BEFORE THE OHIO POWER SITING BOARD

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In the Matter of the Application of Firelands Wind, LLC, for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Huron and Erie Counties, Ohio.	:	Case No. 18-1607-EL-BGN

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PROCEEDINGS

before Mr. Jay S. Agranoff and Mr. Michael Williams, Administrative Judges, Ohio Power Siting Board, conducted via Webex, called at 1:30 p.m. on Friday, October 16, 2020.

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VOLUME IX

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Friday Afternoon Session,
October 16, 2020.

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ALJ WILLIAMS: Okay. Nothing else preliminarily, we'll go ahead and allow Applicant to call Mr. Rana.

MR. SECREST: I believe Ms. Fleisher still needs to be made a panelist.

ALJ AGRANOFF: Mary, if you could please promote.

ALJ WILLIAMS: She's on her way, I can tell.

MR. SECREST: Thank you.

ALJ AGRANOFF: Thank you.

ALJ WILLIAMS: Good afternoon, Ms. Fleisher.

MS. FLEISHER: Good afternoon. At this point the Applicant would like to call Deepesh Rana.

ALJ WILLIAMS: I see you've already been promoted, Mr. Rana. Would you please raise your right hand so I could swear you in.

(Witness sworn.)

ALJ WILLIAMS: Please begin.

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DEEPESH RANA

being first duly sworn, as prescribed by law, was examined and testified as follows:

DIRECT EXAMINATION

By Ms. Fleisher:

Q. Mr. Rana, can you please state and spell your name for the record.

A. First name is Deepesh, that's D as in David, e-e-p-e-s-h, last name is Rana, R-a-n-a.

Q. And can you please state where you are employed and your business address.

A. I am employed at Apex Clean Energy. Our business address is 310 Fourth Street Northeast in Charlottesville, Virginia, Suite 300.

Q. And do you have access to a copy of your rebuttal testimony you filed in this case yesterday?

A. I do. I have a soft copy virtually on my screen.

MS. FLEISHER: And can we have this marked as Applicant's Exhibit 90, please.

ALJ WILLIAMS: So marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

Q. (By Ms. Fleisher) And, Mr. Rana, is this a true and accurate copy of the testimony that you've prepared for submittal in this case?

A. Yes.

Q. Do you have any corrections or changes to make to the testimony at this time?

A. I don't.

MS. FLEISHER: And the Applicant will proffer Mr. Rana for cross-examination.

ALJ WILLIAMS: Thank you, Ms. Fleisher.

Attorney Van Kley, cross?

MR. VAN KLEY: Yes, your Honor, thank you.

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CROSS-EXAMINATION

By Mr. Van Kley:

Q. Mr. Rana, let's start off by talking a little bit about your job experience. How long have you been with Apex Clean Energy?

A. I have been with Apex since July of 2018.

Q. Now, I'm looking now at your written direct testimony marked as Applicant Exhibit 90, page 2, Answer 2, and it says at lines 18 through 19 that prior to joining Apex, you worked at Enel Green Power as a grid connection specialist, right?

A. Yes.

Q. And you did that between October of 2016 and July 2018?

A. Yes.

Q. During your experience from October 2018 to the present, you've had some duties related to interconnection of wind turbines to the electric grid; is that right?

A. Yes.

Q. And can you just generally describe what those duties have been?

A. Sure. So as is stated in my testimony in response to No. 2, Question No. 2, in general, I manage all of the intermittent or renewable resource assets for Apex Clean Energy and manage them through the respective RTO's interconnection process or the transmission study process. Through that process I maintain an understanding of all of the different studies that are required, any deposits that need to be provided to perform the studies, but also communicate the results of the respective interconnection studies to internal as well as external stakeholders, and eventually, once the study process is completed, negotiate and work on the negotiation for interconnection agreements for wind as well as solar resources.

Q. During the time that you've worked for Apex, have you been involved in operating any wind

turbine farms?

A. I have not been directly involved in operating wind turbine farms from the sense that I don't work in the operations team but I have been involved in ensuring that the operational characteristics of a wind farm, when it is operational, meet the compliance criteria that they are supposed to meet prior to operations, during the commissioning, but also post the operations. The actual responsibility of operating the wind farm is not mine. That is the control room operator.

Q. Yeah. What are your duties with respect to the electric grid and wind power facilities that have occurred after the wind farm starts to operate?

A. I don't have any direct duties in respect to after a wind farm starts to operate.

Q. And when you worked at Enel Green Power, were you involved in operating any wind projects?

A. Yes. In some aspect I was involved in the post-commercial operation due diligence and specifically working with the control room operators at Enel to hand off the project to them. During the initial I would say two months of commercial operation, once all the checklists were complete and the project had satisfied the control room criteria

for accepting the project into their operational criteria, they would then take ownership of operating the wind farm.

Q. And at that point you would no longer be involved?

A. Largely, yes, but in case there was any sort of issues, technical issues associated with a compliance documentation or anything needed to be diligenced technically that I had worked on during the commissioning, they would reach out to me for guidance as well as professional input on what was the studies that were performed, what was the compliance that was performed, but that was more ad hoc. It wasn't something that would occur on every project.

Q. So, for example, you were not in the control room for operation of the wind farms.

A. That's right.

Q. And the same would be true during the time that you've worked for Apex.

A. That's right.

Q. Since the time that you have -- or during the time that you've been working for Apex, has Apex operated wind farms?

A. Yes.

Q. Okay. Have any of those wind -- are any of those wind farms located in the -- the PJM ISO?

A. I don't believe I know the answer to that so I cannot confirm or deny that.

Q. And how about when you worked for Enel Green Power, did that company operate any wind farms?

A. Yes.

Q. Were any of those wind farms located in the PJM ISO?

A. Yes.

Q. Which one or ones?

A. I don't recall the specific project names if that's what you mean. But they were wind farms that underwent commercial operation and even prior to my time at Enel there had been existing assets that were being operated in PJM as well as other RTOs but I don't recall the project names.

Q. Were any of the projects located in Ohio?

A. Again, I don't recall the locations specifically within PJM and which state.

Q. Do you know how many of the -- the wind farms operated by Enel were located in the PJM ISO?

A. I don't.

ALJ AGRANOFF: Just so the record is clear, I note the term RTO and ISO were utilized. If

we can just have those clarified by the witness as to what those acronyms stand for.

Q. (By Mr. Van Kley) PJM stands for what, Mr. Rana?

A. PJM does not really stand for anything. PJM is PJM Interconnection which is the regional transmission organization and that's the -- that's the acronym RTO that enforces and is responsible for wholesale electricity operations across a certain footprint in the northeast that comprises of course, Ohio, additional states. ISO or independent system operator is essentially the same term. And RTOs -- the term RTO and ISO, the acronyms are used interchangeably.

Q. RTO stands for regional transmission organization; is that correct?

A. That's right.

Q. And ISO stands for independent system operator?

A. That's right. And actually let me -- let me take that back on PJM. I believe initially PJM stood for Pennsylvania Jersey Maryland and since then they expanded to -- their operations to other states and they do not refer to themselves as Pennsylvania Jersey Maryland, they just refer to themselves as

PJM.

Q. Do you know how many states are included in the -- in PJM?

A. I don't recall specifically the exact number, but I believe it's more than 10.

Q. Let's go to page 4 of your testimony, Question 8. All right. I am looking at lines 27 through 29 on page 4 of your testimony which reads as follows: "As indicated in my prior answer, both PJM and NERC promulgate rules, procedures, and reliability standards that are designed to ensure the reliability of the bulk power system, nationwide." Did I read that correctly?

A. Yes.

Q. Okay. And NERC stands for Northern American Electric Reliability Corporation; is that correct?

A. Yes.

Q. Okay. And I know you covered this in your testimony, but just to make the record flow a little better, can you briefly explain what NERC is?

A. NERC is a reliability organization that has -- or that has oversight under the Federal Energy Regulatory Commission, FERC, to enforce and to actually write reliability standards, enforce them,

provide guidance around how they are to be enforced and then perform audits on generation owners as well as transmission operators and utilities to ensure the reliability standards are being complied with.

Q. Somewhere in your testimony you talked about the ISO that governs standards in -- governs utilities in California, right?

A. Yes.

Q. Okay. And that organization is called the California ISO according to Answer 12 on page 7 of your testimony?

A. Yes.

Q. And you've abbreviated that name to CAISO, C-A-I-S-O, in your testimony, correct?

A. Yes.

Q. Okay. So going back to Answer 8, lines 27 to 29 on page 4 of your testimony where you've indicated that NERC promulgates rules, procedures, and reliability standards designed to ensure the reliability of the bulk power system nationwide. That would include CAISO, the property occupied by CAISO as well, correct?

A. Yes.

Q. So NERC -- NERC rules, procedures, and reliability standards apply to California, correct?

A. Yes.

Q. Let's go to page 6 of your testimony. And we are going to look for a while at your answer to Question 11 which is "Will the Emerson Creek Project 'drive up costs' in PJM's wholesale market?" And I believe that somewhere in your testimony you state that at least some of the electricity anticipated to be produced by the Emerson Creek project has been contracted for sale; is that correct?

A. Yes.

Q. I take it from your reference to the wholesale energy markets in your answer to Question 11 on page 6 that electricity can be sold either on a -- either wholesale or retail; is that accurate?

A. I think the answer to that depends on the perspective, whether you are talking from the load perspective or generation perspective. In general, yes, there are retail prices as well as wholesale prices. They are two different things.

Q. Okay. And so the wholesale prices can be different than the retail prices?

A. I'm not sure -- it's not a yes or no question. They could be similar. They could be different.

Q. Okay. How many contracts does Apex have with users or potential users to purchase electricity from the Emerson Creek project?

A. I do not know since that's not part of my job. That would be another department subject matter expert within Apex.

Q. Do you know whether the sales price for the electricity that has been sold so far for the Emerson Creek wind project was sold at market price as opposed to less than market price or more than market price?

MS. FLEISHER: Objection, your Honor. Relevance. He's testifying in his -- in -- here as to the fact that the energy has been contracted. The price at which it's contracted is not relevant to that piece of his testimony.

ALJ WILLIAMS: To the extent he knows, I am going to let him answer the question. He does say the bulk of the power has already been accounted for in terms of sale but I'll allow some latitude here in terms of what he might know in terms of how it's been priced.

THE WITNESS: Can you repeat your question?

MR. VAN KLEY: Yeah.

Q. (By Mr. Van Kley) Can you tell me whether the electricity sold from the Emerson Creek project has been sold at market price versus a price that's either lower or higher than the market price?

MS. FLEISHER: And, your Honor, I -- not necessarily an objection to the question but just raising the issue that this may be confidential information that would require -- if Mr. Rana knows. If he doesn't know.

ALJ WILLIAMS: Let's take it in smaller bites then. Mr. Rana, do you have an answer to the question in terms of how the pricing might -- might currently be developed? Don't give me the answer --

THE WITNESS: Yeah. Let me partly answer that question. We don't know the market price for Emerson because the energy is contracted for sale for the future. So it would be dependent on the future price so we cannot say whether it's been contracted lower or above the market price since it's not been determined.

Additionally, contracts for sale are developed based on the forecast for market price. They could be above or below depending on the specific construct of the retail supplier that wants to purchase the energy and what their appetite is for

price.

The market price is important and it is included in some form within the contracts and typically all contracts for energy offtake. It may or may not equal the fixed price of the contract but there are mechanisms that introduce the actual market price at the time into the contracted sale.

ALJ WILLIAMS: That's helpful by way of context in terms of maybe how the negotiations began or how they play out over time. Do you have specific -- again I don't want you to tell me on the record. Do you have specific information regarding any of the contract prices for the power that's currently committed?

THE WITNESS: I don't. Not at this moment, I don't.

ALJ WILLIAMS: Attorney Van Kley.

Q. (By Mr. Van Kley) Yeah. Can you tell me whether the -- the contracted product -- electricity has been contracted to sell at a price above whatever the market price is at that time?

MS. FLEISHER: Objection, asked and answered. I believe Mr. Rana indicated in his testimony that we don't know what the market price is for the period of the contract, so.

MR. VAN KLEY: That's a different question. My question is whether the electricity will be sold at a -- a price that is above the market price at the time that the electricity is sold.

ALJ WILLIAMS: So I think what I -- what I hear you asking that we might be able to advance would be, are there any contracts that are termed market price plus; is that what I think you are asking?

MR. VAN KLEY: Yes, that's exactly it, your Honor.

ALJ WILLIAMS: Ms. Fleisher.

MS. FLEISHER: Mr. Rana, I will just say if -- feel free to answer the question but if any of this might be confidential, then please indicate that so we can deal with it appropriately.

ALJ WILLIAMS: Mr. Rana, are you comfortable with what's being asked?

THE WITNESS: I'm not, and I don't -- I don't know if the energy will be contracted for sale above or below a certain price. There are -- it's more complicated than just a certain price determining whether the project can sell the output or not sell the output. The contracts have more than just one price determining a project's output.

ALJ WILLIAMS: So what I think Attorney Van Kley is asking, are there any contracts that are essentially maybe termed a variable rate which would be market price plus and your testimony is that you are not aware of anything being contracted that way; is that correct?

THE WITNESS: That is correct.

ALJ WILLIAMS: Attorney Van Kley.

Q. (By Mr. Van Kley) Okay. Do you know what percentage of the project's nameplate capacity will be contracted for sale?

ALJ WILLIAMS: You broke up a little there. I think you asked what percentage of the nameplate capacity is contracted for sale?

MR. VAN KLEY: Will be contracted for sale.

A. I cannot say how much will be contracted for sale, and I believe even the information of how much is contracted for sale is currently not public and hence is considered confidential. But I will say, as in my testimony, the bulk of the project's output has been contracted for sale.

Q. Yeah. And I guess my question is a little different and perhaps I didn't express it very clearly. So let me break it down a little bit. You

are aware that this project has a nameplate capacity of about 297 megawatts?

A. Yes.

Q. Okay. And do you expect that the company will contract for sale 297 megawatts of electricity or will it be some lesser amount?

A. I don't believe I'm the subject matter expert that can answer that question. There are -- if I can -- I will refer from past experience, projects could be contracted for sale at 100 percent of their output. They could be contracted for sale at 50 percent, 90 percent, and the remaining percentage that is not contracted could be run merchant into the market depending on the appetite for -- for the eventual operator of these assets. So there is no binary answer to that question.

Q. Uh-huh. You are aware that the -- the wind power that -- or you are aware that the wind that powers this project is not expected to constantly blow at a rate that would enable the project to produce electricity, correct?

A. I am not aware of specific wind speeds in the area, if that's what you are referring to.

Q. My question is a little simpler which is are you aware that at times the wind speed at this

project will not be suitable to produce electricity?

A. I am aware that wind speeds vary in every region and they are not the same and you will have periods of high winds and periods of low winds and periods of no winds and that's the case with every project, not specifically to this project.

Q. Okay. So to go back to my question then, there are periods, for example, when there is no wind when this project cannot produce electricity, correct?

A. That is -- yes, theoretically possible there is no wind, the project will produce little to no output, that's accurate.

Q. So in periods where the project produces no electricity, where will the customers who buy the electricity from this project obtain their electricity?

A. I am not the customer that is buying the output so I cannot answer the question around where -- where they will buy their electricity from but, in general, power purchasers don't buy power from just one generation source. They buy power from different generation sources based on their assessment of their expected demand that takes into account the net capacity factors of each individual

project that they are contracting output from.

So that means based on the yearly expected demand if one project is not expected to meet that -- that demand criteria, they would hopefully contract power from other generation owners as well and other projects. They could be wind projects. They could be natural gas. It does not -- it does not matter. It's up to their appetite. But if one project is not suitable for meeting the needs, there will be other projects out there that they could contract with.

Q. Okay. Have you heard the term "standby power source"?

A. I may have but I would ask that you clarify.

Q. Well, are you aware that there are sources of power in the PJM that are available to provide power on a standby basis where another source of power may be producing less electricity than expected?

A. Yes. In general, there are those resources that meet that criteria.

Q. And would you expect that during periods when the Emerson Creek wind project is not producing electricity that the project's electricity customers

would obtain power from those standby sources?

A. Again, it depends on the time or the demand at the time that the wind is not being produced. Standby resources or standby generators that you are referring to are on standby for periods of peak demand. They are not on standby for periods of off-peak demand. And they do not have the capability to buy power from -- so in the event that the project is not generating output, it is not the customer that determines who they buy power from. It is the market operator, in this case PJM, that schedules resource ahead of time to ensure that in the event of a shortfall in generation output, there are other resources available to supply any shortfalls and they provide the shortfalls based on multiple criteria. It's not just -- it's not as simple as just because you are standby, you will provide power. You could if you are called upon to do so.

Q. Can you tell me whether or not the Emerson Creek wind project will enjoy any government subsidies?

A. I don't know about -- what do you mean by government subsidies but all wind projects in general have a federal subsidy and that's the only one that I

am aware of in this project.

Q. With regard to the federal subsidy, does -- does -- will that subsidy affect the sales price for the electricity from this project?

A. I'm not aware of how subsidies affect sales price.

Q. Can you tell me -- well, let me ask another preliminary question first. In the course of your business, do you keep track of how well wind power is performing in other countries?

ALJ WILLIAMS: I'm sorry to interrupt. How well in terms of what measure, Attorney Van Kley?

MR. VAN KLEY: How well they are performing technically.

ALJ WILLIAMS: In terms of predictable -- I am not sure what you are trying to ask.

MR. VAN KLEY: Do they work or do they not work essentially.

ALJ WILLIAMS: Reliability standard?

MR. VAN KLEY: Yes, uh-huh.

ALJ WILLIAMS: Okay.

A. No. I don't track the status of projects outside of the United States and even outside of on a project-specific basis. I only track the status of Apex projects. I am aware of the status of other

projects, being in the industry, but I do not know how projects either underperform or overperform in other national grids outside of the United States.

Q. Yeah. Setting aside for a second the reliability of other wind projects that may be outside the United States, do you keep track of -- of how -- do you keep track of whether or not the existence of those wind power projects in other countries affect the prices of electricity there?

A. No.

Q. Let's go to page 8 of your testimony. I have some questions about your answer between lines 5 and 13. Let's take a look at the sentence that starts on the third line which is line 7. I'll read the sentence first and then I will break it down by question. The sentence states "As can be inferred, not only does CAISO have a much higher percentage of renewable resources compared to PJM, but it is almost all comprised of solar." Do you see that?

A. Yes.

Q. All right. Now, CAISO is the ISO that governs California, right?

A. I wouldn't use the term "govern," but they do operate the wholesale electricity markets in California.

Q. Okay. Fair enough. All right. So what, if any, significance do you ascribe to the fact in this sentence that almost all is comprised of solar?

A. I think the intent is very literal is these are the percentages and solar is a significantly high percentage of the overall intermittent resource footprint. That's what the intent is.

Q. All right. So are you trying to say here that wind energy is more reliable than solar energy or not?

A. The intent is to provide additional insight into the fact that not all RTOs are the same. They have different generation mixes. I do not know if wind is more reliable than solar or that solar is more reliable than wind or for any other resource. But different mixes of generation that make up a certain RTO cannot be equated with one another because the solar production profile does not look similar to wind and wind does not look similar to solar.

Q. But you can't tell me whether or not the blackouts that California has been experiencing are solely related to solar as -- as a -- a source of power in their mix of energy sources?

MS. FLEISHER: Objection. Your Honor, Mr. Van Kley is describing blackouts as to which we have little to no evidence in the record so if he can keep references to the facts in evidence for Mr. Rana to opine on them.

ALJ WILLIAMS: Attorney Van Kley -- go ahead.

MR. VAN KLEY: Go ahead, your Honor.

ALJ WILLIAMS: I was going to have you maybe break the questions apart into smaller bites. You know, I think the presumption that the blackouts in California are caused by renewable energy in and of itself may be a question that might be objectionable or might be answerable or not answerable in smaller bites. But I think, as asked, the question is overbroad and not applicable in this case.

MR. VAN KLEY: Yeah. And as a premise for my question, I was -- I had in mind the -- his answer to Question 14 on page 9 where he references the blackouts. But I can break it down a little bit more and add a little more context.

ALJ WILLIAMS: Thank you.

Q. (By Mr. Van Kley) You are aware, Mr. Rana, that California had some electricity

blackouts during the summer of 2020?

A. Yes.

Q. And are you aware that California was -- let's see here. I thought I had something on it.

All right. So are you aware of what the energy mix of electricity sources is in California, comparing the solar and wind renewable sources on one hand, against other sources of electricity on the other hand? In other words, are you aware of the percentage of electricity in California that is ordinarily produced by a combination of solar and wind?

A. Yes. As indicated in my response to Question 13, 31 percent of the generation mix accounts for solar, while wind is 2 percent, so that would be 33 percent of the mix as of today from these two energy sources.

Q. Uh-huh. And are you aware that the blackouts experienced this year in California were attributed, at least in part, to the fact that solar and wind were not producing as much electricity as had been expected?

MS. FLEISHER: Objection. Your Honor, attributed to whom? It's just -- attributed by whom? It's an ambiguous question.

ALJ WILLIAMS: I am going to sustain the objection. Attorney Van Kley, if you could rephrase the question.

Q. (By Mr. Van Kley) Are you aware of any persons who have evaluated the cause of the blackouts in California?

A. No, I am not, and I believe that evaluation is still ongoing.

Q. The evaluation by whom?

A. I would think by California, the state itself. And additional states that California interacts with for wholesale electricity power purchases. I am sure there are multiple entities that have an interest in this issue within California including generators, ratepayers, the state itself, as well as governing authorities that we've previously mentioned or I should correct myself and say reliability authorities that we have previously spoken about, in this case NERC, but that's my expectation. It's not a one-person or one-entity effort. It would be something that requires coordination among different entities that have different footprints within the California ISO.

Q. Are you aware of any statements of those persons that you just referred to in your answer who

have made any -- I better start over.

Are you aware of any statements made by any persons referenced in your answer about the cause of the blackouts in California?

A. I am not.

Q. Going back to Question 13, it asks "Are there differences between how CAISO and PJM manage the impacts of intermittent resources?" And that's the question you answered on page 8 as well as some on page 7, correct?

A. Yes.

Q. Okay. So let me ask you to place this question into context. What's the purpose of this question and your answer? I mean, why are we talking about the differences between CAISO and PJM? How does that matter to your testimony?

A. From the testimony that Mr. Schreiner had given, specifically in reference to his assertion that the blackouts in CAISO from my opinion of his testimony was that he was equating that to say the same applies to any other RTO including PJM, where if you have high renewable penetration, it reduces reliability, drives up prices, and is likely the cause of blackouts.

The question and response to my question

in my testimony is to provide evidence, using my experience, that not each RTO is similar, and especially CAISO is not just only in the western interconnect which is a completely different seam of interconnection within the United States but it operates a different market structure, has a different generation mix than PJM does.

Q. All right. Then with respect to your intent to rebut Mr. Schreiner's opinions, what difference does the generation mix make with respect to your rebuttal of his opinions? Why is it relevant?

A. It is relevant because generation mix accounts for a very important construct that we've been talking about, reliability, but outside of reliability, the construct of resource adequacy. Each RTO's responsibility is to ensure that a certain set of -- certain kinds of resources are available to supply expected demands, and resource adequacy is based off of the concept of what is the expected load and what generation is available to supply that expected load. If the generation mix going into RTOs is different, their resource adequacy constructs as well as the overall modeling of those constructs is different.

Q. And so what are the differences in generation mix for CAISO as -- as distinguished from the generation for PJM that makes a difference with respect to Mr. Schreiner's opinions?

A. The generation mix in CAISO is 31 percent solar and 2 percent wind. PJM accounts for 5 percent wind and 1.7 percent solar. Additionally, the overall -- the amount of resources that PJM has is almost in -- from what I recall is more than twice in terms of total capacity. PJM has at least twice as many resources to include in their resource adequacy construct than -- than CAISO does.

Q. So with respect to the difference in the amount of solar- and wind-produced electricity in CAISO versus the amount produced of -- from solar and wind in PJM, why does that matter? What difference does it make?

A. Pinpointing specific differences just because of a certain percentage of resource mix is -- is not something that any single individual including myself can -- can purport to know.

The reason it matters is the inputs in the planning models, demand supply models and demand supply curves, that's where it matters. If the inputs are different, then your results for how

resources are scheduled to supply demand will also change.

How will it change if you reduce the percentage of solar versus wind and flip them around? I don't know. I do not work in, you know, market scheduling or demand supply obligations, but I am aware that there are complex algorithms that utilize these inputs and eventually with the aim of supplying load at the cheapest price but also ensuring that during this process the inherent goal of maintaining the reliability of the grid is not sacrificed.

Q. Let me see if I can perhaps reduce this to a language that a layperson can understand. Can you tell me whether there is anything about the generation mix in CAISO that makes blackouts more likely to happen than they may be prone to happening in PJM?

A. I cannot say there is a generation-mix percentage that increases the likelihood of blackouts. We all know also one of the reasons the blackouts was a thing was because of the extremely high temperatures. That's a consideration. Generation mix is a consideration. Supply is a consideration. Demand is a consideration.

Additionally, CAISO does not just

schedule its own resources as is indicated in my testimony. They actually work in an energy imbalance market where during the periods of imbalance in either generation supply or load demand, they can work with other states that are not part of CAISO but are part of the energy imbalance market to export and import resources and work collaboratively.

PJM does not have that construct. PJM has a defined footprint. All resources, generation resources as well as load within PJM is within PJM's role as an independent system operator to maintain. It does not engage in wholesale transactions or imports or exports with other balancing authorities or RTOs. That's a material difference.

How generation mix could or could not affect the blackout is beyond my purview of expertise. And, in fact, it's beyond the expertise of anyone.

Q. Can you tell me whether -- let's see, I am looking back at one of your prior answers, you said something about the market being different in CAISO.

ALJ WILLIAMS: Page 8, line 15.

MR. VAN KLEY: Say again.

ALJ WILLIAMS: I think that's page 8,

line 15, Attorney Van Kley.

MR. VAN KLEY: Yeah. Let me see if that's what you were saying, Mr. Rana.

A. Yes.

Q. Yeah. You said something in a prior answer that the market was different in CAISO than it is in PJM. Do lines 15 through 18 of your testimony on page 8 discuss that concept?

A. That's right. Lines 15 to I would say 23 discuss that concept.

Q. Okay. So let me ask you a question in lay terms then with respect to this issue which is, can you tell me whether there is anything about the market in CAISO that makes blackouts more likely to occur in CAISO than in PJM?

MS. FLEISHER: Objection, asked and answered. He's already asked him how the various factors relate to the likelihood of blackouts and causes of blackouts.

ALJ WILLIAMS: I think it's a slight variation on the question so I am going to let him answer the question to the extent he is able.

A. I would request you to repeat your question because I do believe I answered that.

Q. Well, I am asking you to explain in lay

terms as opposed to technical -- in -- as opposed to technical terms whether the market situation you've described in lines 15 through 23 on page 8 of your testimony makes blackouts more likely to occur in CAISO than they may occur in PJM.

A. Since the reason for blackouts in CAISO is still being determined, we cannot say if the market structure for CAISO, I cannot say the market structure for CAISO makes blackouts more likely in CAISO than in any other RTO. What I will say is any blackouts or rolling blackouts when transmission lines are shut off and there is no power able -- being able to produce is because of scheduling imbalances and we had talked about you had a question around standby generators. The reason a blackout would happen is even if your intermittent resources that you pointed to might not be generating during periods of low wind, even your standby generators are not available to meet the excessive demand and that's because they don't meet whatever minimum reliability or dispatch criteria that they have to meet to meet that demand during that particular hour. As a result of generation shortfalls, irrespective of resource, the load has to be shut off and hence the blackouts.

Because CAISO manages an imbalanced

market where they may or may not be relying on imports or they may be exporting power to other regions, it adds another layer of complexity into the already complex market structure around dispatch scheduling and load scheduling since you need to forecast for generation availability, not just within your territory but other states. So a blackout would not happen only just because certain wind sources were not operating; it is also an issue of capacity or standby shortages that could not meet or were not enough to meet the expected load.

Q. Yeah. So in PJM, if there's a shortfall of electricity through sources that are not standby sources, then those sources can draw on the standby sources found inside of PJM to produce electricity they need, correct?

MS. FLEISHER: Objection, your Honor. I'm not sure we've got a definition of "standby sources" either, at least not one that's necessarily consistent across all the discussion. It would be helpful to clear that up for the record before Mr. Rana answers the question.

ALJ WILLIAMS: Attorney Van Kley, can you break that out for us.

MR. VAN KLEY: Yeah. I thought we had

already discussed that in some detail earlier in his testimony, but we can -- we can make sure the record is clear.

Q. (By Mr. Van Kley) As you refer to them in your prior answer, what's your understanding of what the term "standby sources" mean?

A. Standby sources would typically -- they have different meanings in different RTOs again. Cannot be one and the same thing across regions but typically anything that is not scheduled in the day-ahead markets and in the real-time markets, so day-ahead is looking a day forward, during the real time if load is exceeding the expected demand, you would have other resources that would be considered -- in the case of PJM, let's talk PJM, they would be considered capacity resources. From what you are describing, that's what I think you mean by "standby generators" and those capacity resources could be called upon in the event the need arises to supply excessive load.

Q. Okay. So in the case of CAISO, do the energy consumers in the CAISO area have standby sources that can be utilized in terms -- in times where their usual sources of electricity are not producing enough for them?

A. Every RTO has to have capacity or what you are terming as standby resources in addition to your normally-dispatched resources. So every RTO has to have generation resources that are considered capacity or standby for periods of excessive demand.

Q. And with respect to CAISO, does -- do the -- does the grid in CAISO rely on standby sources that are located outside of CAISO at least in part?

A. No. I cannot say yes or no. But, yes, theoretically it could but also theoretically it could not. It depends on what generation is or isn't available and where the demand is coming from.

Q. Well, looking at line 17 through 19 on page 8 of your testimony, where you refer to multiple balancing authorities including portions of Arizona, California, Idaho, Nevada, Oregon, Utah, Washington and Wyoming among others. Do you see that?

A. Yes.

Q. Okay. So does that mean that -- that the consumers in the CAISO area draw on energy sources from outside of the CAISO area where they need them?

A. Again, consumers do not draw from resources. It is the ISO that balances the load with the generation. CAISO itself could rely and could use imports, if it so needed to, from other states

that I've mentioned. Also the other states could rely on resources from California or CAISO should they have a shortfall.

Q. Okay. So then my question is, if the ISO -- if the CAISO can draw on energy sources outside of CAISO in order to supply electricity during times of shortfall within CAISO, how is that any less reliable, if it is, than the PJM ISO drawing on alternative sources of electricity within the PJM?

MS. FLEISHER: Objection, asked and answer. Mr. Rana testified he couldn't offer a definitive opinion on whether the energy imbalance market construct makes CAISO more or less reliable which I believe is what Mr. Van Kley is asking.

ALJ WILLIAMS: I am going to sustain the objection.

Q. Well, if that's the case then I have several other questions for you, Mr. Rana, which is why are we even talking about market from line 17 -- or lines 15 through 23 in your answer on page 8?

A. Because the markets are different. Whether they are different to their benefit or to their detriment is not important, but pointing out that RTOs are not the same is important. So what happens in one RTO may not be something that happens

in another RTO because their market structures and constructs are different. We do have a national grid but the grids are separated by regions and each RTO is responsible for only managing its particular footprint, not anything outside of it.

Q. So you can't tell me then that the difference in the markets between CAISO and PJM would make blackouts any less likely to occur in PJM.

A. No. I can answer they're just different markets but I cannot say whether one market construct makes it more likely or less likely for blackouts to occur in -- in either market.

MR. VAN KLEY: Well, then I have no more questions.

ALJ WILLIAMS: Ms. Fleisher, redirect?

MS. FLEISHER: If we could have 5 or 10 minutes just to consider.

ALJ WILLIAMS: Let's come back at 2:50. We are off the record.

(Recess taken.)

ALJ WILLIAMS: Ms. Gibson, let's go back on the record.

Redirect, Ms. Fleisher.

MS. FLEISHER: Yes. Just very brief, your Honor.

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REDIRECT EXAMINATION

By Ms. Fleisher:

Q. Mr. Rana, at one point Mr. Van Kley asked you about whether NERC reliability standards apply nationwide. Do you recall that?

A. Yes.

Q. And does that mean that NERC's standards are uniform in terms of their content and implementation nationwide?

A. Yes. So the specific standards are uniform. So I had referenced, for example, PRC-024 and PRC-025 in my testimony that would be applicable to any RTO or any region. But within the specific standards there are -- there could be differences and there are differences in the case of PRC-024, for example, since they are curated to meet the needs of specific regional grids.

I previously mentioned that CAISO or California ISO is in the western electricity grid or western interconnect. PJM falls under the eastern interconnect. There are different voltage and frequency criteria specifically within each standard that could differ between the western interconnect, the eastern interconnect, and similarly other

standards may have different criteria that are specifically curated by NERC based on the performance and makeup of that particular region's grid.

Q. And do you recall Mr. Van Kley asking you about your experience directly operating a wind farm?

A. Yes.

Q. As part of your job, do you need to understand the operational characteristics of a wind farm?

A. Yes. I do.

MS. FLEISHER: That's all I have, your Honor.

ALJ WILLIAMS: Thank you, Ms. Fleisher.

Does any other counsel have any clarifying questions they want to ask?

Okay. I have just a couple questions, Mr. Rana.

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EXAMINATION

By ALJ Williams:

Q. In your testimony at page 8, you describe the relative generation mixes of alternative energy as equating to roughly 33 percent in California or CAISO and roughly 7 percent in PJM. Do you recall that?

A. Yes, I do.

Q. Are we able to make any general statements regarding the reliability of electricity with a construct that's 500 percent more fully developed in an alternative capacity in CAISO than we are in PJM?

A. We -- I am not because I am not able to make that determination specifically based on resource percentages because these are percentages off a total value. I had previously mentioned CAISO actually only has, you know, about at least twice as few resources overall than PJM does. As a result of that, you would -- we are making the assumption that 31 percent -- or 33 percent are intermittent, but they are of a smaller overall nameplate value. PJM has a lot of additional resources that CAISO does not within its footprint.

The question around whether a certain percentage is detrimental or beneficial to a particular region's grid is not one that can be answered because, again, it all goes back to the concept of resource adequacy. You need a mix of resources of different kinds to meet demand and expected demands. And the respective RTOs, in this case CAISO or PJM, will try and balance what they

have in their mixes to try and supply the load that they need to supply at the most economic price.

Q. I think your answer to that question probably answers this but I wrote it down anyway so I'll ask it. Are you aware of any NERC or PJM market goal in terms of renewable energy that exists? So we are currently at roughly 7 percent. Do they -- do they feel at 10 percent or 20 percent or 33 percent that we're reaching some alarming high percentage or is that not really how they analyze this?

A. So in general, I don't know if NERC has analyzed, you know, their future reliability guidelines based on a certain percentage of renewables but I do know that NERC is instituting and is actively holding workshops, and so is FERC in that regard, around inverter-based and converter-based technologies integrating into the grid and specifically looking at additional standards and reliability guidelines that they may need to brainstorm over the next few years because currently the NERC standards, they don't declassify generator owners. They classify generator owners as anything that owns generation. But now they are starting to look at specifically what are the differences between generator owners and what additional stringent

guidelines may need to be incorporated for one generator versus another depending on their specific technologies.

Q. Thank you.

And then the last question, I think you answered this a couple of times but my notes are a little unclear, you talked about the excess capacity within PJM to meet unexpected demand. I believe you indicated that it was twice as much as they need?

A. I don't recall saying that.

Q. Okay.

A. I think what I meant was -- maybe you are talking about twice as much specific to the amount of generation, overall generation, that PJM has relative to CAISO. If I recall correctly, the last that I saw, existing generation in CAISO was about 33 or 35 gigawatts of resources and PJM -- PJM had something closer to 90.

Q. And that wasn't what my notes said and maybe my question is more artful in terms of standby resources. Could you give us a percentage of standby resources within PJM?

A. I would not know the exact percentage. In fact, you cannot classify a standby resource as a certain percentage because a standby resource can

also be a wind project or a solar project if it qualifies for providing the capacity.

So there is no -- I don't think there is an existing construct that says there is X amount of percentage of standby resources. Standby resources are any resources that can supply capacity shortfalls and even wind and solar can qualify for that if they do meet the criteria.

ALJ WILLIAMS: Okay. Thank you for clarifying those points for me.

Within that narrow construct of my clarifying questions, any more questions of counsel?

All right. Seeing none, Mr. Rana, thank you for your time. You are excused.

ALJ WILLIAMS: Ms. Fleisher, take up the exhibit.

MS. FLEISHER: Yes. I would like to offer Applicant's Exhibit 90 for admission, your Honor.

ALJ WILLIAMS: Attorney Van Kley.

MR. VAN KLEY: No objection.

ALJ WILLIAMS: Applicant's Exhibit 90 is admitted.

(EXHIBIT ADMITTED INTO EVIDENCE.)

ALJ WILLIAMS: I will turn over the rest

of the afternoon to Judge Agranoff.

ALJ AGRANOFF: Thank you. At this time are we ready for the Applicant to call its next witness or do you want to take a break or?

MR. SECREST: I'll defer to others. The Applicant is ready to proceed.

MR. VAN KLEY: We're good to go.

ALJ AGRANOFF: All right. Then let's do it.

MR. SECREST: Your Honor, may the Applicant call Dr. Paul Rabie.

ALJ AGRANOFF: Have Mr. Rabie promoted, please. Hello there.

THE WITNESS: Good afternoon.

ALJ AGRANOFF: If you could please raise your right hand.

(Witness sworn.)

ALJ AGRANOFF: Thank you.

Mr. Secrest.

MR. SECREST: Thank you, your Honor.

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PAUL RABIE, Ph.D.

being first duly sworn, as prescribed by law, was examined and testified as follows:

DIRECT EXAMINATION

By Mr. Secrest:

Q. Good afternoon, Doctor. How are you?

A. I am well today. Thank you. How are you?

Q. I am well also. Thank you.

Would you please state and spell your full name for the record.

A. My name is Paul Rabie, that's R-a-b-i-e.

Q. You just cut out a bit, but I believe you said R-a-b-i-e; is that right?

A. That is correct.

Q. Thank you. By whom are you employed and what is your business address?

A. I'm employed by Western EcoSystems Technology, Incorporated. My business address is 1610 Reynolds Street, Laramie, Wyoming.

Q. Thank you, Doctor. Do you have in front of you a copy of your prefiled rebuttal testimony?

A. I do.

Q. Okay. Is that a true and accurate copy of your testimony?

A. It is.

Q. Do you have any changes or corrections to that testimony?

A. I don't.

MR. SECREST: Your Honor, may I move to have Dr. Paul Rabie's rebuttal testimony marked as Applicant's Exhibit 89.

ALJ AGRANOFF: It shall be so marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

MR. SECREST: Thank you, your Honor. And with that, I will offer Dr. Rabie for cross-examination.

ALJ AGRANOFF: Thank you.

Mr. Van Kley.

MR. VAN KLEY: Thank you, your Honor.

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CROSS-EXAMINATION

By Mr. Van Kley:

Q. It says here that you are a biometrician; did I pronounce that correctly?

A. You did.

Q. What is a biometrician?

A. A biometrician is very similar to a quantitative ecologist. We are interested in the statistics around biological phenomena.

Q. And how many years of experience do you have as a biometrician?

A. I would say I have about 15 years of experience as a biometrician.

Q. Okay. Looking at your résumé which is marked as Attachment PR-2 to your testimony which is marked as Applicant Exhibit 89, it says that you've been a biometrician with WEST from 2013 to the present, correct?

A. That's correct.

Q. And before that time, from 2010 to 2012, you were a research associate.

A. That is correct.

Q. Okay. That was with the University of Minnesota; is that correct?

A. I was employed by the University of Minnesota. I was advised at that time by United States Geological Survey scientists.

Q. You were what again with the USGS?

A. My advisors at that time were USGS employees.

Q. Oh, okay. So what does it mean you were a research associate?

A. I was employed as a researcher, many would call that role a postdoctoral researcher. It

was -- it was employment as a research scientist following conference of the -- of my Ph.D.

Q. So were you going to school at the same time? Or was that after you had gotten all of your degrees?

A. That was after the conference of the Ph.D.

Q. Was that a full-time position?

A. Yes, sir.

Q. And during the time that you were -- were a research associate with the University of Minnesota, did you perform any work related to bats?

A. At that time I had my first experience looking into the search process for bat carcasses under wind turbines and the subsequent process of analysis. It was all desktop work. But that was in fact where I gained my first experience with fatality estimation for bats at wind farms, yes.

Q. And so was that -- were you working on that project full time or was that part of what you were doing?

A. Definitely part of what I was doing during that time.

Q. Okay. Can you give me an estimate of the number of hours you spent on that project?

A. It was not a lot. I think that it was -- let's say it was fewer than 250 hours.

Q. From 2009 to 2010 you were a consultant for Southside Community Health Services; is that correct?

A. That is correct.

Q. What were you duties in that position?

A. I was helping to manage their electronic medical records database.

Q. From 2002 to 2008, you were a teaching assistant at Washington State University; is that correct?

A. Yes, that is correct.

Q. And during that time, you were still going to college?

A. I was in a postdoctoral program.

Q. In your position from 2013 to the present as a biometrician for WEST, when did you first start working on projects related to bats?

A. I believe it was January 7 which would have been the day that I started.

Q. So that would have been January 7, 2013?

A. Yes, sir. I may have that date wrong but it was the first week or so of January.

Q. During the time that you have been

employed by WEST, have you worked for wind company -- or wind -- wind power companies?

A. Since 2013, I have been employed only by WEST.

Q. Yeah. My question is, whether during the time you've been employed by WEST, you have worked for wind companies as clients.

A. I have had wind companies as clients almost that entire duration.

Q. Okay. And approximately what percentage of the time that you've worked for -- let me start over with a better question.

During the time that you've worked for WEST, approximately what percentage of your time has been spent working on projects in which a wind company was a client?

A. On an hours basis, I would guess that it's in excess of 85 percent.

Q. Are you at all familiar with the Application of Firelands Wind in this case for a certificate from the Ohio Power Siting Board?

A. I'm aware that it exists.

Q. Okay. Did you perform any duties related to the preparation of that application?

A. No, I did not.

Q. Have you published any peer-reviewed papers on subjects related to bats?

A. No, I have not.

Q. Have you published any peer-reviewed papers related to mortality searches at wind projects?

A. Yes, I have.

Q. How many?

A. One.

Q. One? Okay. And what's the name of that paper?

A. I am referring to my résumé. "Developing an efficient protocol for monitoring eagle fatalities at wind energy facilities."

Q. All right. Help me find that in your résumé. Is that on the second page of your résumé?

A. That's the second page of the résumé and it's the second publication listed.

Q. Got it.

A. May I clarify?

Q. Yes, you sure can.

A. When you say "peer-reviewed," I assume that you're talking about the peer-reviewed journal literature. In fact, I have two to four publications that were published in collaboration with USGS

scientists which do have -- USGS does have its own peer-review process, so. If we count those, there's more than that one. Including for bats.

Q. Okay. Are those also listed in your résumé?

A. Oh, I neglected. Some of them are, yes.

The Hayes publication, at the top of the publications list, is a peer-reviewed bat fatality paper.

Hallingstad, the second one we've talked about, that's not about bats but it is about fatality.

Dalthorp and colleagues, the third one, is the GenEst statistical model that is related to estimating fatalities of birds and bats. Simonis and company is -- has the same subject matter.

In addition, there is what's known as an open-filed report that involves a fatality estimator for rare events. That is published with Dalthorp and other colleagues. That was a USGS publication. There may be another that I'm forgetting.

Q. Have you performed the fieldwork for any bat mortality searches?

A. No, I have not.

Q. Have you performed the fieldwork for any

bat mortality detection trials?

A. No, I have not.

Q. Did you listen to Dr. Smallwood's testimony in this case?

A. Yesterday, I did.

Q. When did you start to prepare your rebuttal testimony in this case?

MR. SECREST: Objection, relevance.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: I just want to see how thorough he was in his work.

MR. SECREST: Again, I don't see how that's relevant.

ALJ AGRANOFF: One moment. I'll allow the question.

A. My recollection isn't exact. I think that I was alerted that we may need rebuttal testimony about two weeks ago.

Q. Okay. And at that time did you start preparing for the testimony?

A. Yes.

Q. Okay.

A. Yes.

Q. Let's go to this testimony which has been marked as Applicant's Exhibit 89. We'll start on

page 3, Answer 6. Let's go to lines 19 and 20 where you state that you are a coauthor on the Generalized Estimator for Mortality, abbreviated as GenEst, correct?

A. That's right.

Q. Did you help to develop the GenEst estimator?

A. I did.

Q. And when was the GenEst estimator introduced publicly?

A. The publication date for the finished product is 2018. We were publicizing its development in advance of that.

Q. Which -- I see there appear to be two papers cited after the sentence I just read to you. Is one or both of those papers the paper in which you introduced the GenEst estimator to the public?

A. The paper with Simonis as a first author is the user manual for the software package that is used to implement the estimator. The paper further, with Dalthorp as the first author, describes some of the statistical models used by GenEst. Depending on your point of view, one or the other would be the important introductory paper.

Q. What is an estimator as you use that term

in your testimony?

A. I'm using that term to refer to a specific statistical model designed to estimate a specific quantity.

Q. A quantity of what?

A. In this case, fatalities of birds or bats.

Q. Your answer to Question 7, starting on page 3, identifies a number of other estimators, correct?

A. Yes, it does.

Q. Can you give me an approximate or, if you know it, an exact number of estimators that have been utilized to monitor for birds and bats at wind projects?

A. I cannot give you an exact number. I'm aware of at least three that are not listed in my answer to Question 7. I expect that there are many more.

Q. Okay. And how many are listed in your Answer 7?

A. I will have to review.

Q. Just take a moment to do that, please. It will make the record a little clearer.

A. Question 7 refers to four. Question 6

refers to a couple more.

Q. So your testimony refers to 6 in all?

A. I believe that's correct.

Q. Okay. And then you're aware of, did you say at least three more?

A. That's correct.

Q. Okay. And the results of the different estimators can be different even though utilizing the same data of mortalities; is that correct?

A. Yes, that's correct.

Q. Let's go to page 4 of your testimony which continues your answer to Question 7. And I would like you to look at lines 4, 5, and 6 where you refer to some information related to an estimator, correct?

A. That's correct.

Q. And which estimator is being referred to in lines 4 through 6?

A. I copied that estimator from Dr. Smallwood's testimony.

Q. Okay. And Dr. Smallwood's testimony refers to more than one estimator, correct?

A. Yes, it does.

Q. Okay. Which of the estimators referred to in Dr. Smallwood's testimony is being referenced

in lines 4 through 6 on page 4 of your testimony?

A. I don't recall if he gives that a name, but I think he refers to it as the same basic fatality estimator used everywhere or something to that effect.

Q. Are you familiar with a term that Dr. Smallwood uses in his testimony where he references one of the estimators as the simple method?

A. I don't recall his simple method.

Q. You are aware of the estimator that Dr. Smallwood refers to as the overall detection method, correct?

A. I am. I believe that's what he published in his 2018 integrated bias trials manuscript.

Q. Yes. And the -- the estimate that you are referring to on lines 4 to 6 on page 4 of your testimony is not the overall detection estimator, correct?

A. That's correct.

Q. The detection method that lines 4 through 6 on page 4 of your testimony refers to is a method that is no longer being used by Dr. Smallwood, correct?

MR. SECREST: Objection, speculation,

unless you know.

ALJ AGRANOFF: One moment, sir. If the witness is personally aware of whether or not this particular estimator is still being used by Dr. Smallwood, he can answer.

A. It depends a little bit on your temporal scale when you say "still."

Q. What do you mean by that?

A. His 2018 manuscript publication on the integrated bias trials made use of that estimator by way of comparison.

Q. Comparison to what?

A. To the integrated bias trials method. I believe that in his testimony he used that estimator for what he referred to as the on-site estimates for the Wolfe Island energy center.

Q. Okay. When you refer to the integrated, what was the term -- entire term you used, integrated something?

A. Integrated bias trials.

Q. Okay. So Dr. Smallwood used the -- used this method to compare its results to the results of the overall detection method?

A. In which document?

Q. In the document you just referred to.

A. In his 2018 publication, yes, he did.

Q. Okay. Do you have Dr. Smallwood's testimony in front of you?

A. Yes, I do.

Q. Okay. Would you go to page 26 of Dr. Smallwood's testimony.

A. I'm there.

Q. Okay. I would like to refer you to the text on page -- on lines 13 through 16, that full sentence there starting with the words "I prefer." And let me know when you have found that.

A. I see that.

ALJ AGRANOFF: Okay. Mr. Van Kley, if you could just wait for one moment.

MR. VAN KLEY: Yeah, sure.

ALJ AGRANOFF: Thank you. Okay. What was the reference to Dr. Smallwood's?

MR. VAN KLEY: It's page 26, and we are currently on lines 13 through 16.

ALJ AGRANOFF: Thank you.

Q. (By Mr. Van Kley) All right. In that sentence, you will see a reference to a capital D; is that correct?

A. That's correct.

Q. What's your understanding as to how that

capital D is being used here?

A. My understanding is that capital D is the detection probability for a carcass. In that sense it would be in the denominator of his equation on line 5.

ALJ AGRANOFF: Line 5 of which document?

THE WITNESS: Dr. Smallwood's direct testimony, page 26.

ALJ AGRANOFF: Okay. Thank you.

Q. (By Mr. Van Kley) Going back to your testimony on page 4, I'm looking at line 14. And there's a formula there, right?

A. That's right.

Q. An equation, okay. And is that the equation for the GenEst estimator?

A. Yes.

Q. Is there anything in this equation that adjusts for the body mass of the mortalities being found?

A. No, there's not. The presumption is that your estimate will be piecemeal into categories of -- of carcass sightings.

Q. What do you mean by that?

A. I mean we might use that equation for bats, and then all of the terms in that equation,

including k and p and S and v and a, would be estimated for bats. And then again for small birds and so on.

Q. Looking further down in your testimony on page 4 at lines 15 through 21, there are a number of adjustment factors there that apply to the GenEst estimator; is that correct?

A. That's correct.

Q. And what is the role of an adjustment -- an adjustment factor in this estimator?

A. The role of all of the adjustment factors in all of the statistical fatality estimators that I am aware of is to adjust raw carcass counts for biases that will enter those counts as a consequence of a collection of processes that occur after a carcass arrives at a facility.

Q. So, for example, one of the adjustment factors you list at lines 18 and 19 on page 4 of your testimony is searcher proficiency, correct?

A. That's right.

Q. And can you explain what searcher proficiency is.

A. Searcher proficiency refers to the probability that a searcher will detect a carcass that is in the search area and available to be

detected at the time of the search.

Q. So with respect to the categories of bats or birds that are being searched for and analyzed with the GenEst estimator, are all species of bats included in the same grouping for purposes of applying these adjustment factors?

A. That's a typical approach that is not necessarily the case. If one had enough carcasses of a particular species, you could make it a species-specific adjustment factor.

Q. So if you -- if you didn't make it species specific, then the GenEst estimator will treat all -- treat the bats of all sizes in the same way; is that correct?

A. That's correct.

Q. In the -- in your testimony you've discussed and you also attached an analysis you did utilizing the GenEst estimator for Wolfe Island bat fatalities, correct?

A. That's right.

Q. Uh-huh. When you did that work, did you break down the bat species or did you breakdown the group of bats by species or did you include them all in this same grouping?

A. No, sir. They were all in one grouping.

Q. Generally speaking, larger bats are easier to find than smaller bats; is that correct?

A. I have never searched for bats, but I would guess that it is.

Q. Looking back at lines -- or line 20 on page 4 of your testimony, you refer to the time of carcass arrival.

A. That's right.

Q. Okay. Is that another way of saying that the -- the body of the animal -- the body of the bat or the bird is -- is evaluated for to determine approximately how long it's been dead?

A. No.

Q. What does it mean then?

A. The GenEst estimator begins from an assumption that there will be a clearing search before the study begins. Suppose that's on the first day of the new year. And your searchers will go out and search periodically. Suppose that's every week. And let's suppose that they find a carcass at the end of January. What the time of arrival in this equation does is to acknowledge that we don't know when that carcass appeared at the wind farm. We know that we found it at the end of January four weeks after we began searching. And it may have arrived

immediately in the search interval prior to that search, or it may have been missed once and arrived a week and a half earlier, or twice and arrived two and a half weeks earlier and so forth. And depending on when it arrived, the detection probability is different because a carcass that sits in the field for 20 days has a larger chance to be removed by a scavenger, and it becomes more difficult to detect also.

So the "t" in that equation is an acknowledgment that carcasses have different detection probabilities depending on their arrival time, and since we don't know when that carcass arrived and we don't attempt to estimate when that carcass arrived, we need to evaluate its detection probability over any of the potential arrival periods. And that is what we are doing with "t" and, frankly, that is what makes the equation on line 14 difficult.

ALJ AGRANOFF: When you say "arrival time," arrival time to where?

THE WITNESS: It would be the time that the carcass was freshly dead and deposited. Arrival to the search area.

ALJ AGRANOFF: Okay. Thank you.

Q. (By Mr. Van Kley) Now, does the employment of this adjustment factor for the time of carcass arrival depend on the performance of what's known as a clearing search?

A. To the extent that it does, if the clearing search was poor, it would bias your estimate upwards.

Q. It will bias your estimate of what upwards?

A. Fatality.

Q. But if -- if you're using a GenEst estimator to do a -- an efficiency trial, then it will also bias the results of your efficiency trial higher than it should have been, right?

A. No. I can't make sense of your question.

Q. Okay. Well, I will try to make some more sense of it then. Can you tell me whether there are mortality searches that are conducted for the purpose of determining what the efficiency of the detections are for mortality searches?

A. Yes, there are.

Q. Okay.

A. In fact, that -- those trials happen as a part of the standard mortality searches.

Q. Yeah. And in the process of doing such

an exercise, a clearing search is conducted first in order to find carcasses that are already there prior to this exercise, correct?

A. That's correct.

Q. Okay. And if a carcass is not found during the land clearing search but it is found during the search aimed at determining searcher efficiency, then it will upwardly bias the efficiency found by that exercise, correct?

A. No.

Q. No? Why is that not correct?

A. Carcasses that arrive as part of the fatality process that we're interested in at a wind farm, that is animals that are unfortunate to collide with a turbine and then be killed, are not used to estimate the searcher efficiency because we don't know how many there were.

Carcasses that are used to estimate the searcher efficiency are placed at a known time and location by a trial administrator, and when the searcher then goes out and either finds or does not find that carcass, we know exactly how many were available and we know exactly how many were found and we can estimate the searcher efficiency directly and we don't need to deal with the fact that we don't

know an arrival time because, in fact, we put it there at a specific time and we record that time.

Q. Yeah. And I -- I think you misunderstood the question, but your answer was helpful. So let me follow up with a question I intended to ask which is, when you are doing a trial like this, if the searchers discover a carcass that had been there prior to the purposeful placement of the carcasses for the study, that is if the land -- if the clearing search missed a carcass, it was still there, and then it was found during the trial, that would make the efficiency look higher than it really was.

A. No. Our bias trial carcasses are typically marked with a small piece of black electrical tape around an ankle so that when we find a carcass and it's not a bias trial or it's not marked as a bias trial, its detection does not influence the searcher efficiency estimates.

Q. Do you know that that marking practice is done in -- has been done in all of the trials that have been performed for purposes of evaluating searcher efficiency?

MR. SECREST: Objection. All the trials ever performed?

Q. Yeah. In other words, I am asking are

you aware of any trials that have ever been performed for searcher efficiency that have not utilized this marking technique.

ALJ AGRANOFF: I'll allow the question.

A. I have certainly not reviewed all of the bias trials that have occurred. I've never seen a bias trial described where the researchers did not have some means of determining whether a found carcass was a trial carcass, not always with electrical tape, but I've never seen a trial described that didn't have that.

Q. Okay. How many trials have you studied?

A. I have not kept track. I would be surprised if it was fewer than 200.

Q. Okay. Let's go to page 5 of your testimony.

A. Yes.

Q. And we are going to start around line 22 where you talk about Dr. Smallwood's estimator as described in the paper identified as Smallwood et al. 2018. Do you see that?

A. Yes, sir.

Q. All right. I think now would be a good time to introduce a new exhibit. Would you find what has been marked for identification in the documents I

sent out last night as BSBO Exhibit 7 in your file.

A. I'm there.

Q. Okay. We will just give everybody else a chance to find it.

MR. VAN KLEY: Everybody have it? Okay. Your Honor, I would like to have this document marked as BSBO Exhibit 7. And for the record it is entitled "Estimating Wind Turbine Fatalities Using Integrated Detection Trials."

ALJ AGRANOFF: It shall be so marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

MR. VAN KLEY: All right.

Q. (By Mr. Van Kley) Dr. Rabie, do you recognize this document?

A. I do.

Q. Okay. This is -- this is a copy of the paper that is identified on line 23, page 5 of your testimony as Smallwood et al. 2018?

A. Yes, it is.

Q. And is this the paper in which Dr. Smallwood and others publicly introduced the overall detection estimator?

A. I think that the public introduction was some years previous to this, but this is the first peer-reviewed mention of it that I am aware.

Q. Okay. I'm just looking at the Abstract on the first page of that document. If you go to the fourth line, that sentence reads "We introduce a new approach for estimating fatalities by quantifying overall detection rates rather than separate rates for searcher detection error and carcass persistence." Do you see that?

A. I do.

Q. Okay. That's where I got the idea that this was the paper in which it was introduced. But what do you think?

MR. SECREST: Asked and answered.

Q. What do you think in light of this paper now that you've seen that sentence? Does it change your mind about when it was introduced, whether it was introduced in this paper or not?

A. No, I don't.

Q. Okay.

A. I think that that's common language to use when we're working again in the format of a peer-reviewed journal.

Q. Okay.

A. This is the first introduction to this sort of verified scientific community but I think that the estimator and the method he produced was

actually put in front of the public some years earlier.

Q. Okay. Fair enough. So I take it from your remarks then that the BSBO Exhibit 7 is a peer-reviewed paper?

A. Yes, sir.

Q. Now, if you continue to look downward in the Abstract on page 1 of BSBO Exhibit 7, look at the sixth and seventh line -- the seventh and eighth line, I'm sorry. Do you see where the paper states that fatality searches were conducted at the Sand Hill and Santa Clara wind projects?

A. Yes, I do.

Q. Is the Santa Clara wind project another name for Vasco wind project?

A. I don't know.

Q. Now, on lines 22 through 25 on page 5 of your testimony, you state that, first of all, that Dr. Smallwood performed three years -- or performed monitoring of carcasses over a period of three years, correct?

A. Yes, I do.

Q. Okay. And this work was performed for three years at the Sand Hill wind project, correct?

A. I don't know.

Q. All right. Well, going back to BSBO Exhibit 7, can you tell me the answer to that question?

A. Dr. Smallwood makes reference to Sand Hill and to Santa Clara in that document and he makes reference to three years of searches in that document and I did not read his methods closely enough to say, you know, whether three years occurred at both projects or whether there was a combination of projects used among those three years.

Q. Well, in lines 25 to 27 on page 5 of your testimony, you state that "During the third year, however, Dr. Smallwood demonstrated a 25 percent error in his own validation estimates and attributed the validation failure to a drought and a 'desperate scavenger community.'" Do you see that?

A. Yes, I do.

Q. Okay. Can you tell me whether this 25 percent error occurred only at the Sand Hill location or only at the Santa Clara location or at both?

A. One moment, please. I don't think that his paper has enough information to answer that question.

Q. Would you go to another paper that I sent

around by e-mail last night which has been preliminarily marked so you can find it as BSBO Exhibit 10.

A. I'm there.

Q. Okay. We will just give everybody a chance to find it including me.

MR. VAN KLEY: All right. Does everybody have that now? Okay. I see shaking heads up and down.

Have you seen -- let me first mark this document as BSBO Exhibit 10 which is entitled "Final Report, 2012 to 2015, Avian and Bat Monitoring Project, Vasco Winds, LLC." Could I have that marked as BSBO Exhibit 10, please.

ALJ AGRANOFF: It shall be so marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

Q. (By Mr. Van Kley) All right. Dr. Rabie, this is a paper prepared by, among other people, Dr. Smallwood, correct?

A. It looks like it.

Q. Okay. Have you seen this paper before today?

A. I believe I have. It's been some time.

Q. All right. And in this paper you will find the results of fatality monitoring from the

Altamont Pass, correct?

A. Yes.

Q. And this monitoring was performed at what's been noted to be Vasco Winds, LLC's facility?

A. That's correct.

Q. And this is -- this report contains the data that Dr. Smallwood collected from the Santa Clara location that we've been talking about, correct?

A. I don't recall if -- the title says Vasco, the footer says Vasco. I won't say that it doesn't contain Santa Clara data, but I don't recall.

Q. Is there nothing in this report that would give you the answer to that question?

MR. SECREST: Objection. It's a rather lengthy report. Perhaps Counsel can direct the witness to a portion.

MR. VAN KLEY: Well, I wouldn't ask him to go through the entire report obviously. I was just wondering if he knew, by glancing, where he could find that information.

A. If I was tasked with it and it is on my computer, I would simply search for "Santa Clara" and see if it popped.

Q. Okay. Would you mind doing that?

A. Neither "Santa" nor "Clara" appear in this document according to my software.

Q. All right. I appreciate your looking. All right. We may come back to this paper later. Just put it aside for the sake of efficiency right now.

Do you know whether Dr. Smallwood has performed a study, other than the one that is documented in BSBO Exhibit 7, for the purpose of evaluating the efficiency of mortality searches?

A. I don't. I'm not sure what you mean exactly by "the efficiency of mortality searches" in this case though.

Q. Okay. Well, maybe I should clarify then. How would you characterize the objective of Dr. Smallwood's detection trials that are described in BSBO Exhibit 7?

A. Those are designed to estimate the overall detection probability.

Q. All right. So using that terminology then, are you aware of any other studies that Dr. Smallwood has performed, other than the one documented in BSBO Exhibit 7, for the purpose of determining overall detection probability?

A. I think that Exhibit 10 uses that same

methodology and I think --

ALJ AGRANOFF: Which part of Exhibit 10?

THE WITNESS: Page 15, the first full paragraph.

ALJ AGRANOFF: Are you referencing BSBO Exhibit 10?

THE WITNESS: Yes, sir.

ALJ AGRANOFF: Okay. Thank you.

MR. SECREST: Doctor, are you referencing the actual page labeled as 15 or PDF No. 15?

THE WITNESS: Thank you for clarifying. It's the actual page labeled 15. It is PDF page 31.

MR. SECREST: Thank you.

Q. (By Mr. Van Kley) All right. And the -- the study that was conducted and documented and then documented in BSBO Exhibit 10, according to page 15, was a trial that occurred over a period of three years; is that correct?

A. I don't think so. I think that this was the inaugural run of this method for Dr. Smallwood and I think that he didn't use that same method in all three years. I think it might have been just the third year when he did that at the Vasco facility in Exhibit 10, but I would have to confirm that.

Q. When you state that you think he used the

same method during that third year, are you talking about the overall detection estimator?

A. That's right. I think that in the third year he introduced the overall detection method.

Q. Just looking at the bottom of page 15 there, it states that placements of trial carcasses were initiated on June 18, 2012, and discontinued after April 7, 2015 and May 5, 2015, respectively, for birds and bats, right?

A. That's right.

Q. So that would have been the time period during -- during which the fieldwork was being done for the purpose of this study, right?

A. That's right.

Q. Okay. If you look at the first full paragraph on page 15, you'll see that it states that the overall detection rate, D, was used?

A. Yes.

Q. And that's the same capital D that we discussed earlier in your testimony, correct?

A. That's correct.

Q. And that -- that use of D is what Dr. Smallwood uses in his overall detection estimator, correct?

A. Yes, sir.

Q. And are you aware of whether the results that Dr. Smallwood obtained from his study that's documented in BSBO Exhibit 10, produced validation results that were good as expressed in -- in the same way as expressed on page 5, line 23 of your testimony?

A. I don't recall if there was a proper validation study associated with BSBO Exhibit 10.

Q. Let's go to page 6 of your testimony. And I would like to go to the sentence that starts on line 1 which reads as follows: "But his test of dog searchers versus human searchers (Smallwood et al. 2020) showed that variation in the searcher proficiency of dogs versus humans resulted in 270 percent to 670 percent variation in estimated fatality rates."

I think this is a good time to introduce another exhibit. If you find the exhibit that was circulated by e-mail last night that is -- that was labeled in the e-mail as Exhibit 9.

MR. VAN KLEY: Your Honor, this document is entitled "Dogs Detect Larger Wind Energy Effects on Bats and Birds," and I would like to have this marked as BSBO Exhibit 9.

ALJ AGRANOFF: It shall be so marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

Q. (By Mr. Van Kley) All right. Dr. Rabie, do you recognize BSBO Exhibit 9?

A. I do.

Q. And is this a copy of the paper you referred to as Smallwood et al. 2020 on line 2 of page 6 of your testimony?

A. Yes, it is.

Q. All right. I just think for the sake of continuity we are going to put this aside for a moment and come back to it later where it's referred to by you later in your testimony. Just put Exhibit 9 aside for the moment.

Let's go to Answer 8 on page 6 of your testimony.

A. All right.

Q. And we're looking at the sentence that starts at line 18 which reads as follows: "Without getting into technical details, survival analysis estimates a time-to-removal function from which it is possible to calculate the average persistence probability for a carcass based on its search interval." Do you see that?

A. I do.

Q. Is the result of this analysis produced

as a mean?

A. No. It's possible to extract a mean from the removal function, the time-to-removal function, but we're usually not interested in it with respect to the estimation of total fatality. We usually report either the mean or the median removal time because people are interested, but that is really incidental to the estimation of fatality.

Q. Let's go to page 7 of your testimony. Question 9 on page 7 refers to a paper as "Smallwood (2020)" entitled "USA Wind Energy-Caused Bat Fatalities Increase with Shorter Fatality Search Intervals," correct?

A. That's right.

Q. Okay. Let's pull out another exhibit from last night's e-mail which has been labeled Exhibit 8.

MR. VAN KLEY: Your Honor, I would like to have this marked as BSBO Exhibit 8.

ALJ AGRANOFF: It shall be so marked.

(EXHIBIT MARKED FOR IDENTIFICATION.)

Q. (By Mr. Van Kley) All right. Dr. Rabie, is BSBO Exhibit 8 a copy of the paper that is referenced in Question 9 on page 7 of your testimony?

A. Yes, it is.

Q. Is this a peer-reviewed paper?

A. I believe so.

Q. Now, in lines 9 through 13 of your answer to Question 9 on page 7 of your testimony, you state that in this publication "Dr. Smallwood re-estimates fatality rates from a variety of PCM studies and finds that estimated fatality rates are inversely related to the search interval." Do you see that?

A. I do.

Q. And then the next sentence says "In other words, studies with very short search intervals had much higher fatality rates than studies with longer search intervals." Do you see that?

A. Yes.

Q. Okay. Now, does -- and your reference here to the 2020 publication, you're talking about BSBO Exhibit 8, correct?

A. Yes.

Q. Okay. And what's the meaning of the acronym PCM as referred to in your answer to Question 9?

A. PCM refers to post-construction monitoring.

Q. Okay. Now, there was nothing in BSBO Exhibit 8 stating that the fact that studies with

very short search intervals had higher fatality rates than studies with longer search intervals applied to Dr. Smallwood's overall detection estimator, correct?

A. I'm sorry. I don't understand.

Q. Yeah. Is there anything in Exhibit 8, BSBO Exhibit 8, that indicates that the principle you enunciate on lines 10 through 13 of page 7 of your testimony affects the accuracy of the overall detection estimator?

A. I'm still not sure I understand your question. The title of Exhibit 8 suggests that fatalities increase with shorter search intervals.

Q. Uh-huh. Yeah, true enough. But does -- are there any studies from -- any studies identified in BSBO Exhibit 8 that were analyzed through the use of the overall detection estimator?

MR. SECREST: Objection, vague.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: I think it's pretty clear. The title refers to -- or the paper refers to studies that were evaluated in order to come up with the conclusion of the paper that's in its title, and my question is whether any of those studies that led to this conclusion had been analyzed with the overall detection estimator.

ALJ AGRANOFF: Mr. Secrest.

MR. SECREST: That question is clear for me but I suppose I'll leave it to Dr. Rabie.

ALJ AGRANOFF: If the witness understands the question, he's certainly free to answer.

A. I don't know about the original studies that Dr. Smallwood drew on for this publication, but I think his results are all based on the equation he gives on page 3 which is not the overall detection rate equation.

Q. Was -- is your testimony on lines 9 through 13 on page 7 of your testimony meant to be a criticism of the results of Dr. Smallwood's overall detection probability study at Altamont Pass?

A. No.

Q. Okay. I should have asked that question first. It would have saved us all a lot of time.

A. If I may add?

Q. Yeah. Go ahead.

A. Dr. Smallwood uses a similar approach as in BSBO 8 in his testimony. He takes multiple approaches to the Wolfe Island estimates, and one of them is -- is similar to this where he adjusts the bias trial estimates to -- to reanalyze the Wolfe Island PCM data.

Q. Uh-huh.
A. And it was meant as a criticism of that.
Q. But it wasn't meant to say that very short search intervals affected the validity of Dr. Smallwood's overall detection probability study at Altamont Pass, correct?
A. I don't think we know anything about the effect of the search intervals on his study at Altamont Pass.
Q. Okay. Good enough. Let's go to page 8 of your testimony.
ALJ AGRANOFF: Mr. Van Kley, just as a point of reference, approximately how much cross do you think you will have left?
MR. VAN KLEY: Maybe an hour.
ALJ AGRANOFF: Do you know --
MR. VAN KLEY: Good time for a break?
ALJ AGRANOFF: If you have got about an hour, this would be a good time for a break.
MR. VAN KLEY: Yeah. Let's take a break then.
ALJ AGRANOFF: That way those of us who need to put money in the meter might be able to do that as well.
MR. VAN KLEY: Okay. All right.

ALJ AGRANOFF: Okay. Let's take a 15-minute break and come back at 4:45.

(Recess taken.)

ALJ AGRANOFF: Okay. Let's go back on the record. And Mr. Van Kley.

MR. VAN KLEY: All right.

Q. (By Mr. Van Kley) All right. Dr. Rabie, I think we are on page 8 of your testimony.

A. Okay.

Q. Let's go to line 5 and 6. And you state there that Dr. Smallwood's estimate of bat mortality was not produced using statistical methods that are recommended by the USGS and the BWEC. Do you see that?

A. I do.

Q. USGS is U.S. Geological Survey, correct?

A. That's right.

Q. And what does BWEC stand for?

A. I may get this a little wrong, but it's Bats and Wind Energy Cooperative.

Q. Well, it's early in your testimony. We know that. We can confirm that. So my question here is, are there valid estimators that -- let me start over.

Does the fact that the USGS or the BWEC

has not recommended a estimator necessarily mean that it's an invalid estimator?

A. No, it does not.

Q. Okay. Let's go to lines 8 through 13 on page 8 of your testimony. The first sentence in that passage states as follows: "Dr. Smallwood's estimates of bat mortality were produced by applying corrections for searcher efficiency and carcass persistence that were measured in Altamont Pass, which is a wind-energy project located in hilly grasslands in California." Do you see that?

A. I do.

Q. When you refer to Dr. Smallwood's estimates of bat mortality, are you referring to something in his testimony in this case?

A. I am. I'm referring to his overall estimate.

Q. His overall estimate of what?

A. It is the overall estimate of bat fatality in table -- give me a moment, please. Table 2, overall detection rate, and that is his integrated detection trials --

Q. All right.

A. -- method.

Q. So you are on page 36 of the BSBO

Exhibit 2?

A. Yes, I am.

Q. Can you point where -- could you point to where in Dr. Smallwood's estimates -- I'm sorry. Entirely messed that up. Start over.

Can you point out where in Dr. Smallwood's testimony he applied corrections for searcher efficiency and carcass persistence that were measured in Altamont Pass?

A. I was speaking loosely in my testimony when I said searcher efficiency and carcass persistence. Returning to page 26 of Dr. Smallwood's testimony on line 5, he gives the estimating equation, F over delta. And on line 8, he refers to searcher efficiency and carcass persistence probabilities as I think they are S and r, as he has them there. And those come together to produce an estimate of delta. And on line 13, he says "I prefer to measure delta as capital D."

So lower case delta, capital D, searcher efficiency and carcass persistence together are three ways of getting at the same concept. In that sense, his work in Table 2 was derived from carcass persistence and searcher efficiency in integrated detection trial.

Q. You just pointed out on line 5 of page 26 of BSBO Exhibit 2 is the formula that Dr. Smallwood says was used by Wolfe Island, right?

A. No.

Q. No?

A. Wolfe Island uses something closer to the formula on lines 7 and 8.

Q. Okay. Does Dr. Smallwood use the formula on line 5 in order to perform his overall detection probability study at Altamont Pass?

A. Yes, he does. I would like -- I would like to clarify that the formula on line 5 is the same formula used by everybody, and how we differ is in how we estimate the lower case delta. That's true of every fatality estimator that actually tries to adjust for bias.

Q. All right. So I am still struggling with your statement in line 8 and 9 on page 8 of your testimony that Dr. Smallwood's estimates of bat mortality were produced by applying corrections for searcher efficiency and carcass persistence measured at Altamont Pass because I am not seeing that on page 26 of the BSBO Exhibit 2. So can you point out to me where it states that Dr. Smallwood applied corrections to the searcher efficiency and carcass

persistence?

A. Yes. On line 16 of that same page 26, there is a sentence that reads: "Trial outcomes informing D," detection, "are simply whether the trial carcasses were found or not, and it does not matter to the fatality adjustment whether trial carcasses were missed due to searcher detection error," which I have been referring to as searcher efficiency, "or scavenger removal." So although it doesn't say so explicitly, there's an implicit acknowledgment there that D captures searcher efficiency and carcass persistence.

Q. Let's go back to page 8 of your testimony on line 15 where you state "In some cases Dr. Smallwood does not present confidence intervals," et cetera. Could you tell me what cases you are referring to there on line 15?

A. It will take me a moment, but I can. On page 39, Dr. Smallwood --

ALJ AGRANOFF: Of which document?

THE WITNESS: I'm sorry. Page 39 of Dr. Smallwood's direct testimony.

ALJ AGRANOFF: Thank you.

A. Line 9 has 37.3 bat fatalities per megawatt per year, 12 has 35, 13 has 41, 14 has 50.

Now, those are all numbers without confidence intervals and sometimes you do that in shorthand but -- but when you start taking the ratios of those confidence intervals as he does on line 15, 2.33 times higher, well, it matters a lot whether the 2.33 includes 1 with a confidence interval. Because if it includes 1, then there is no difference. And if it includes numbers less than 1, then, in fact, the difference may be lower.

Q. Let's go to page 8 again on your testimony, line 25 through line 27, where you state that "Dr. Smallwood's 'Overall' estimator failed to produce fatality estimates within 75 percent of a known benchmark data set used for model validation (Smallwood et al. 2018) in one out of the three years for which it was tested." Do you see that?

A. I do.

Q. So here again, you're referring to that one year at Sand Hill in Altamont Pass that Dr. Smallwood said occurred during a drought, correct?

MR. SECREST: Objection to the extent it mischaracterizes prior testimony. I don't think Dr. Rabie identified which particular wind project. There were two of them, as I recall, that were the

subject of that study.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: I'll rephrase. Otherwise it was so beautifully worded too, I don't know if I can reproduce it.

Q. (By Mr. Van Kley) All right. So the -- the subject matter of lines 25 through 27 on page 8 of your testimony is referring back to that one year of data in Dr. Smallwood's Altamont Pass study in which Dr. Smallwood stated a drought occurred, correct?

A. That's right.

Q. Let's go to page 9 of your testimony. Line 3 refers to Dr. Smallwood's method of area correction. Do you see that?

A. I do.

Q. Okay. And Dr. Met -- Dr. Smallwood's method of area correction uses actual field data, correct?

A. Yes.

Q. And then you state in lines 3 and 4 that "Dr. Smallwood's method of area correction has never to our knowledge been tested against a known benchmarking data set." Do you see that?

A. Yes.

Q. And then in the next sentence you state "This is in contrast to the TWL area correction estimator, which has been tested under a variety of hypothetical field conditions." Do you see that?

A. Yes.

Q. What's the TWL area correction estimator?

A. Truncated weighted maximum likelihood.

Q. And what does that all mean? Just give me a general overview of what the -- that estimator does.

A. That estimator fits a density function, the curve, to the relative density of carcasses as a function of distance from the turbine base. And it does so in a way that accounts for known biases in the detection probability. In other words, as you move further from the turbine, if you are searching less area and your detection probability is therefore falling, the TWL estimator will account for that detection probability to avoid a bias in the resulting carcass -- relative carcass density estimates.

Q. And the -- the sentence that starts with the words "This is in contrast to," on line 4 through 6 of your testimony on page 9, would be used in conjunction with hypothetical field conditions,

right?

A. I'm sorry. I don't -- I don't fully understand what you're asking.

Q. Okay. Well, you're stating there in this sentence that the TWL area correction estimator has been tested under a variety of hypothetical field conditions, right?

A. That's right.

Q. And it hasn't been tested using actual field data?

A. If I may, I don't know of any way to test a -- an area correction method against actual field data in a way that produces convincing results. And the reason is we never know the true carcass density distribution. Dr. Smallwood used dogs. And I think that dogs are very good at finding carcasses and perhaps those dogs did a better job than humans, I am sure they did, but we -- we don't know what their detection bias is and we don't know what their detection bias is as they traverse those hilly landscapes in southern California. So I don't think that you can really validate a -- an area correction method against the field data which is why we prefer to simulate it.

Now, the TWL method has been certainly

used on a number of field data sets and it's always the case with an estimate that we look at it and ask is this plausible? Does this make sense? But with field data you really don't know the truth which is why we estimate it.

When we test these under hypothetical conditions, we -- we can, in our computers, generate data where we actually know the exact answer and then we simulate the processes that introduce biases into our counts and we can ask, well, is our estimator able to recover the truth in a way that you just can't do with field data.

Q. Didn't Dr. Smallwood's dogs find 100 percent of the carcasses in the study you mentioned?

A. I wouldn't be surprised if they did. I don't recall that number. To a statistician, that's -- that's not a -- that's based on a sample. I think that any reasonable person would intuit that no dog is going to be 100 percent effective, although in the trial, however many carcasses Dr. Smallwood used, that was the outcome for that trial. But that 100 percent has some uncertainty around it.

Q. Well, if the carcasses are marked, doesn't the -- doesn't the person administering the

study know how many carcasses are used in the study?

A. They do. And that's a reasonable way to validate the searcher efficiency and carcass persistence portions of your estimate. But the person administering the study doesn't know how to distribute those carcasses such that they mimic the actual spatial fall patterns of the carcass. So area correction is perhaps one of the more difficult aspects of fatality estimation.

Q. Yeah. Well, going back to my question about whether the dogs found 100 percent of the trial carcasses in that particular study, you're not contesting that, are you?

A. No.

Q. Okay. Go back to page 8 of your testimony, please, lines 25 through 27, where you say -- state that "The overall estimator failed to produce fatality estimates within 75 percent of a known benchmark data." Is -- does this statement include any consideration of confidence intervals?

A. No.

Q. All right. Then let's go back to page 9 of your testimony, lines 8 through 12. And here you are discussing the -- Dr. Smallwood's study at Altamont Pass, correct?

A. Yes.

Q. And in the last sentence you state "Wind regimes, the characteristic flight heights of the species at a facility, and the topography of the land below the turbines can all be expected to affect the fall distribution of carcasses around wind turbines." Do you see that?

A. I do.

Q. Can you tell me how wind regimes can be expected to affect the fall distribution of carcasses?

A. Yeah. When a carcass collides -- or when a bat, a live bat, collides with the turbine and ceases to be alive, it goes limp and at that time it becomes subject to the wind forces on its body; and if that happens under high winds, a bat can be expected to be pushed rather further from the turbine than if it happens under low winds.

Q. Does that affect the efficiency -- the searcher efficiency for the bats?

A. Not in and of itself.

Q. Why not?

A. Well, the forces on a bat as it's falling don't really have anything to do with the person's ability to detect that bat once it has fallen.

Q. Okay. So why do you mention it in this sentence with respect to Dr. Smallwood's study in Altamont Pass?

A. He could have easily applied the area correction that he developed in that study to his reanalysis of the Wolfe Island data for his -- I keep calling it the wrong thing but it's the right-hand side of that Table 2 in his direct testimony.

Q. How do flight heights of a species at a facility affect the searcher efficiency, if indeed they do?

A. I wouldn't expect that they would. We certainly don't know, but I would doubt that they would, and I can't imagine how they would.

Q. Okay. And does the topography of the land below the turbines affect searcher efficiency?

A. I don't know that it's been studied explicitly, but I would be surprised if the ruggedness of the land does not affect searcher efficiency.

Q. Is there anything about the topography of the Altamont Pass area, that was the subject of Dr. Smallwood's study at Altamont Pass, that would make carcasses harder to find?

A. With the caveat that I'm speculating, I

think the answer is yes. If you look at his BSBO Exhibit 10, there are some nice, shaded relief contour maps. One of them is on PDF document page 22. And as you can imagine, a searcher trying to traverse a search area with -- and I don't know what the search area was but suppose it had a 100-meter radius with turbines being located on ridge lines and the search area falling steeply off to mountainous or hilly landscape, those searchers are going to need to have some portion of their attention focused on where their feet are falling and maintaining balance and I would expect that to negatively impact searcher efficiency.

Q. Yeah. Well, we haven't established that the study document in BSBO Exhibit 10 was part of the Altamont Pass study that was documented in BSBO Exhibit 7, have we?

A. My geography is generally poor, but my understanding is that all of the studies we have been talking about that Dr. Smallwood has produced, that are referenced here, occur in landscapes that are mountainous or at least hilly.

Q. Can you tell me whether there is topography at Sand Hill where Dr. Smallwood, in part, performed his Altamont Pass study that would affect

searcher efficiency?

A. I'm not intimately familiar with that landscape. No, I can't.

Q. Okay. What about the same question with respect to the Santa Clara portion of that study?

A. Santa Clara's steeper terrain ranged from 252 to 356 meters. They said there that the terrain there is steeper. I am in Exhibit 7 on PDF page 4.

ALJ AGRANOFF: When you said Exhibit 7, BSBO Exhibit 7?

THE WITNESS: Yes, sir. BSBO Exhibit 7. I am talking about the left column.

Q. And do you think those characteristics would make it harder to find carcasses?

A. I do.

Q. Would the fact that dogs were used make it easier to find those carcasses?

MR. SECREST: Objection. Assumes facts not in evidence that dogs were used for those prior studies.

MR. VAN KLEY: I think it's in the report but he can tell us, I suppose.

ALJ AGRANOFF: Mr. Van Kley, if you could direct the witness to where he might find that information.

MR. VAN KLEY: It might be easier to ask the witness if he knows whether it's in there because he might be able to find it quicker than me. So could we start there and if he doesn't know, then I will try to find it.

ALJ AGRANOFF: Certainly.

A. I don't know that but I can still do searches.

Q. All right.

A. The word "dog" does not appear in BSBO Exhibit 7.

Q. Okay. Let's go to page 11 of your testimony marked as Exhibit 89 for the Applicant. Looking at lines 3 through 5, you state that "under certain conditions, this adjustment could yield a detection probability in excess of 1.0." Do you see that?

A. That's right.

Q. Have any of the results of your use of the GenEst estimator ever yielded a detection probability in excess of 1.0?

A. I don't believe it's possible for GenEst to yield a detection probability in excess of 1.0, either at the point estimate or at an upper bound. So the short answer is no.

Q. Okay.

A. It's not.

Q. Let's go to page 13 of your testimony. And we'll go to the sentence starting at line 13 which reads as follows: "Variable searcher proficiency and carcass persistence estimates suggest a high probability for inaccuracy in the fatality estimates produced using Dr. Smallwood's single detection probability model from California." Do you see that?

A. I do.

Q. Is the single detection probability model from California that you reference in this sentence the same estimator that we've been referring to as the overall detection estimator? Or is it a different one?

A. It is the same estimator but it's also the same estimator parameterized with those same inputs that he -- he used with that one.

Q. I'm sorry. I didn't understand that answer.

A. The estimator is a statistical model. And he used it with a single instance which is to say he's got one detection probability that was derived from studies at Vasco, according to page 35 of

Smallwood's direct testimony.

Q. Okay. Let's go to lines 16 through 18 on page 13 of your testimony where it states "I also note that we used an adjustment for unsearched area beyond 50 meters that was based on a PCM study in the upper Midwestern US where dogs were used for carcass searches, so the detection probability was relatively high." Do you see that?

A. That's right.

Q. And you're referring here to a study that you utilized in order to come up with an estimate of the mortalities at Wolfe Island, correct?

A. It was one component of our adjustment, our fatality estimator. It was the area correction and that answer is yes.

Q. And can you tell me what state that project was located in that's referred to here in line 16 through 18?

A. I'm going to confirm that in Attachment 3 to my testimony. I believe it was Indiana. Yes, Indiana.

Q. And what was the name of that facility?

A. Headwaters.

Q. Where was it located?

A. Beyond telling you Indiana, I may

struggle with that. Let me see if we have that information. I do not know the county name.

Q. What part of the state was it in?

A. I can't tell you that either.

MR. SECREST: Perhaps I can direct the witness to page 11 of the report, second entry.

THE WITNESS: Are we talking about Attachment 3?

MR. SECREST: Correct.

A. Randolph County, Indiana.

Q. Okay. That sounds like southern Indiana, doesn't it?

A. I don't know.

Q. What is the terrain like in that project area?

A. It's supposedly flat and it's agricultural with -- I think all of our search areas are in -- in agricultural fields or just on roads and pads, so flat and relatively homogeneous.

I'll take that back. I can confirm that we don't search, at least not with humans, we don't search in vegetation. If there is vegetation, we're using dog searches. And at that one, as our memo in my testimony states, there were dog searches. So they may have been dogs in soy, but it's flat and

it's tilled.

Q. Was there woodland in the project area for that project?

A. I believe that there is. I would have to confirm.

Q. If you look at page 3 of PR-3, you'll see that there's a paragraph under the heading "Search Area Adjustment Estimate."

A. Yes, sir.

Q. Then it refers here to unsearched areas due to survey obstacles such as ground cover, for example tall crops, or terrain, or areas where the carcasses fell outside the search area. Do you see that?

A. Yes.

Q. Does that mean that in this particular project area in Indiana that -- that at least some of the turbines were in fields with tall crops?

A. No. I stand guilty of recycling generic language to describe why we do area corrections and why areas may be unsearchable. When areas are unsearchable in cropland, sometimes it's because of standing water and sometimes there's a hedgerow that we opt not to search. But that -- that particular sentence is not a description of a search area at

Headwaters.

Q. Uh-huh. So with regard to the study done at this location in Indiana, was any of the study done in search of carcasses that were in fields with crops in them?

A. I believe that when we use dogs, we are willing to search in soy, but I can't confirm that definitely with this one.

Q. By "soy," you mean soybeans?

A. I do.

Q. Uh-huh. But you don't know whether there were soybeans in the field or -- that -- or fields with respect to the search areas in the Indiana study?

A. I don't.

Q. Uh-huh. Do you know whether corn may have been present in the survey areas?

A. I would be surprised if it wasn't. I don't know.

Q. What time of the year were the searches done in that Indiana survey?

A. Our searches in that part of the country typically start in early to mid May and they typically go through September or mid August. And sometimes when there's no risk to a covered species,

an ESA-listed species, we don't search during the summer months.

Q. Do you know how tall the corn is in Indiana typically during September?

A. I don't.

ALJ AGRANOFF: Dr. Rabie, you mentioned the acronym ESA.

THE WITNESS: Endangered Species Act.

Q. (By Mr. Van Kley) Let's go to page 14 of your testimony. And -- all right. I am looking at Table 3.

A. All right.

Q. Table 3 has the results of your estimation of bat mortalities at Wolfe Island, correct?

A. That's correct.

Q. And just to make sure that we're all interpreting it accurately, let's take a look at some of the information in that Table 3. For Average, under GenEst, you have the number 7.7 there?

A. That's right.

Q. Uh-huh. And does that stand for the mean of the number of bat mortalities expected or that occurred in your estimate per megawatt for Wolfe Island?

A. Per megawatt per year.

Q. Yeah. The 7.7 represents the mean of the estimated numbers of bats killed per year per megawatt at that location, right?

A. The mean across three years.

Q. Okay. What does the 6.5 in parentheses after the 7.7 mean?

A. That's the lower confidence bound.

Q. What does that mean?

A. Taken together, the 6.5 and the 12.9 next to it form a 95 percent confidence interval, and we generally say then that we're 95 percent confident that the true fatality estimate falls within that range.

Q. Okay. Thank you.

Let's go to page 15 of your testimony. All right. Here you refer to a review of WEST's database of publicly-available PCM study data from the United States and Canada since 2010, correct?

A. That's right.

Q. Where is this information publicly available?

A. These are all reports that have, in one way or another, been made available to the public somewhere. Now, where you would find any one of

them, I couldn't tell you. Many are available via a Google search. I can't guarantee they all are. Some of them are publicly available because they exist as in support of compliance monitoring for -- or the drafting of a Habitat Conservation Plan, and so it would be available on -- on government agency websites but these are -- these are documents that are for the purposes of information in the public sphere.

Q. And you state here you filtered that data to include only bias trials that used real mouse carcasses; is that correct?

A. That is an error. That should say "bat."

Q. "Real bat carcasses"?

A. Yes.

Q. Okay.

A. I apologize.

Q. Well, fortunately for you because I had a lot of mouse questions coming.

MR. SECREST: Fortunately for all of us then.

A. I was very concerned about those bat -- those mouse questions.

Q. Okay. Working our way through that answer, you state that this demonstrated considerable

variability in searcher proficiency, 0 through 100 percent. Can you explain that?

A. Well, across those 195 searcher efficiency estimates, the low end of that range was near 0 and the high end of that range was near 100 percent.

Q. And that would be the -- the number of available carcasses that the searcher found?

A. The percentage.

Q. Okay. And then you go on to say Figure -- or, you go on to say mean carcass persistence times, 0 to 35 days. What's the meaning of that information in the context of this answer?

A. I need to read the question. The mean carcass persistence time is, as Dr. Smallwood has pointed out, a poor way to address scavenger and persistence probability at a site. It is, on the other hand, a quick reference to get a notion for how intense the scavenging pressure is at a site.

So what it means that carcasses persisted from near 0 days to near 35 days is that depending on where and when you drop a carcass in the field, there's -- there is a great deal of variation in the length of time it's likely to persist and, therefore, the probability with which it will be available to a

searcher.

Q. All right. Let's go to page 18 of your testimony. Just to make sure the record is clear here, Question 16 asks about a 2020 study comparing fatality estimates derived from human versus dog searchers published by Dr. Smallwood, correct?

A. And colleagues, yes.

Q. And that has been marked as an exhibit in this case as BSBO Exhibit 9?

A. That's correct.

Q. Going to the bottom of page 18, line 27, we have a sentence that starts there which says "Further, Dr. Smallwood acknowledges that on average, carcasses were left in the field for 15 days after a dog search and before a human search." Can you tell me where in BSBO Exhibit 9 you saw that acknowledgment by Dr. Smallwood?

A. I will attempt to find it.

ALJ WILLIAMS: I think it might be at page 6, second column.

A. That's right, page 6, first full -- first full sentence in the second column of BSBO 9, "Some of the bats missed by humans were likely removed by scavengers in the time between our dogs finding them and the next human search with an average of 15 days,

as low as 1 and as high as 28."

Q. All right. Thank you. I can't recall if I asked you this or not so I'll ask it, BSBO Exhibit 9 is a peer-reviewed paper; is that correct?

A. It is.

Q. Okay. Just to make sure I've asked the same question of the others, BSBO Exhibit 7 is a peer-reviewed paper?

A. Yes, it is.

Q. And BSBO Exhibit 8 is a peer-reviewed paper?

A. Yes, it is.

Q. And going back to BSBO Exhibit 10, would you go to page 114 which should be almost at the back of that document.

A. Getting there. Yes.

Q. All right. You see there that, in the fourth paragraph, this paper was reviewed by Julie Yee and Leslie New?

MR. SECREST: Objection, mischaracterizes the document.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: I don't think it does, but I'll rephrase the question.

ALJ AGRANOFF: Where are you looking,

Mr. Van Kley?

MR. VAN KLEY: The fourth paragraph under Section 6, Acknowledgments, on page 113 of Exhibit 10, BSBO Exhibit 10. And I am looking at the sentence that starts on the fifth line.

ALJ AGRANOFF: Can you hold on for a minute?

MR. VAN KLEY: Sure.

ALJ AGRANOFF: Okay.

MR. VAN KLEY: All right.

Q. (By Mr. Van Kley) There's a sentence there that says "Julie Yee and Leslie New provided much insightful statistical discussions and patient guidance and thought provoking comments." Do you see that?

A. I do.

Q. Julie Yee and Leslie New are with the USGS, correct?

A. I'm familiar with Leslie New's name. I believe she is with USGS. She certainly has been. Julie Yee, I don't know.

Q. Okay. And you recognize Leslie New as a reputable authority on the subject matter in this paper?

A. I know that she --

MR. SECREST: Hold on, Doctor.

ALJ AGRANOFF: One moment. One moment.

Mr. Secrest.

MR. SECREST: Thank you, your Honor. Objection just to the extent that it's overly broad. Authoritative or reputable with regard to a subject matter of this document. This is a rather long document and there is quite a bit of subject matter, including the title indicating it's a final report spanning three years.

MR. VAN KLEY: Well, I will reword the question, but I think it's going to be essentially the same.

Q. (By Mr. Van Kley) The subject matter of this paper concerns mortality estimates, correct?

A. Yes.

Q. Do you recognize Leslie New as an authority on that topic?

A. No. I know her as an authority in collision risk modeling which is actually different from fatality estimation.

Q. Okay.

A. But that's not to say that I know her body of work in its entirety.

Q. Okay. You'll see in the same paragraph

that this document was reviewed by a number of government employees as stated in the first sentence of the fourth paragraph under Section 6.0, Acknowledgments?

A. I do see that.

Q. Okay. Now, let's go back to your written direct testimony marked as Exhibit 89. Can you tell me -- or let me ask you the question this way, it's a little more direct: It's true, isn't it, that 50 percent of the area within 50 meters of the turbines at Wolfe Island is unsearchable for carcasses?

A. I thought that was variable from year to year, as I recall.

Q. Do you recall the range of searchability?

A. The low end -- I'm looking. I think it's in my Attachment 3 to my evidence. The low end -- the lowest value --

ALJ AGRANOFF: Where are you looking, Dr. Rabie?

THE WITNESS: I'm sorry. I am trying to find it. I'm looking on page 7 of Attachment 3.

A. No, that's not true. I apologize. I can't find that number, but I know that it was -- it started with a high near 90 percent in the first

season of search, and it decreased from there to values that may well have been in the neighborhood of 50 percent.

Q. All right. Now, so let's go to Attachment PR-3 to Applicant's Exhibit 89 which is your testimony.

A. Yes.

Q. Actually let's go to PR-2. Wait a minute. Just a second. PR-2 is your résumé. Okay. Here is why I'm confused. It looks like your Technical Memorandum of October 14, 2020, is behind a cover sheet identifying it as PR-3, but the header on the report itself in the upper right-hand corner says it's PR-2. Do you see that?

A. I do.

Q. Yeah. Okay. All right. So with that understanding then, let's ask some questions about this attachment. Let's go to page 1 of that attachment, paragraph 2, last sentence of that paragraph, you state that GenEst is recommended by various folks there as the most accurate method for estimating bird and bat fatality rates at wind energy projects. My question here is, have these organizations or persons done so in any published documents?

A. The training presentations that Drs. Huso and Dalthorp and others put together recommend GenEst as the best current estimator and those would appear in the form of PowerPoint slides that were at these publicly-held trainings.

Q. Who -- who are the sponsors of those trainings?

A. I was involved with helping to plan them. I don't recall that there were sponsors as such. I think that the Fish and Wildlife Service was involved in helping to plan them. And I think that -- you know, I don't recall. There were a couple of -- a couple of NGOs in the room. But I don't know that we ever said those were sponsored by anybody in particular.

Q. Was WEST one of the organizations that organized these seminars?

A. We participated in helping to get them organized.

Q. Let's go to page 2 of Attachment PR-3. Let's go to the bottom of page 2, the paragraph under the heading of "Detection Reduction Factor." And I would like to refer you to the last sentence which says "A value for k of 0.67 has been estimated for bats in the northeastern United States (Huso et al.

2017), and this value was assumed in this study for bats." Do you see that?

A. Yes, I do.

Q. What is the value for k?

A. The value that we used is .67.

Q. Yeah, but what is k? What does k mean?

A. k is a parameter that adjusts the searcher efficiency as carcasses are missed on sequential trials. So if a fresh carcass falls in the field, it's got some probability of being detected by a searcher assuming it's available at the time of search. And just to keep the math easy, we will say that probability is .8. And if the searcher does not find it on that first search and it's still available when they come back on the second search, it's not reasonable to expect that the detection probability would still be .8. For one thing, that bat was -- may have been missed because it was difficult to detect in the first place. For another thing, that bat may begin to return to the earth, decay, that is.

So the reduction factor acknowledges that by saying, well, if your detection probability on search number 1 is .8 and the detection factor -- reduction factor also has a value of .8, then on the

second search you will multiply those two together and on the second search you get .64. And if you miss that again on the second search, it's going to be less likely you will detect it if it's available on the third search. And you multiple your .64 by .8 again, and at that point I don't do math in my head anymore, but that is, in a nutshell, how k works in the GenEst fatality estimator.

Q. Yeah. k was derived from some searches that were performed, correct?

A. That's right.

Q. Were these searches performed at Wolfe Island?

A. No.

Q. Where were they performed?

A. They were all in the northeastern United States, and we would have to check the reference to get their exact locations because I don't have that information.

Q. They were actually -- k was actually derived from a study in which a site was surveyed four times for carcasses, correct?

Let me start over. The value of k was based on carcasses placed at four sites in the northeast United States, correct?

A. I'm sorry. My internet connection broke up. Would you repeat that?

Q. Yeah. Isn't it true that the value of k was based on carcasses placed at four sites in the northeast United States?

ALJ WILLIAMS: That broke up as well.

A. That time was microphone noise.

ALJ WILLIAMS: Can we try one more time?

Q. (By Mr. Van Kley) Yeah. Sure. Isn't it true that the value for k was obtained from searches performed at four sites in the northeast United States?

A. I don't recall the number but that is in -- that wouldn't surprise me.

Q. Has the data from the searches utilized to come up with this value for k been publicly published?

A. I don't know. The analysis with full details and the value of k and uncertainty around it are all published in the document that I cite which is Huso and colleagues 2017, and I reviewed the -- that --

ALJ AGRANOFF: I think that got -- hold on for a minute. I think that got garbled. Karen, were you able to hear that?

COURT REPORTER: Not all of it.

ALJ AGRANOFF: If you could please repeat your answer, Dr. Rabie.

A. The methods and -- and results of the analysis that produced that value for k were published in Huso 2017, and I have reviewed that to the extent that I'm comfortable working with that value of k, but I don't recall if the raw data are available.

Q. Okay. Let's go to page 9 of PR Attachment 3. And we'll go to the paragraph that is numbered 2 towards the bottom.

A. Yes.

Q. And you state there that -- starting on the third line that "Insignia (2009) stated 'Carcass removal rates were the highest during the fall 2008 and winter 2008/2009 seasons where approximately 80 percent of carcasses were scavenged during the first 72 hours' based on their studies at the Buena Vista Wind Farm in California, which is one of the study areas used by Dr. Smallwood to calculate his estimates of searcher efficiency and carcass persistence." Do you see that?

A. Our internet connection became such that I couldn't understand anything after one of the

studies.

Q. Okay. I just read to you a sentence that starts with the word "Insignia" on line 3 of the paragraph that is numbered 2 and goes to the end of it where you see the words "carcass persistence." Do you see that sentence?

A. I do.

Q. Okay. Where do you obtain the information that Dr. Smallwood used the information described in this sentence to calculate his estimates of searcher efficiency and carcass persistence?

A. Dr. Smallwood didn't use those values. Dr. Smallwood's estimate, as we know, came from his integrated detection trials, estimates that he made. As far as we know, the Insignia study was -- was carried out independently of Dr. Smallwood's, and this point goes to the fact that searcher -- excuse me, carcass persistence was very different between Wolfe Island and the California grasslands.

Q. Well, are you saying in this sentence that the Buena Vista Wind Farm in California was one of the study areas that Dr. Smallwood used to calculate his estimates in searcher efficiency and carcass persistence?

A. I don't believe it was.

Q. Okay. So that statement is incorrect?

A. I'm going to have to check that. Dr. Smallwood's estimates in his direct testimony, the -- the integrated detection trials I know came from Vasco, but he has three different -- different adjustments that he made to the Wolfe Island, and I need to make sure that these Buena Vista ones are or are not there before I can -- before I can comment on the sentence.

Q. Okay. Would you do that, please.

MR. SECREST: Your Honor, would it maybe be better to take 5 and allow the witness to review without all of us staring at him?

MR. VAN KLEY: My suggestion would be for us to take a break in preparation for Mr. Secrest's redirect because I'm at the end of my questions once he answers this one.

ALJ AGRANOFF: Perfect.

MR. SECREST: That works for me.

MR. VAN KLEY: Okay.

MR. SECREST: So I'm confused. I thought we were taking a break.

MR. VAN KLEY: Yeah. I am willing to take a break right now.

ALJ AGRANOFF: Okay. I thought basically

we were saying you had this one last question, and then we were going to take a break.

MR. VAN KLEY: My suggestion is to take a break to allow the witness to find the answer to this question and use the same break for Mr. Secrest to prepare for his redirect.

ALJ AGRANOFF: Okay. How much time do you think you are going to need, Mr. Secrest?

MR. SECREST: Well, I'm glad -- I'm glad we're virtual, so nobody can throw anything at me. Perhaps 15 minutes, your Honor?

ALJ AGRANOFF: Okay. Then let's come back at 6:20.

MR. SECREST: Thank you, your Honor.

ALJ AGRANOFF: Okay. Thank you.

(Recess taken.)

ALJ AGRANOFF: Let's go back on the record.

And at this time, Dr. Rabie, have you had a chance to locate the answer to the question that was asked of you by Mr. Van Kley?

THE WITNESS: I have. And we're looking at the bottom of page 9 of my Attachment No. 3 and the second paragraph numbered 2, and I see the paragraph is poorly worded. The data from the

Insignia report are -- are presented by way of showing that scavenger pressure in this area generally is quite high and the removal times are vast and the persistence probability is low. And we do that to make a contrast between what happens in the California grasslands versus what happens in the Great Lakes. So it's -- it's not to say that Dr. Smallwood used those estimates; it's to say there is a considerable difference between carcass persistence dynamics at the two different facilities.

And in the exhibit, BSBO Exhibit 10, that statement is backed up rather more directly in Table 18 on BSBO Exhibit 10, PDF page 83, where we can see that in 2013, the value for Rc, which is the probability of persistence, during fall of 2013 is just .1. That is a 10 percent probability of persistence through a seven-day search interval.

Q. (By Mr. Van Kley) All right. So the statement in PR-3 on page 9 and in the paragraph numbered 2, that Dr. Smallwood used studies at the Buena Vista Wind Farm in California to calculate his estimates of searcher efficiency and carcass persistence is not accurate, correct?

MR. SECREST: Objection. That's not what the document says. It does not say that

Dr. Smallwood relied on Buena Vista studies.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: Yeah, I'll reword.

Q. (By Mr. Van Kley) The statement that Dr. Smallwood used the Buena Vista Wind Farm in California as one of his study areas to calculate his estimates of searcher efficiency and carcass persistence is inaccurate, correct?

A. That statement would be inaccurate with respect to the estimate.

ALJ AGRANOFF: I think, Dr. Rabie, you are breaking up again, and it was difficult to hear that response so if you could please repeat.

THE WITNESS: I said that estimate is inaccurate with respect -- that statement is inaccurate with respect to the estimate Dr. Smallwood makes at Wolfe Island.

ALJ AGRANOFF: Were you able to get that, Karen? Okay. Thank you.

MR. VAN KLEY: I have nothing else at this time.

ALJ AGRANOFF: Thank you.

Mr. Secrest.

MR. SECREST: Thank you, your Honor.

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REDIRECT EXAMINATION

By Mr. Secrest:

Q. Dr. Rabie, do you still have in front of you what was marked as BSBO Exhibit 2? It's Dr. Smallwood's direct testimony.

A. I do.

Q. May I refer you to page 36.

A. Yes.

Q. You were asked some questions on cross-examination about whether Dr. Smallwood was using estimates from Altamont for searcher efficiency and carcass persistence related to the reanalysis of Wolfe Island data. Do you recall those questions?

A. I do recall those questions.

Q. Okay. I'm looking at Table 2, specifically footnote A, which states "I used the overall detection rate, D, from Smallwood et al. (2018) where values of D were estimated from hundreds of trials performed in the Altamont Pass, and I used values for d from searches using dogs (Smallwood unpublished data) and A from on-site measurements." What is your understanding of what that means?

A. Dr. Smallwood's bias trials came from the Altamont Pass, and they were -- given that we're talking capital D, they were his integrated detection

probability trials, but they capture scavenging, persistence probability, and searcher efficiency; so, yes, those came from the Altamont.

Q. Okay. Thank you, Doctor.

May I refer you to Table 3 to your testimony, specifically page 6.

A. Yes.

Q. Do you recall questions on cross-examination relating to unsearchable areas on Wolfe Island?

A. I do.

Q. Do either of these tables -- well, specifically does Table 4 address the unsearchable areas?

A. Table 4 does address unsearchable areas at Wolfe Island, and it's the table I couldn't find.

Q. Okay.

A. And the column labeled "OMNR and both of the Smallwood Estimates" have the information that I think Mr. Van Kley was asking about.

Q. Okay. Do you have any other clarifications to your prior responses now that you found this table?

A. With respect to the searchable area at Wolfe Island, the searchable area ranged from .8 to

.1 or 2 depending on the year. There was also a line of questioning about the searchable area at the Headwaters Wind Farm, where the correction came from, and I've confirmed that our search plots were searchable with -- for all of our search areas --

ALJ AGRANOFF: I believe -- one moment, Dr. Rabie. I wasn't able to hear what you were saying. I don't think the court reporter was either so if you could please --

ALJ WILLIAMS: Attorney Van Kley, just on a chance, can you mute and see maybe we can get some better integrity on this?

THE WITNESS: Did we get the section about Table 4 which talks about searchable -- Table 4 --

MR. SECREST: We did.

THE WITNESS: My Attachment 3?

ALJ AGRANOFF: That we got.

MR. SECREST: We got that, Doctor. I think we lost you at you were -- just began discussing headwind (sic), and it looks like you are still breaking up a bit.

THE WITNESS: Headwaters had a completely searchable area in all search plots within 70 meters of the turbine, either because we mowed the corn or

because we used dogs to search under the soy.

MR. SECREST: Thank you, Doctor.

Q. (By Mr. Secrest) Do you have what was marked yesterday as Applicant's Exhibit 73?

A. Will you remind me what that is?

Q. The title is "Performance of the GenEst Mortality Estimator Compared to the Huso and Shoenfeld Estimators."

A. I do.

Q. Great. May I direct you to page 22.

A. Yes.

Q. On cross-examination you were asked questions related to whether USGS has publicly recommended GenEst. Can you look at numeral 4 on page 22, the first bullet point. It reads "GenEst is currently the best available statistical mortality estimator." Do you see that?

A. I am still getting to 22. I apologize.

Q. Quite all right.

A. Yes.

Q. Is this a publicly-available document?

A. This is a publicly-available document. It was produced for AWWI, the American Wind Wildlife Association, and it was -- went through the USGS vetting process and is listed in the USGS public

record as a collaborator document and there's a number available for that which I could find in relatively short order if I needed to.

Q. I don't believe so. Let me ask you one more question: To your knowledge, is USGS recommending any other fatality estimator?

A. Not for general estimation of bird and bat fatalities.

Q. Okay. Almost done, Doctor. Are you aware of studies that have shown that variations in carcass persistence rates affect fatality estimates?

A. Carcass persistence rates are highly variable, but a good estimator should be able to manage those. The estimated rate is similar.

Q. Has studies shown that variations in searcher efficiency rates affect fatality estimates?

A. Again, there's a lot of variation in searcher efficiency rates from time to time and place to place, but a good estimator should be able to produce a reliable estimate in the face of variable searcher efficiency rates.

Q. Does GenEst?

A. GenEst absolutely produces stable estimates in the face of variable searcher efficiency or carcass persistence rates and that was

demonstrated in the AWWI document we were just talking about.

MR. SECREST: Thank you, Doctor. I have nothing further.

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: Yeah.

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RECROSS-EXAMINATION

By Mr. Van Kley:

Q. Going back to Attachment PR-3 to your direct testimony marked as Applicant Exhibit 89, let's go back to page 6. I just wanted to make sure that I was interpreting this Table 4 accurately. When you say, for example, that there's a .81 rate in the middle column of that table, does that mean 81 percent?

A. That could be restated as 81 percent.

Q. Okay. All right. So help me interpret this table. What's meant by the column "OMNR and both of the Smallwood Estimates"?

A. OMNR refers to Ontario Ministry of Natural Resources and it --

ALJ AGRANOFF: Dr. Rabie. Dr. Rabie, you -- you broke up when you were basically giving that entire response. Mr. Van Kley.

MR. VAN KLEY: Yeah.

ALJ AGRANOFF: If you could make sure that you mute after you ask the question in order to hopefully avoid the interference that we're getting.

Can you reask the question so that --

THE WITNESS: I recall the question.

ALJ AGRANOFF: Okay.

A. OMNR refers to Ontario Ministry of Natural Resources. And the fact that the original fatality estimates in the published reports used the OMNR estimator and because Dr. Smallwood was tabulating data from the original reports, he must have used these estimates also. And these estimates of .81 or 81 percent in May of 2009, for example, state that within the 50-meter search radius, 81 percent of the land area was searchable, and we have those estimates, that I won't read all of them to you, for subsequent months.

Our GenEst estimates we -- we had access to the raw data and those GenEst estimates are a little different and I'm not sure why, but to the extent they differ, our estimates are more conservative. Does that answer your question?

Q. Yes. Thank you. Go back to Applicant Exhibit 73. And this exhibit is entitled

"Performance of the GenEst Mortality Estimator Compared to the Huso and Shoenfeld Estimators," correct?

A. That's right.

Q. Did this paper compare the performance of the GenEst mortality estimator to any estimators other than the Huso and Shoenfeld estimators?

A. No, it did not.

Q. Okay. And you are the lead author on this paper; is that correct?

A. Yes, I am.

Q. And the paper was prepared for the American Wind Wildlife Institute; is that right?

A. That's right.

Q. And who are the members of the American Wind Wildlife Institute generally speaking? What type of members do they have? Is it wind companies, or is it -- does it include memberships by anybody else?

A. You broke up after "who are," and I've never seen a list. I do know that wind companies are members. I don't know who else are members.

Q. Okay. Did you hear my question well enough that you're confident you answered? Because it sounded to me like you did.

A. I heard your question very well through the part where you said who are the members of AWWI.

MR. VAN KLEY: Yeah. That's what I was asking. And I think you answered that. And if that's the case, then I have no more questions.

ALJ AGRANOFF: Thank you. Are there any clarifying questions from other counsel?

Okay. If not, we appreciate your testimony, Dr. Rabie.

And, Mr. Secrest.

MR. SECREST: May I move for the admission of Applicant's Exhibit 89.

MR. VAN KLEY: No objection.

ALJ AGRANOFF: There being none, it shall be admitted as part of the record at this time.

(EXHIBIT ADMITTED INTO EVIDENCE.)

ALJ AGRANOFF: Mr. Van Kley.

MR. VAN KLEY: Yeah. We will move into admission BSBO Exhibits 7, 8, 9, and 10.

MR. SECREST: No objection, your Honor.

ALJ AGRANOFF: There being no objection, the aforementioned exhibits shall be admitted as part of the record at this time.

(EXHIBITS ADMITTED INTO EVIDENCE.)

ALJ AGRANOFF: And other than that, I

think other than the briefing schedule, we are complete.

MR. VAN KLEY: Oh, I'm sorry. I forgot to move into admission BSBO Exhibit 7.

MR. SECREST: No objection, your Honor.

ALJ AGRANOFF: There being none, BSBO Exhibit 7 shall be admitted as part of the record at this time as well.

MR. VAN KLEY: So we got 7, 8, 9, and 10 just to make sure my notes are right?

ALJ WILLIAMS: Correct.

ALJ AGRANOFF: Yes.

MR. VAN KLEY: Good. Thank you.

ALJ AGRANOFF: You're welcome.

ALJ WILLIAMS: Do you want to go off the record and talk about the briefing schedule and come back on and put that on and be done?

ALJ AGRANOFF: Well, we could just do it on the record right now. I had proposed the schedule yesterday with respect to initial and reply briefs. And specifically I had proposed the 20th of November for initial and December 4 for reply.

MR. SECREST: That's fine for the Applicant, your Honor.

MR. VAN KLEY: That's good for me too.

ALJ AGRANOFF: Everybody else in agreement?

Okay. Is there anything else that we need to discuss?

If not, Judge Williams, do you want to wrap it up?

ALJ WILLIAMS: Subject to the briefing schedule, we will consider this matter to be submitted on the record. I want to thank everybody for their participation. Obviously it was novel two weeks ago. I think we all developed a pretty high confidence level and candidly I thought the case was really well argued on behalf of all the parties, so I appreciate everybody's cooperation before, during, and now after the hearing.

And we will look forward to receiving the briefs and looking forward to a decision. Thank you.

MR. VAN KLEY: And I appreciate everybody's accommodating me today in my schedule for this afternoon.

MR. SECREST: Certainly.

ALJ WILLIAMS: Absolutely.

Okay. We are off the record. Thank you.

(Thereupon at 6:42 p.m., the hearing was adjourned.)

CERTIFICATE

I do hereby certify that the foregoing is a true and correct transcript of the proceedings taken by me in this matter on Friday, October 16, 2020, and carefully compared with my original stenographic notes.

_____

Karen Sue Gibson, Registered Merit Reporter.

_____

Carolyn M. Burke, Registered Professional Reporter.

(KSG-6976)

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Summary: Transcript in the matter of the Firelands Wind, LLC hearing held on 10/16/20 - Volume IX electronically filed by Mr. Ken Spencer on behalf of Armstrong & Okey, Inc. and Gibson, Karen Sue Mrs.