risk at the New Era Wind Farm. A more detailed explanation of the Service's disagreement with the appropriateness of data from the 100m plots can be found in Appendix B.

New Era's Characterization of the Service's Collision Risk Assessment Model.

The Service appreciates New Era's efforts to explain the differences between the Band Model (used by New Era) and the FWS model for the PUC. The Service wishes to address the statements made by New Era regarding the FWS model (please see Appendix C).

Specifically, the Service would like to stress that there is no collision risk model for predicting eagle fatalities at wind farms that has been tested and shown to be accurate. Neither the Band model nor the Service's model is based on bald eagle fatality data at wind farms, because such data is not available. Once post-construction data has been collected at the New Era Wind facility, both models can be updated and adjusted. A detailed analysis of these comments can be found in Appendix C.

Fish and Wildlife Service Comments on New Era Wind's Avian and Bat Protection Plan, including the Eagle Conservation Plan

General Avian and Bat Protection Plan Comments

As part of the general Avian and Bat Protection Plan, the Service appreciates the inclusion of adaptive management for non-eagle avian species. The Service would like additional information on further action New Era will undertake if adaptive management does not prevent avian and bat mortalities.

Additional Comments on New Era Wind's Field Survey Techniques

Westwood provided field notes from flight path surveys for the Service's analysis. On several occasions, field notes showed that at times the observer moved the observation point without recentering the radius of the observation (Location 1: October 27, November 3, and November 11). This observation point then became approximately approx. 2,450 feet away from the original center of the plot, making the observer 4,550 feet away from the farthest wind turbine. The Service questions how accurately the observer could determine if the eagle is within vs. below the rotor swept zone, or how close the eagle was to a hypothetical turbine. As stated above, the Service is not aware of any observer bias training to account for these changes in field protocol.

Regarding field surveys conducted by the Service, "as documented by USFWS, many of the nests report by citizens … were occupied by … squirrels." (p. 54) Please note that the Service had not received reports from citizens purporting that squirrel nests were raptor or eagle nests. Squirrel nests were included *in addition* to reported raptor/eagle nests in order to indicate an exhaustive search. Although no new eagle nests were definitively found during this site visit, the Service made note of multiple nests they recommended be surveyed in subsequent years, as some of citizen reported nests could be alternate or inactive eagle nests.

New Era Wind has stated, "Per USFWS recommendations, point counts were not conducted over the winter." (New Era's Appendix O) The Service did not tell New Era to stop doing eagle

surveys in the winter. In a letter from the Service to Westwood Professionals dated September 16, 2012, the Service encouraged New Era to expand winter field surveys, and at no time recommended they halt point counts in the winter.

In the aforementioned letter, under the heading: "Winter use of Goodhue County by Bald and Golden Eagles," the Service recommended recording "Eagle behavior [to be recorded] includes activity, numbers, age, flight type, flight height, flight direction, time in rotor-swept area, and other pertinent behaviors (i.e. territorial, courtship, etc.)."

While the Service was aware by Summer 2012 that New Era had not done winter point-count surveys (from reading New Era's quarterly report), the Service was not aware that New Era believed this to be a request by the Service prior to reviewing this current version of the ABPP/ECP. The Service apologizes for the misunderstanding; however, collision risk analysis is still possible without this missing data.

P. 46: "A total of 126 observation hours were spent conducting 2011 fall migration point counts." Please note that the survey dates (October 3-December 15) encompass most, but not all of the fall migration timeframe for bald eagles.

P. 47: "Bald eagle foraging behavior during the 2011 fall migration season was dramatically different than during previous or subsequent seasons." The Service agrees that bald eagle behavior is likely different during fall migration, but it would be difficult to determine if this is due to natural bald eagle behavior or artificial food sources. Because at the time of publication of the ECP, New Era Wind had only completed one complete set of fall surveys, comparison to previous or subsequent fall surveys is not possible.

P. 63. 9.4.1.4 Continued Bald Eagle Monitoring/Risk Modeling. The Service concurs that post-construction monitoring will aid in further refining collision risk numbers, regardless of which model is used.

Association of Artificial Food Sources and Eagle Numbers and Comments on Important Eagle Use Areas (IEUAs) (foraging and roosting areas)

The Service acknowledges that there appears to be a positive relationship between eagle numbers and observed carcasses. This could indicate that artificial food sources may be contributing to increased eagle numbers within the footprint of the New Era Wind farm. However, the Service disagrees that higher than expected eagle numbers (roosting, foraging, etc.) can be definitively linked to the presence of carcasses. In order to make this determination, New Era field biologists would have to undertake a systematic survey for carcasses on the landscape.

However, New Era biologists only conducted searches on days when they thought there might be carcasses present. The Service encourages New Era to pursue a carcass reduction program as part of their Eagle Conservation Plan. The Service believes that while reduction (but not elimination) of livestock carcasses on the landscape is feasible, complete detection and removal of roadkill and wildlife carcasses is not feasible or sustainable over the course of a 30-year project. One point to keep in mind is that of all the nine times carcasses were recorded, only two of those instances were livestock. In an additional three instances, carcasses were only suspected, never confirmed. It is important to note that while it is likely New Era will be most effective trying to control the presence of livestock carcasses on the landscape, wildlife carcasses will be more difficult to detect and control.

Westwood states that all roosting areas were associated with artificial feeding sources (pp. 48, 50, 51). Again, this conclusion is not supported by the data, due to the lack of a systematic carcass survey. Without this, it is difficult to tell if eagle roosting areas near carcasses is causative or correlative.

P. 48: "... it is unclear whether the food sources are, in fact, reliable sources that will support ongoing eagle use in these areas." The Service does not agree with this statement for the following reasons: New Era only has one complete season of fall eagle data, New Era will not be able to fully eradicate all carcasses from the landscape, and New Era cannot say with certainty that carcasses are the cause of eagle numbers, because no systematic survey for carcasses was performed.

P. 50 "When food source was eliminated during January and February, no bald eagles were observed foraging or perching at this site." With only one year of data, it is difficult to tell if this reflects seasonal variation in eagle abundance or causation with carcasses.

P. 51 "[L]ocation of livestock carcasses, relocated road kills or deer hunt remains....do not appear to be IEUAs as defined by the USFWS." Because bald and golden eagles have been shown to congregate in these areas, because Westwood only has one year of data, and because no systematic carcass searches were performed, the Service will consider these areas to be foraging and roosting areas until further data (subsequent years of fall/wintering data) demonstrates that fall/winter 2011-2012 was anomalous or can be ameliorated through a carcass reduction program.

P. 52: "The presence of multiple bald eagles temporarily perched during mild weather ... overlooking an artificial food source is not true 'roosting' behavior." New Era states that eagle roosts on the project site do not meet the definition of roosting areas due to the absence of cold weather. Please note that eagles can demonstrate roosting behavior at night, regardless of temperature. Because of this, the Service will rely on the MN DNRs records of the night roosting area in the northern section of the project area. Subsequent years of observation can help elucidate whether this roosting area was an isolated incident for one year, or if eagles gather in this area yearly. Additionally, although New Era may not consider these to be actual "roosts" or "foraging areas," the fact remains that eagles were seen in these areas, and the Service will still consider this data in assessing risk to eagles.

P. 61 "We anticipate that the ACPs described below in Section 9.4, particularly food base management, will further reduce collision risks." Regardless of the final collision risk numbers included in the Service's final EA, the Service agrees with this statement – implementation of ACPs are anticipated to reduce overall eagle collision rates.

Food Based Management Comments

P. 63: Initiation of Food Base Management. The Service would like additional information on when this program will begin, and requests updates as this program progresses. The Service encourages New Era to foster good relationships with landowners as part of a carcass-reduction program.

P. 64: "Prey-based enhancement and/or land acquisition ... to draw eagles out of the project footprint." The Service has stated in previous correspondences (September 23, 2011, FWS letter to Westwood, and January 12, 2012, FWS to DOC) that this is discouraged as a management

tool. Please see the Service's September 23, 2011, letter for a detailed explanation of why the Service does not recommend this measure.

P. 65 "If New Era staff observe an unusual concentration of eagles where New Era lacks access and cannot obtain landowner cooperation ..." Please note that concentrations of eagles do not mean that baiting is occurring. Without a systematic carcass surveys, any evidence of this is correlative, not causative. The Service recommends fostering amenable relationships with landowners.

P. 65: "If a landowners is uncooperative ... BAH will be contacted." The Service recommends early coordination with the MN Board of Animal Health (BAH), including sharing this ECP with them.

P. 65: "Unresolved incidents ... will be reported to the USFWS." The following was noted in the FWS to DOC January 12, 2012, letter:

> Additionally, landowners have by law 72 hours to dispose of carcasses. Due to the large number of eagles already present in the area, it is likely eagles will discover carcasses quickly. Therefore, eagles feeding on carcasses will likely be a long-term issue for AWA Wind. Although Service Eagle Guidelines (2007) discourages artificial feeding of eagles, there is no federal law which prohibits such feeding, unless it results in the take of an eagle. The Service recommends AWA Wind resolve this matter through cooperative efforts with landowners.

Finally, the Service supports New Era's plan to implement a carcass reduction program as a means for reducing eagle fatalities around wind turbines. However, only after implementation of such a measure and post-construction surveys are conducted will it be evident if this is an effective ACP. If New Era wishes to determine if eagle concentration numbers are causative with carcass availability, the Service recommends incorporating a systematic carcass survey methodology as part of the on-going eagle surveys.

New Era Wind Construction and Post-Construction Eagle Surveys

P. 66: Continued Bald Eagle Monitoring. The Service would like to know if future surveys will be conducted year-round, or follow the same pattern survey schedule as in 2011-2012 (with some gaps in surveying).

P. 67: "... risk assessment modeling results will be updated for two years after the project becomes commercially operational." The conditions of the requested eagle disturbance permit have not yet been written. It is possible the Service may recommend longer than two years of post-construction monitoring, based on updated collision risk estimates.

P. 67: "Explore obtaining a permit ... to fit 3-6 juvenile bald eagles ... with ... radio telemetry transmitters." The Service will consider robust proposals for eagle telemetry research in the project area.

New Era Wind Turbine Curtailment Plan

P. 68 – Turbine curtailment plan. New Era Wind has stated they will implement an annual curtailment allowance of up to 1,200 mwh. As mentioned in the Service's December 14, 2012, letter to the DOC, regardless of how much of the curtailment allowance has been utilized in a calendar year, the Service may still recommend further curtailment if New Era appears to be reaching the permitted take threshold for bald eagles, or if there appears to be a risk to golden

eagles. Continued surveys and updating collision risk modeling predictions will help inform New Era and the Service under which conditions (seasonal, weather, etc.) curtailment is likely to be most effective. The Service agrees that real-time curtailment is probably not feasible, and supports reliance on "eagle risk events." The Service would like to know if New Era has curtailment plans for other non-eagle avian/bat risk events.

Fish and Wildlife Service Next Steps for Eagle Take Permit Review

P. 61: "Based on the collision risk analysis and input received from USFWS, New Era has applied for a programmatic non-purposeful eagle take permit for up to one (1) bald eagle per year based on the following annual fatality rate estimates." The Service is currently in the process of reviewing the eagle take permit application and conducting an environmental assessment (EA) on the effect issuing a permit would have. Once that assessment is complete, the Service will decide if the requested take of one eagle per year is appropriate.

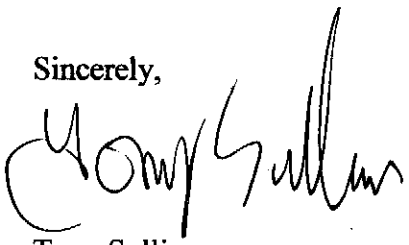
P. 61: "New Era has requested an eagle permit with an initial term of 5 years (with a request to extend to 30 years once USFWS regulations allow it)." Please note that if the eagle take permit rule is changed to allow permit duration to be extended to 30 years, New Era Wind may have to incorporate substantial additional avoidance, minimization, mitigation, and monitoring before a 30-year permit is issued. A simple amendment to extend the permit to 30 years is unlikely.

Appendix M: Eagle Risk Factor Assessment: The Service appreciates this detailed assessment of turbine-specific risk to eagles.

The Service thanks the DOC for the opportunity to present a preliminary assessment of collision risk to bald and golden eagles at the New Era Wind project site, as well as provide comments on New Era Wind's Eagle Conservation Plan. The Service will prepare a more thorough analysis of the collision risk assessment, as well as an in-depth Environmental Assessment (EA) of the eagle take permit application and Eagle Conservation Plan. Once completed, these will both be available for public review and comment.

Please contact me at (612) 725-3548, ext. 2201, or Mags Rheude, Fish and Wildlife Biologist, at (612) 725-3548, ext. 2202, if we can be of further assistance.

Sincerely,



Tony Sullins
Field Supervisor

cc (email only): Jane West, USFS RO-MB
Paul Richert, USFWS RO-ES
Jamie Schrenzel, MN DNR
Richard Davis, USFWS-TCFO

Appendix A:

New Era Wind - Eagle Collision Fatality Prediction Model (Preliminary Results)

Species	Predicted Collision Rates per year	Predicted Years Between Collisions
Bald Eagle	8.4 -13.8 eagles/yr.	-
Golden Eagle	0.039 - 0.059 eagles/yr.	17-26 years

Please note these numbers assume no avoidance or minimization measures.

Seasons:

Here is the seasonal breakdown of daylight hours used in the model runs presented below (based on lat/long of 44.401, -92.71 in decimal degrees); this is used for all model runs presented below, though seasonal definitions or operational daylight hours can be changed if deemed biologically appropriate:

Season	Days	DayLight Hours	Date Range	Average Day Length
Winter	90.25	859.2602	12/01-02/29	9.520889
Breeding	153.00	2169.5520	03/01-07/31	14.180078
Fall Migration	122.00	1433.9438	08/01-11/30	11.753638
Annual Total	365.25	4462.756	1/1-12/31	12.21836

Project Data:

Other project information used in running the FWS basic model

- 48 turbines
- turbine rotor radius = 41.25 meter (0.04125 km)
- observation area = 800-m circular plot (2.010619 km^2)

Overview of New Era Bald Eagle Data:

	Survey Hours	Eagles	Total Eagle Minutes
Winter			
2011	30	46	141
2012	6	3	4
Breeding			
2011	148	23	87.6
2012	156	85	251
Fall_Migration			
2011	154	190	746.9

2012	138	85	412
Grand Total	**632**	**432**	**1642.5**

Notes:

- Some eagle minutes from 2011 were estimated by the consultant by converting flight path distances (assumes constant rate of flight)
- The basic FWS model assumes that sampling is representative of eagle use of the project area
- Low levels of winter sampling relative to the number of eagles and eagle flight minutes observed (compare Winter 2011 with Breeding 2011)

Appropriate Eagle Minutes for basic FWS model:

For the basic FWS collision model, in order to appropriately use the collision probability, eagle use should include all observations of eagle flight below 200 meters. The New Era eagle observation data were collected such that observations below and above 120 meters could be identified, but there is no way to distinguish the observations between 120-200 meters and those above 200 meters. In the model runs included below, all eagle flight minutes observed were included. This likely includes some eagle use above 200 meters, which means the estimates may be higher than if we could distinguish between eagle flight above or below 200 meters. But, since we cannot determine the true exposure below 200 meters, the exposure data used should be slightly more conservative if anything. An alternative would be to extrapolate the eagle use below 200-m to the 80 additional meters between 120-200 meters. We ran these models and found the resulting predicted fatalities to be even higher. This suggests that eagle use above 120-m is less that below 200-m and that using all eagle minutes observed more accurately describes eagle use above 120 meters.

MODEL 1 - BALD EAGLE, SEASONAL, ALL MINUTES:

- includes all eagle minutes; does not use RSH correction
- stratified by season
- includes observations w/livestock carcasses reported

Survey Inputs

Season	Eagle Minutes	Survey Hours	Daylight Hours
Winter	145.0	36	859.3
Breeding	338.6	304	2169.6
Fall_Migration	1158.9	292	1433.9

Exposure rate (posterior)[1]

Season	Mean	SD
Winter	1.94	0.16
Breeding	0.55	0.03
Fall_Migration	1.97	0.06

[1]Exposure is the rate of eagle flight minutes in the hazardous area per area per time

Predicted Annual Fatalities

Season	Mean	SD	Q10	Q20	Median	Q80	Q90
Winter	2.9	2.6	0.41	0.78	2.1	4.5	6.3
Breeding	2.1	1.9	0.3	0.56	1.5	3.3	4.6

Fall_Migration	4.9	4.4	0.69	1.32	3.6	7.7	10.7
Total (Annual)	**9.8**	**5.5**	**3.86**	**5.22**	**8.7**	**13.8**	**17.1**

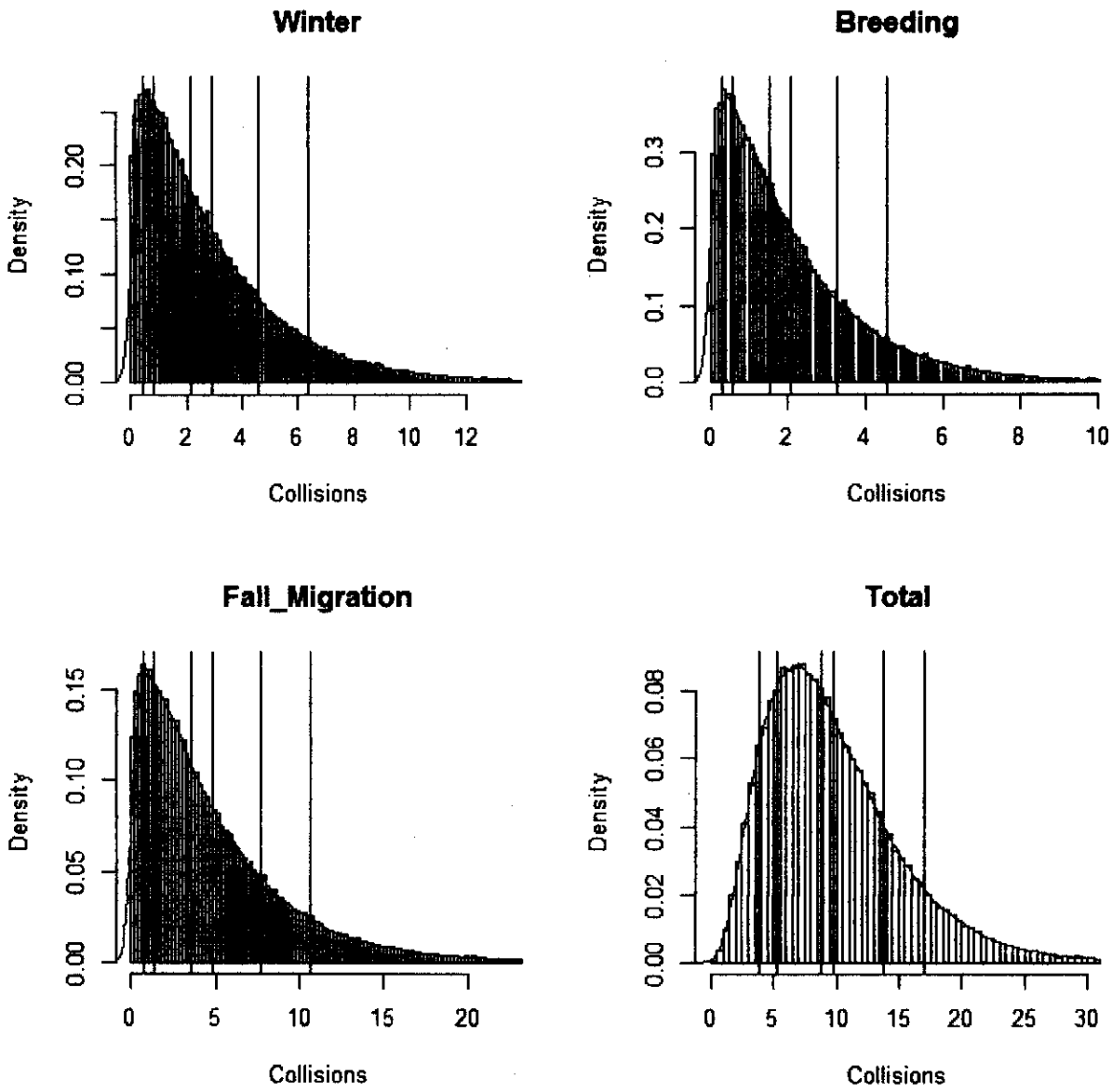


Figure 1. Distributions of predicted fatalities simulation results from Model 1. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

MODEL 2 – BALD EAGLE, SEASONAL, ALL MINUTES, EXCLUDES POSSIBLE LIVESTOCK BAITING:

- includes all eagle minutes; does not use RSH correction
- stratified by season
- excludes observations w/livestock carcasses reported

Survey Inputs

Season	Eagle Minutes	Survey Hours	Daylight Hours
Winter	132.0	35	859.3
Breeding	338.6	304	2169.6
Fall_Migration	1108.9	291	1433.9

Exposure (posterior)[1]

Season	Mean	SD
Winter	1.82	0.16
Breeding	0.55	0.03
Fall_Migration	1.89	0.06

Predicted Annual Fatalities

Season	Mean	SD	Q10	Q20	Median	Q80	Q90
Winter	2.7	2.5	0.4	0.7	2.0	4.3	5.9
Breeding	2.1	1.9	0.3	0.6	1.5	3.3	4.6
Fall_Migration	4.7	4.2	0.7	1.3	3.4	7.4	10.3
Total (Annual)	**9.4**	**5.3**	**3.7**	**5.0**	**8.4**	**13.2**	**16.4**

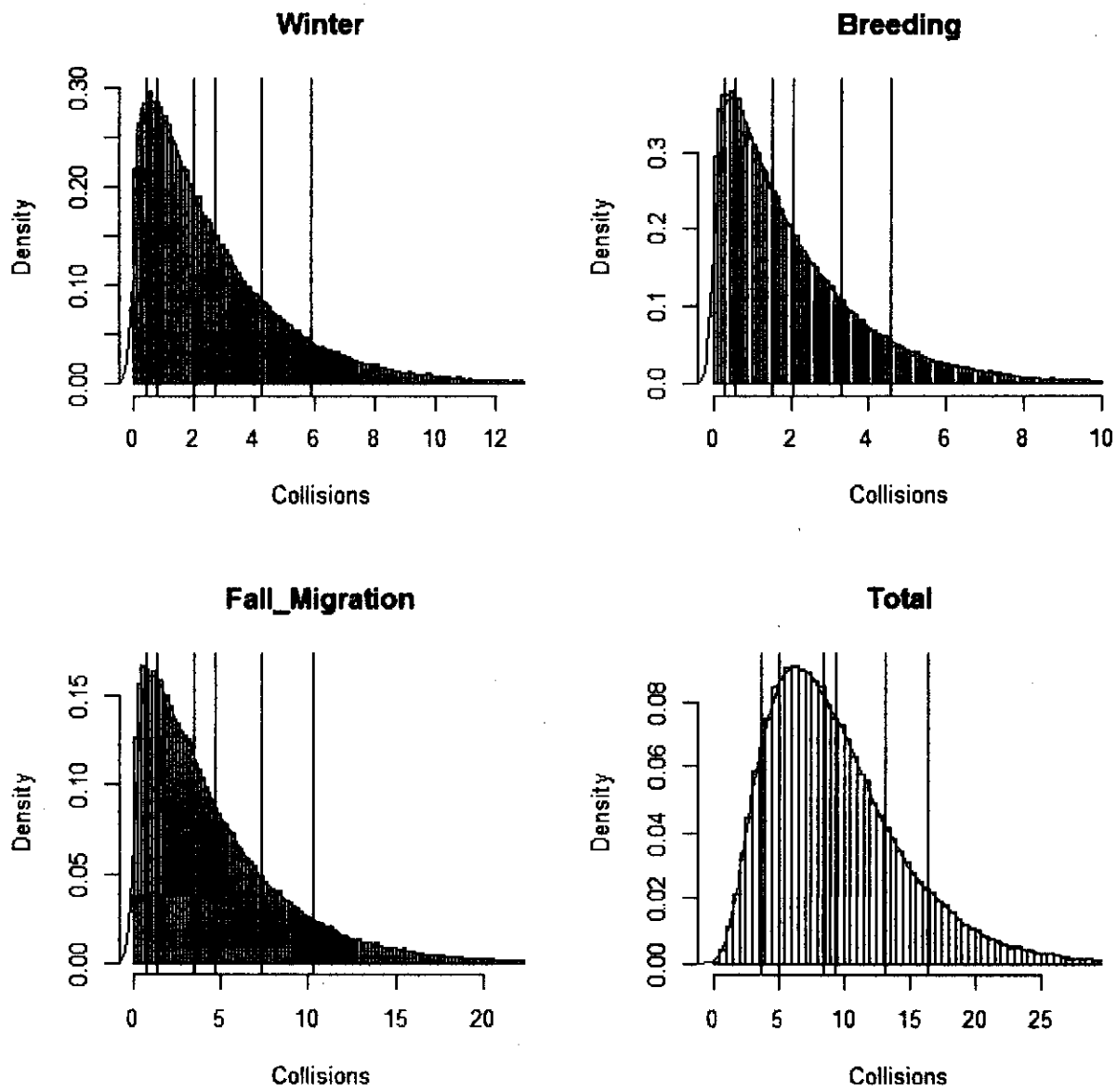


Figure 2. Distributions of predicted fatalities simulation results from Model 2. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

MODEL 3 – GOLDEN EAGLE, SEASONAL, ALL MINUTES:

- includes all eagle mins; does not use RSH correction
- stratified by season
- 2 GOEA (4 EMin) observed during Fall_Migration period
- Assumes 0 GOEA use in Breeding season

Survey Inputs

Season	Eagle Minutes	Survey Hours	Daylight Hours
Winter	0	36	859.3
Breeding	0	304	2169.6
Fall_Migration	4	292	1433.9

Exposure (posterior)[1]

Season	Mean	SD
Winter	0.013	0.013
Breeding	0	0
Fall_Migration	0.008	0.004

Predicted Annual Fatalities

Season	Mean	SD	Q10	Q20	Median	Q80	Q90
Winter	0.019	0.032	0.001	0.002	0.008	0.028	0.049
Breeding	0	0					
Fall_Migration	0.021	0.023	0.002	0.005	0.014	0.032	0.048
Total (Annual)	**0.040**	**0.039**	**0.008**	**0.013**	**0.029**	**0.060**	**0.085**

Historically, golden eagles do not use the area surrounding the proposed project during the spring or summer months. Golden eagle exposure was, therefore, set to 0 for the "Breeding" season (3/1-7/31). The other seasons, "Winter" and "Fall Migration", both include months where golden eagles could be in the general area.

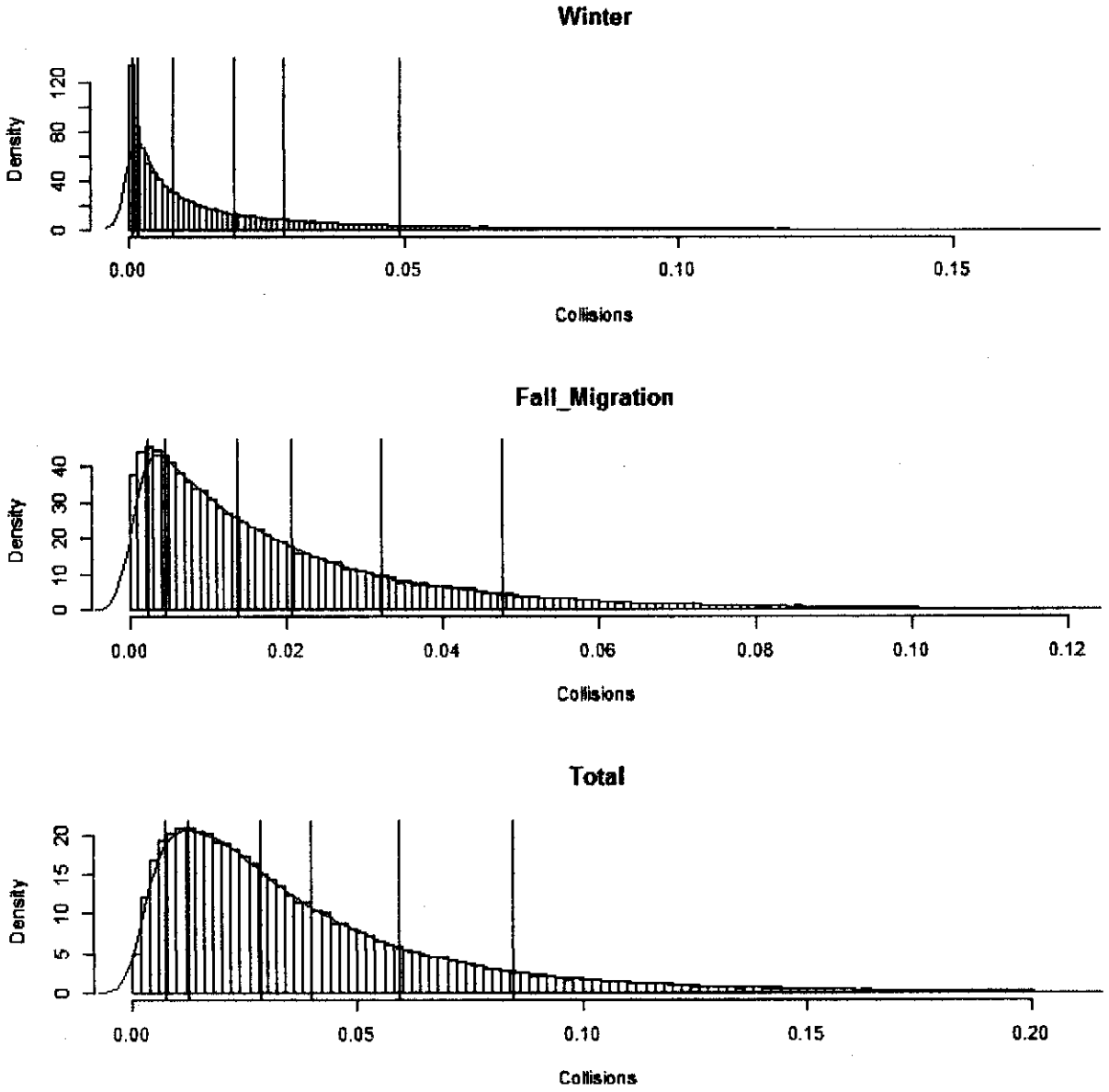


Figure 3. Distributions of predicted fatalities simulation results from Model 3. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

ESTIMATING EAGLE POPULATION SIZE FOR THE LOCAL AREA:

We estimate the local area population size of bald eagles by assuming the population sizes designated in the Service's final EA (see also ECPGv2 Technical Appendices) are equally distributed across the eagle management units. We then use the average natal dispersal distance of the eagle species to determine the potential area from which local eagles may be impacted by the project. We calculate the area within the natal dispersal distance of the project and then multiply by the assumed eagle density to get the local area population size.

For Goodhue Wind/New Era the local area population (LAP) is around 418 bald eagles. The Service uses the range of 1-5% of the local area population when considering the relative scale of predicted take for wind projects. So the predicted take from the two bald eagle model runs, without removing the livestock baiting days, could be as high as 3.5% the local area bald eagle population.

Appendix B

Explanation of why FWs does not concur with Westwood Analysis of 100m plots.

Summary: Analyzing the eagle use (exposure) observed as part of an 800m plot count as multiple 100m plots is not advisable for several reasons: it assumes the observer has the ability to record the data to such a fine scale without significant error or bias, it reduces the survey area, it intentionally excludes eagle use observed in the areas between the 100m plots, and (the way that it is being used in Westwood's analysis) it artificially increases survey effort credited.

Definitions:

m = meter

800m vs. 100m plots: Westwood Professionals (consulting firm for New Era Wind) established six 800m survey plots throughout the proposed wind farm footprint to survey for eagles. This survey involved an observer standing in the center of the 800m plot, and counting eagles for 1 hour. Each 800m survey plot contained between two and five proposed wind turbines. The observer noted if eagles were flying below, within, or above the rotor swept zone of the proposed turbines. In addition to data on eagles flying in the 800m survey plot, Westwood noted if eagles were flying within 100m of the proposed turbine locations. During their data analysis, Westwood stated doing a 1-hour survey of these 800m plots is equivalent to conducting [x] 1-hour surveys in 100m plots, where [x] = the number of turbines found within each plot (see attached map).

Determining Flight Height: The Rotor Swept Height (RSH) for New Era Wind's proposed turbines are as follows:

Below RSH: 0-39m
Within RSH: 39-120m
Above RSH: >120m

The Service is not aware that Westwood ever performed observer bias studies to determine if technicians could determine eagle flight height at various distances, or if technicians were accurately able to determine how close eagles were flying to hypothetical turbines. For example, if a technician was standing in the center of an 800m plot, there may be a 650m (2132 feet) line of sight distance to a turbine (see attached map). At that distance, can the technician determine if the eagle is flying within 100m of the hypothetical turbine? Can they determine at that distance if the eagle is flying at a height of 40 vs. 30 meters? Such studies can provide the information needed to develop observer correction factors that can be incorporated into the analysis, but there is no evidence of this in Westwood's analysis.

Counting Eagles Within vs Within and Below Rotor Swept Height (RSH):
For their data analysis, New Era only looked at eagles seen within the Rotor Swept Height (39-120m). However, eagles were often seen below the rotor swept height during low flights or when foraging on the ground. While eagles are not going to be struck by

turbine blades when they are below the RSH, they do have to pass through the RSH in order to reach these lower flight heights.

How Analyzing 100m Plots Decreases Survey Area

The consultant conducted an 800m radius point count. Within the radius of the point-count were sites of potential wind turbines. The consultant stated doing a 1-hour survey of these 800m plots is equivalent to conducting [x] 1-hour surveys in 100m plots, where [x] = the number of turbines found within each plot.

To determine area surveyed:
800 vs. 100 survey hours/m

(Area of a circle = πr^2, where r = radius)
800 m:
r = 800 m
Area = 2,010,620 m^2

100 m:
r = 100 m
Area = 31,415.9 m^2

So, for each survey location:

Survey Point	800m survey area (m2)	100 m survey area (m2)	# of turbines	Area of 100m survey x number of turbines
Site 1	2010620	31415.9	5	157079.5
Site 1A	2010620	31415.9	4	125663.6
Site 2	2010620	31415.9	2	62831.8
Site 3	2010620	31415.9	4	125663.6
Site 4	2010620	31415.9	3	94247.7
Site 5	2010620	31415.9	2	62831.8
Totals	**12,063,720**			**628,318**

Therefore, by only counting 100m plots rather than 800 m plots, the total area surveyed in the New Era project decreases from 1,2063,720 m^2 to 628,318 m^2. Therefore, by only looking at 100m plots within the 800m survey plots Westwood excluded 95% of the available survey data they collected.

How Analyzing 100m Plots Decreases Eagle Exposure Time (Risk)
(Under-estimation of time eagles spent passing through the 100m plot).

New Era adjusted eagle minutes in the 100m plots to say that eagles did not take 1 minute to pass through the 100m plot. Therefore, they attribute 1 eagle < 1 eagle minute. However, in looking at their raw data, it can be seen that 1 eagle >1 eagle minute, due to the fact that eagles spent significant time in the area. For example, in March 2012 surveys:

Plot	1a	1	2	3	4	5
Total Eagle Minutes	36	19	34	20	2	3
# of Eagles seen	17	7	15	11	1	2
Eagle Minutes (FWS Corrected)	2.12	2.71	2.27	1.82	2.00	1.50

These data suggest that more than one eagle minute per eagle observation would be more appropriate than what was used in New Era's analysis.

How Analyzing 100m Plots Artificially Increases Survey Effort.
By looking at multiple 100m plots within an 800m plot, New Era has artificially increased their survey effort by assuming that the observations at the 100m plot included within the 800m plot are independent samples of eagle use at those turbine locations. There is very little to support an assumption of independence in these cases as the turbines are in close proximity and observations at all of the 100m points included could be affected by the same eagle within the same observation period.

For example, Survey Area 1 (an 800m area) contains 5 potential turbines. If a 1-hour survey was performed on Site 1, New Era analyzes this data as have surveyed for 5 hours among 5 100m-turbine locations. This suggests they are treating the 5 100m surveys as independent, which is a misleading way to analyze data – the only way Westwood could have increased their survey time by 5 plots each time would be if the observer had actually gone to each of the 5 locations and observed for an hour at each, or if there were 5 different people surveying at the same time in the unique locations (even in these cases, the assumption of independence may not be valid). So, Westwood took 6 800m survey plots, and turned them into 20 100m survey plots, or a 333% increase in their effective survey hours.

Use of the 100m plots also significantly decreased the number of eagles included in data analysis. This effectively means that Westwood assumes that eagle use outside of the 100m around proposed turbine locations is not representative of potential use with 100m

of those turbine locations and that eagle use of the project area is very consistent across time.

Example from Plot 1, November 3, 2011

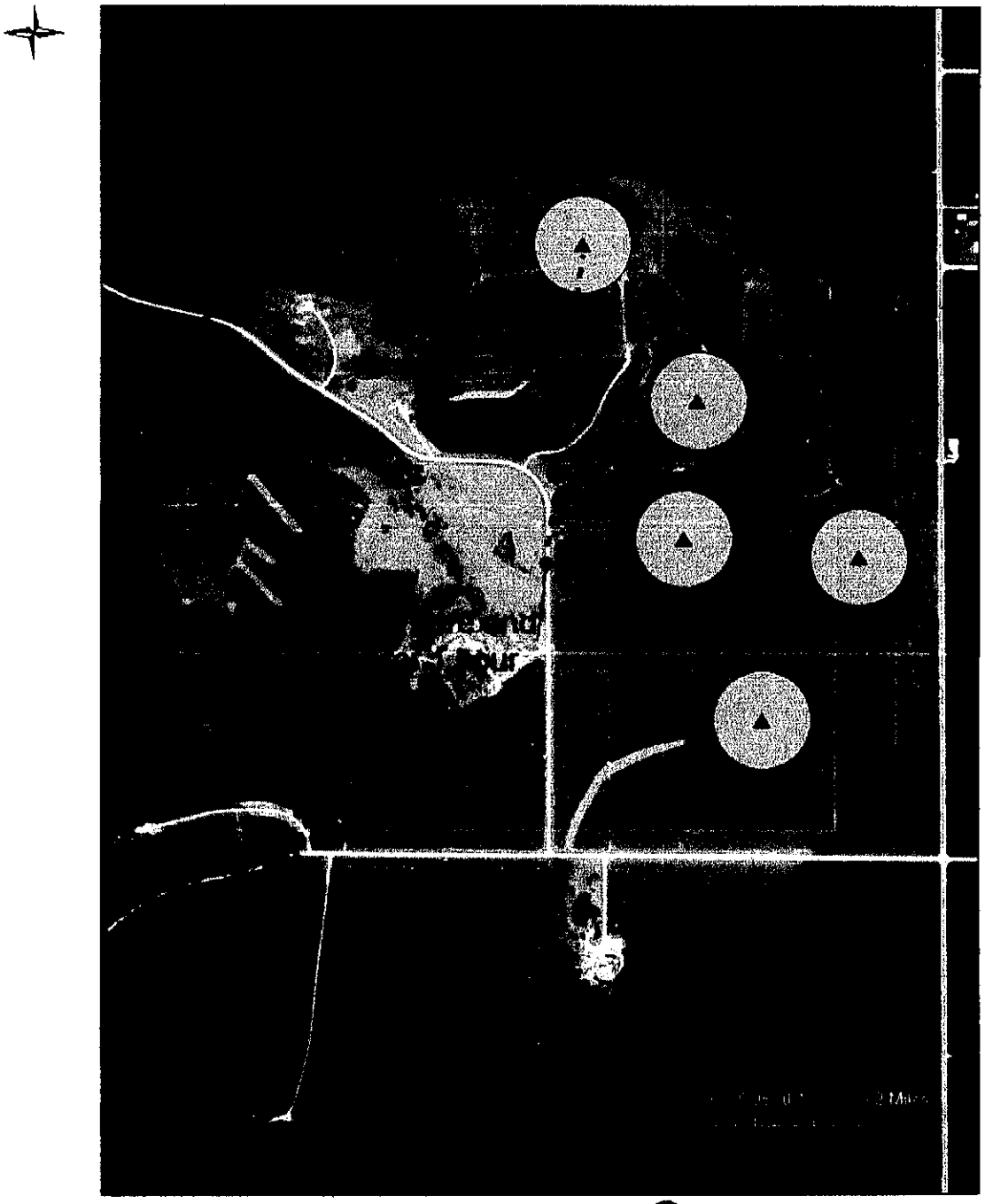
Data by Plot Size, as provided by the consultant

Eagle Minutes Relative to Rotor Swept Height

Area Analyzed	Eagle Minutes Below RSH	Eagle Minutes Within RSH	Eagle Minutes Above RSH	Total Eagles Minutes	Survey Time
800m	48	176	54	278	1 hour
100 m	5	2	0	7	5 hours

In the FWS analysis, combining below and within RSH, New Era Wind in their analysis, looked at only birds within the RSH, stating that they observed 2 eagle minutes in 5 hours versus 176 eagle minutes in 1 hour of observation. This misrepresents the sampling information and results in much lower collision risk estimates for the 100m plots as a result. If Westwood intended to analyze the data at a 100m-plot scale (though this is not what the Service recommends), the sampling should have been designed to provide rigorous, independent data at that scale.

Comparison of 800m vs 100m Survey Plots



▲ =Proposed turbines ◯ =800m survey plot ◯ =100m radius around each turbine

Appendix C

Goodhue/New Era Wind's Characterization of the USFWS Collision Risk Model

P. 59: New Era comments on USFWS CRM model.

"The Band et al (2007) CRM is premised on the availability of an "avoidance factor", which is used to calibrate collision predictions to actual collisions, based on post-construction fatality monitoring. The USFWS CRM relies on an iterative analytical process that becomes more accurate as additional data is compiled and added to future model runs or simulations. Furthermore, the USFWS also acknowledged that the accuracy of its CRM is dependent on the availability of post-construction monitoring data."

Service Response: There is no model for predicting eagle fatalities at wind farms that has been tested and shown via peer-reviewed documentation to be accurate. Neither the Band model nor the Service's model has been validated for bald eagles at wind farms based on post-construction mortality data from rigorous carcass surveys, because such data are not available for bald eagles. The collision probability portion of the Service's model (a Bayesian prior) is based on data for golden eagles at several western US wind projects as reported in the literature.

The Service's model does consider and account for site-specific data in producing fatality estimates. It assumes that operational-phase fatalities of eagles at a project are directly related to pre-construction use of the project area by eagles and the extent of hazardous air space created by the project. Further, the Service's model is in a Bayesian framework that allows for updating and improving the predictive capacity of the model as more information (information that is specifically targeted) becomes available as part of a larger adaptive management approach.

"The USFWS CRM includes in its exposure calculations bald eagle flights below 200 meters. The Band et al. (2007) CRM only considers flights at rotor swept altitudes as representing a collision risk to eagles."

Service Response: The Band et al. (2007) CRM (Band model) and the USFWS CRM (Service model) approach estimating collision risk of eagles in similar ways but that use different definitions of exposure and therefore also in the risk associated with that exposure. Both models estimate birds with potential risk of colliding with turbines and then estimate the probability of a collision occurring. However, the models define hazardous area and risk differently (appropriately so given the models). The Service therefore uses all eagles observed below 200m as part of the exposure calculation, but also uses a different collision probability. The Band model is based on the premise that individual eagles fly at constant height and in straight lines such that, effectively, eagles just above or below the rotor swept zone are never vulnerable to collision. Eagles flying within the rotor swept zone may have greater probability of being struck by turbine blades (as they are in closer proximity to them) than do eagles that are just below or above this area. The collision probability used in Service model accounts for the varying risk of eagles flying 200 m or below by using a distribution that includes a range of risk (from higher risk to essentially no risk); note that the mean risk of collision for the Service model is less than 1 percent.

"The USFWS uses a higher collision rate probability distribution that assumes the predicted collision rate would be at or above the actual collision rate 80 percent of the time. The Band et al. (2007) model assumes the distribution of actual eagle collisions each year would fall about equally above and below the predicted collision rate."

Service Response: To clarify, the FWS model assumes that the collision rate follows a beta distribution, which means the collision rate is between 0 and 1 (0-100%); this is appropriate as there will never be more than 100% of exposed eagles colliding with turbines or fewer than 0 eagles colliding. The Service uses a gamma distribution to define eagle exposure, which is appropriate given the data, but could certainly be changed to a different distribution if shown to be appropriate. The distribution of fatalities that is used to determine the ultimate "fatality estimate" is the result of an iterative process that samples from exposure and collision distributions and then multiplies the numbers through the Service model (exposure rate*collision rate*expansion to account for hazardous area and daylight hours). The Service does not define the resulting distribution of fatalities per se, but rather the result of the many simulation runs through the model. However, this fatality distribution is generally not a traditional "normal distribution" in that the mean and median values are not generally equivalent (at the median, 50 percent of the time the actual fatalities will be lower and 50 percent of the time they will be higher). The actual fatality estimate selected from the distribution to be used by the Service for permitting purposes is risk-averse, that is, intentionally conservative until post-construction data determine that the number of eagles at risk of collision is actually lower. By using conservative collision risk estimates, the Service ensures eagle populations are maintained at a sustainable level, despite the issuance of eagle take permit and also helps ensure that the permit applicant is legally covered if eagle use or collision risk are higher than originally estimated. The Service policy of using the 80th quantile of the fatality distribution is based on potentially overestimating up-front and then later crediting the developer for over-mitigating. The alternative is to underestimate, for which there may be no reasonable way to reduce fatalities on site or could result in the developer incurring unexpectedly high costs.

"The USFWS CRM quantifies the percentage of eagles passing through rotor swept zone that are struck by a blade through the incorporation of post-construction fatality monitoring. Thus, where post-construction fatality data is unavailable, this percentage may be overestimated. The Band et al. (2007) CRM attempts to estimate the probability that an individual eagle exposure will actually result in a collision based on turbine characteristics, such as number and length of blades and rate of rotation."

Service Response: The Service model does estimate the likelihood that an eagle flying for 1 minute under 200-m within the rotor radius of the turbine will result in a collision fatality for a project prior to construction of the project (thus before post-construction data are available). As mentioned before, there currently are no peer-reviewed, post-construction fatality data available for bald eagles. Both the Band model and the Service model base collision rate probabilities on data from other eagle species known to be killed at windfarms. Additionally, it is important to note that though the Band model does includes turbine characteristics, it also includes various assumptions that differ from those of the Service more (e.g. constant eagle flight speed, straight

path line of flight through the turbine blades, etc.).

"In the absence of the food resource and operational management measures proposed in this ABPP, the actual number of bald eagles that would be struck by turbines each year at the New Era Wind Farm would likely fall somewhere between predictions generated by the Band et al. (2007) and USFWS CRMs. However, it is anticipated that the implementation of the management measures described in this ABPP should result in the actual collision rate at the New Era Wind Farm being toward the lower end of this range."

Service Response: The Service agrees that implementation of Advanced Conservation Practices outlined in New Era's ECP should lower the collision risk. However, without any data to verify the degree to which these ACPs may reduce eagle use of the Goodhue project area or the risk of collision, the Service is unable to confirm the specific level of impact these changes may have on eagle fatalities. Similarly, until post-construction data is available, it will not be possible to verify how well either the Band or FWS model estimates reflect reality.

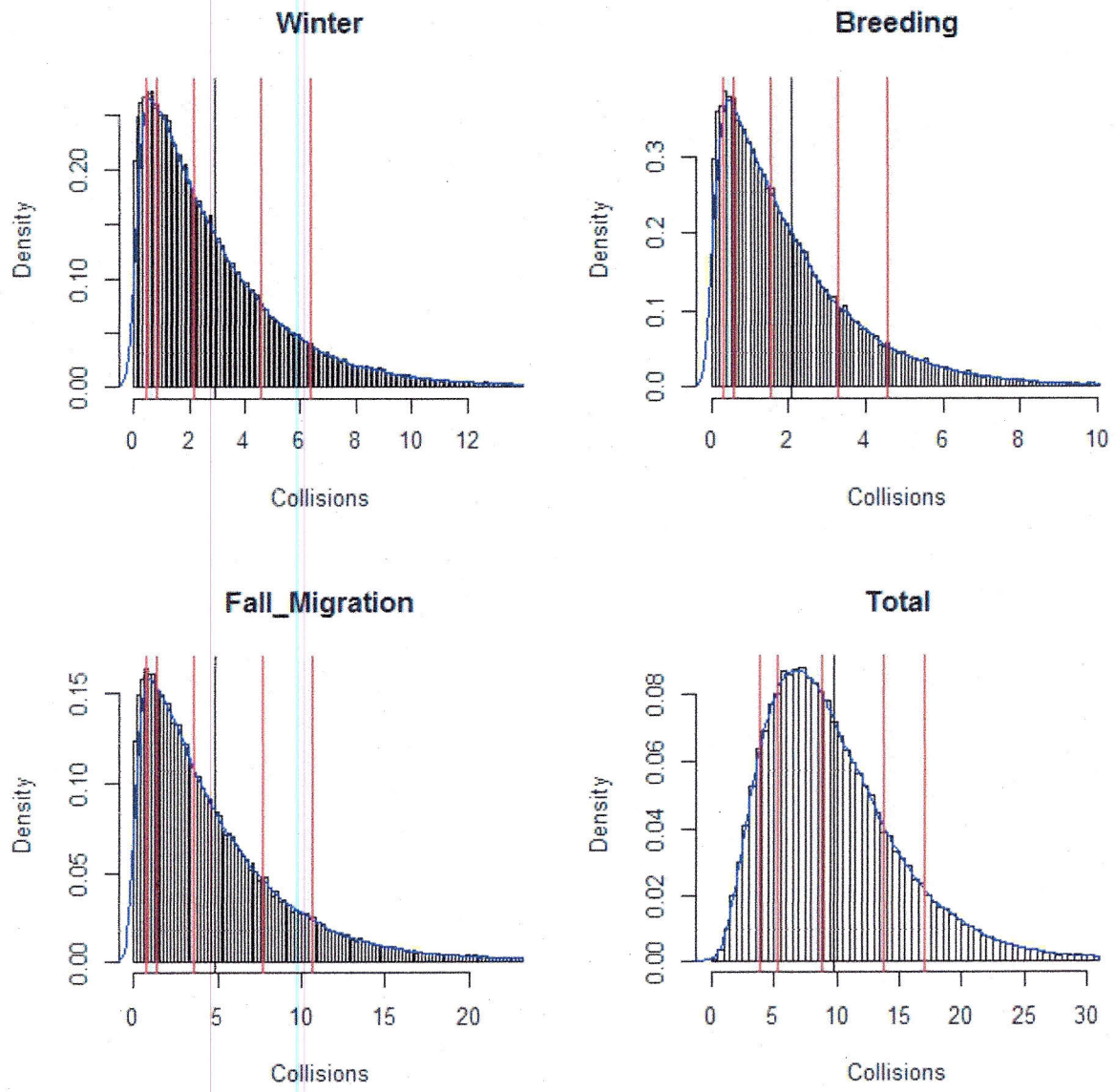


Figure 1. Distributions of predicted fatalities simulation results from Model 1. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

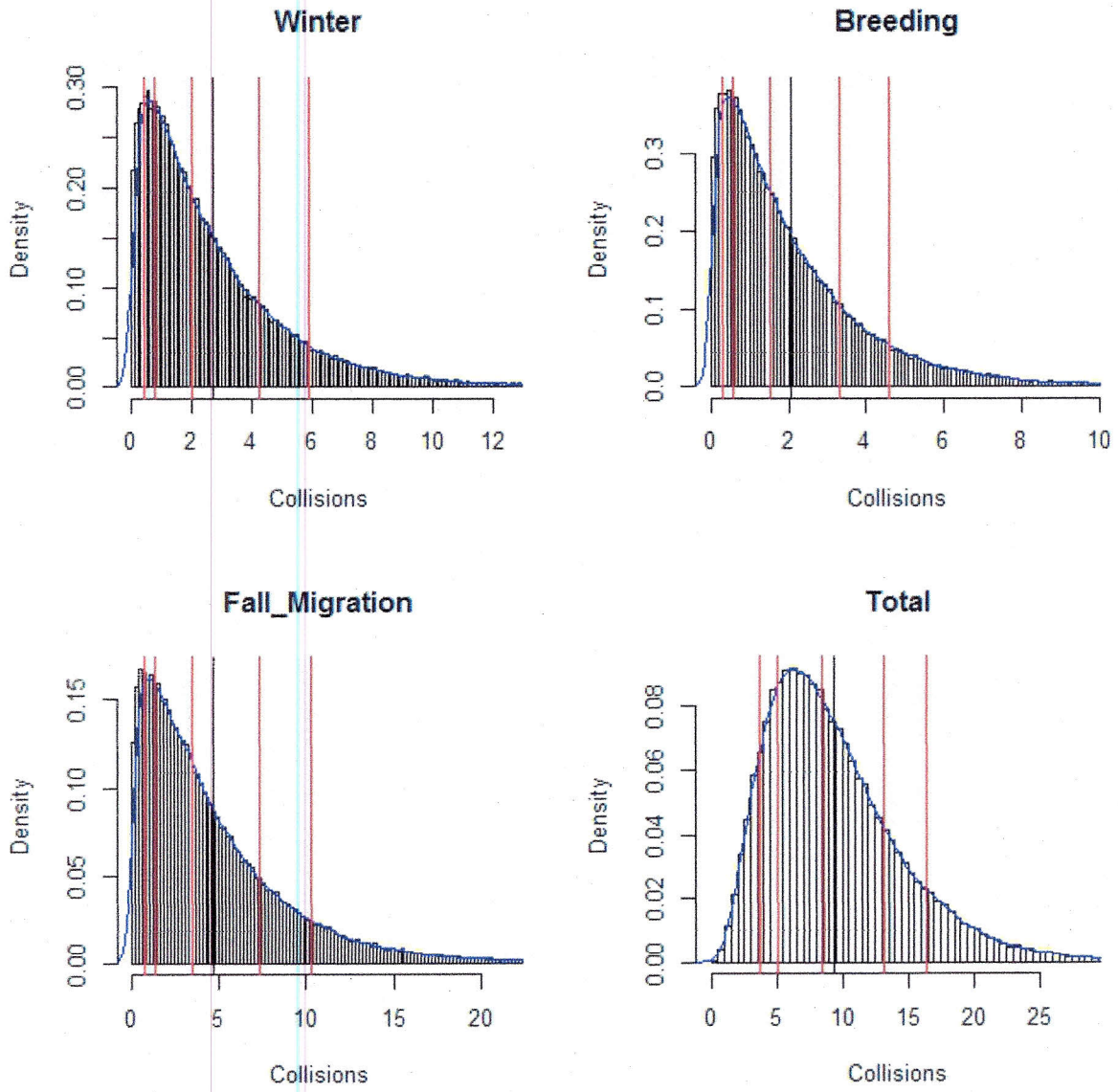


Figure 2. Distributions of predicted fatalities simulation results from Model 2. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

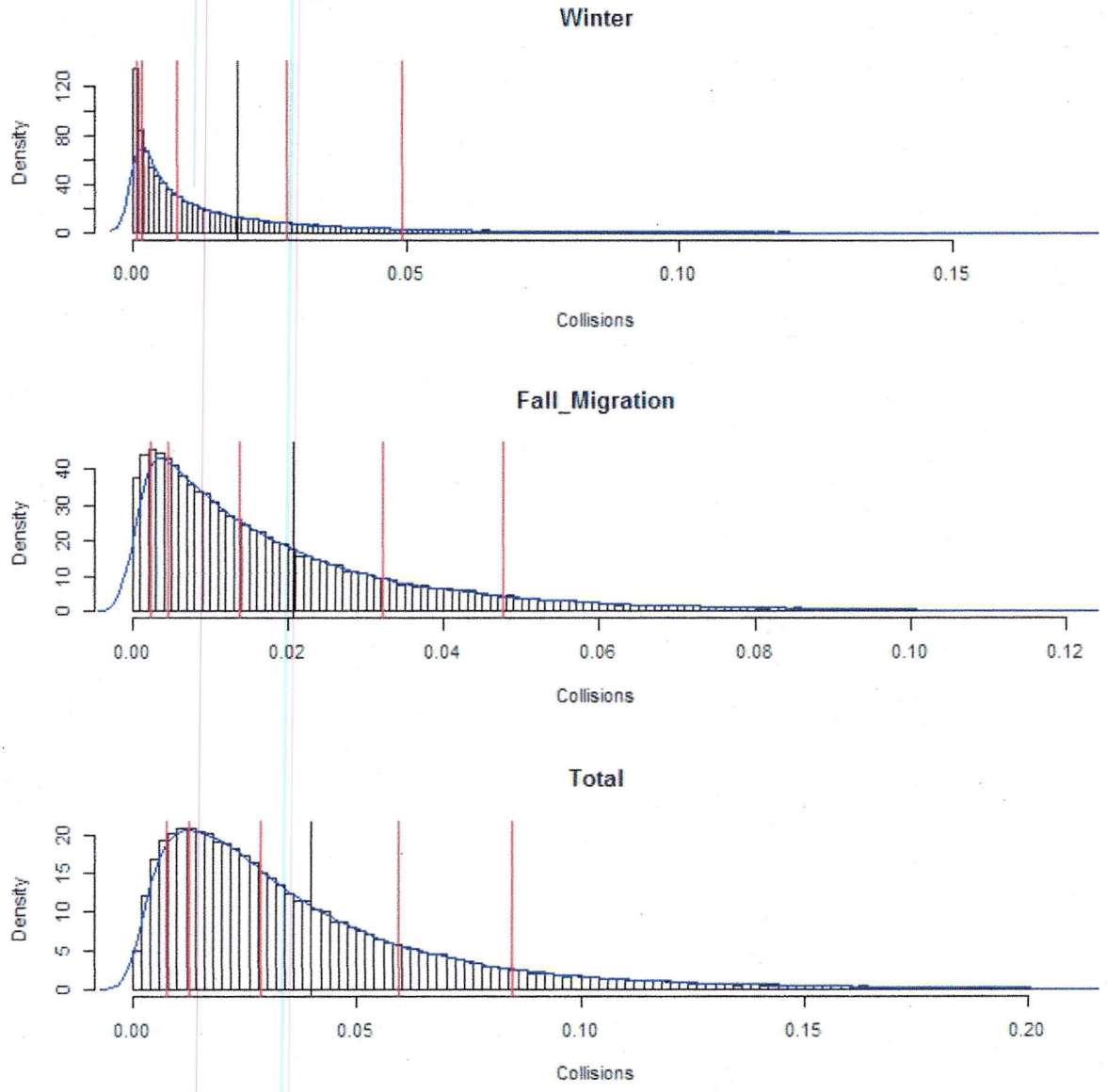


Figure 3. Distributions of predicted fatalities simulation results from Model 3. Vertical lines highlight the 10th, 20th, and 50th quantiles, the mean, and the 80th and 90th quantiles, respectively.

Comparison of 800m vs 100m Survey Plots