UNITED STATES OF AMERICA
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION

In RE:	:	
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Proposed Waiver and Regulations		
Governing the Taking of	:	**Docket No. 19-NMFS-0001**
Eastern North Pacific Gray	:	
Whales by the Makah Tribe	:	**RIN: 0648-BI58 and**
	:	**RIN: 0648-XG584**
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REPORTER'S OFFICIAL TRANSCRIPT OF PROCEEDINGS
NOAA ADMINISTRATIVE PROCEEDING
HEARING ON RULEMAKING
DAY 2 of 6

Jackson Federal Building
915 Second Avenue
Seattle, Washington
Friday, November 15, 2019

BEFORE:

THE HONORABLE GEORGE J. JORDAN
ADMINISTRATIVE LAW JUDGE

Also Present:
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P R O C E E D I N G S

Start time 9:00 Pacific Time

THE COURT: Okay, good morning, this is Judge Jordan and again we are commencing our second session in the hearing regarding the proposed waiver and regulations Governing the taking of Marine Mammals. If I could just quickly, note the parties, their representative, appearances for today for NMFS?

MS. BEALE: Laurie Beale and Caitlin Imaki for NMFS Your Honor.

THE COURT: Very good. For the Marine Mammal Commission?

MR. GOSLINER: Present.

THE COURT: Very good, and for AWI?

MR. EUBANKS: Present, Your Honor.

THE COURT: Very good. And for Sea Shepherd?

MR. SOMMERMEYER: Present, Your Honor.

THE COURT: Okay. For Peninsula?

MS. OWENS: Present, Your Honor.

THE COURT: Okay. And for the Makah.

MR. GRUBER: Yes, we are here, Your Honor.

THE COURT: Very good. Thank you. I understand that we have, first we, even though it is still NMFS's case, we are taking a witness out of order I believe from the Makah Tribe.

MR. GRUBER: Good morning, Your Honor. We would be happy to begin with Ms. Pascua, but we weren't sure that that was exactly how NMFS wanted to proceed. We'd like to have Ms. Pascua testify sometime this morning and after a break would be fine with us. It's really up to NMFS on how they'd like to proceed.

THE COURT: What's your preference this morning?

MS. BEALE: We would prefer to proceed with Mr. Weller's direct, and then perhaps at the …

THE COURT: Direct now, okay, then fine, you may call your witness.

MS. BEALE: Thank you, Your Honor. National Marine Fisheries Service would like to call Doctor David Weller.

THE COURT: Please.

Whereupon,

DOCTOR DAVID WELLER,

A witness produced by the National Marine Fisheries Service was duly sworn on their oath, examined and testified as follows:

THE WITNESS: I do.

THE COURT: Please be seated.

DIRECT EXAMINATION

BY MS. BEALE:

Q. Good morning, Doctor Weller.

MS. BEALE: And actually before I begin, Your Honor, I would like to follow up regarding an email that we sent to the Judge and to the parties yesterday. It contained an attachment that we proposed introducing into evidence as a new exhibit, it would be NMFS Exhibit-101.

The document, I will ask Mr. Weller to explain what that is, maybe I will just proceed with his introductions and then go to that issue. We did distribute that document electronically, again to everyone. We do not have paper copies with us today, but we could make those available Monday if the Judge or any of the parties would like to have a paper copy. And it is available online as well.

THE COURT: All right, we understand that's a, this is again a late filed exhibit which we will move forward to introduce this in this morning. And again, if parties have objections, we will at least bring it in for identification and we will deal later during the hearing about its admission.

(Exhibit NMFS-101 was then marked for identification.)

MS. BEALE: Okay, thank you, Your Honor.

BY MS. BEALE:

Q. Doctor Weller could you please state and spell

your name, for the record?

A. Yes. My name is David Weller, W-E-L-L-E-R.

Q. What is your current work address?

A. 8901 La Jolla Shores Drive; La Jolla, California 92037.

Q. And where are you currently employed?

A. I am employed by the National Marine Fisheries Service and then located at the Southwest Fisheries Science Center.

Q. What is your current job position?

A. I'm a research wildlife biologist.

Q. What are your responsibilities as a research wildlife biologist?

A They are multiple. Part of those, a large part of that is to conduct research. And a primary component of my research program is on gray whales. I also provide scientific consultation and data and advice to organizations like the International Whaling Commission, and the IUCN Western Gray Whale Advisory Panel.

Q. Could you briefly describe your expertise and training with respect to gray whale biology and science?

A. Yes. I have a PhD in Wildlife and Fishery Sciences from Texas A&M University in 1998. I've been studying gray whales since 1997 both in the western North Pacific where I spent about a decade working there kind

of learning some of the first information on that group. And then more recently, in the past ten years on Eastern North Pacific whales.

Q. Are you a member of any professional organizations?

A. Yes. I am on the U.S. Delegation to the International Whaling Commission and the Scientific Committee. And I am also a panel member on the IUCN Western Gray Whale Advisory Panel.

Q. And could you tell us what the IUCN is, so we have that for the record.

A. The International Union for Conservation of Nature.

Q. Thank you. Doctor Weller, could you describe some of your field research activities?

A. Ah yes, I've, well, I've done field research for nearly 30 years now. And it is anything from working on Delphinidae, dolphins to large whales. I think the thing that is probably most relevant to this meeting is my experience with gray whales. As I said, in 1997 I began my research in the Okhotsk Sea off of Sakhalin Island on the Western North Pacific stock of gray whales. I worked there for nearly a decade leading the research program.

And then about, I don't know, 7 or 8 years ago

I handed that over to our Russian colleagues to carry that program forward.

I've also worked extensively on Eastern North Pacific gray whales. I've done research all the way from Mexico up to Alaska. Two of my primary responsibilities for NMFS or the National Marine Fisheries Service are to collect calf production data on an annual basis and also to produce the abundance estimates for the ENP stock.

Q. What research methods do you have experience with, if you could just describe a few of those.

A. Research methods with gray whales include photo identification, biopsy sampling, satellite telemetry, aerial surveys, shore based surveys, acoustic recording and behavioral studies.

Q. Could you describe how photo identification is used for gray whales?

A. Yeah, and photo identification you can think of as kind of each gray whale has got a fingerprint, and that fingerprint is a mottled coloration pattern that occurs all over its body from head to tail. And in terms to the way that we build our photo identification catalog of known individuals is we use the right flank. We get a photograph of an individual, we are able to identify it by the unique coloration patterns, and every time we see that individual again, if we get a photograph of it we

can compare it back to the catalog and make a match.

Q. And do you have personal experience in photographing whales or matching whales?

A. Yes, decades.

Q. Do you have experience approaching whales for research purposes?

A. Decades of experience.

Q. In your experience, how do gray whales react when approached by research vessels?

A. It's highly variable. Some of the whales show no response at all. Some of them show kind of a middling response. And others respond to it more directly. The response is often related to the behavior of the boat and how it is operated. And so we take every measure in our research, is to approach carefully and be sensitive to any signs of disturbance that may be happening as we are getting closer.

Q. And you also have experience, I believe you said biopsying or tagging whales for research.

A. Yes, both.

Q. And could you explain how that works and how whales react?

A. Um-hmm.

Q. To that activity?

A. Yeah, the deployment of a tag and/or a biopsy

bolt, a bolt is essentially a modified arrow with a tissue coring tip on the end. We attach those to the bolt, we fire them from a cross-bow or an air rifle. The biopsy samples will hit the animal and recoil. There's a small rubber stopper, they recoil back and float in the water, we motor over and then pick up those samples.

In terms of tagging, it's the same thing. It's, the tags are either put on to the same bolt and launched from the crossbow or they are fired from and air rifle. And those tags are either implantable or semi-implantable into a whale. And the response for those can also be anywhere from almost no response maybe a slight twitch to a dramatic response including breaching or chuffing and moving away from the vessel.

Q. Thank you. Doctor Weller, could you please identify the declarations that you submitted in this matter, for the record?

A. Yes, one direct declaration, a rebuttal declaration and then follow up on the UME.

Q. In the course of your professional responsibilities at the Southwest Fisheries Science Center, were you asked to assist in developing or evaluating the proposed waiver for this proceeding?

A. Yes.

Q. What was your role?

A. To provide scientific advice, review information that was being written about and presented. And then to review the final regulations as we have seen them today.

Q. Through your review and evaluation, did you form an opinion as to how the waiver would affect the ENP gray whales?

A. Yes, I did form an opinion.

Q. Oh, and what is your opinion?

A. Is that at the population level that the hunt would have no detectible impact on the Eastern North Pacific stock.

Q. Does the occurrence of the 2019 unusual mortality event alter your opinion regarding the likely effects of the hunt?

A. No.

Q. Why not?

A. We have seen UMEs with the gray whales before, you heard about the 1999/2000 UME yesterday. And we use that as a proxy for what we are seeing today. It may not be exactly the same. But it is the best information we have to go back to. And my opinion about the UME and the impact on the ENP population follows what we learned from '99 and 2000. And that is that prior to that earlier UME the population was at about 21,000 individuals. The UME

brought it down to 16,000. Ten years later the population was back up to 21,000 and about ten years after that it's reached this highest point, 27,000 whales.

Q. Doctor Weller, did you also provide information to NMFS regarding the likely effects of non-lethal hunt activities, and by that I mean approaching whales by hunters and unsuccessful strike attempts by hunters?

A. Yes.

Q. How do you expect that non-lethal hunt activities, approaches in particular, would affect the whale subject to an approach?

A. The same as research activities. Really anywhere from no response or mild response to a more pronounced response. But I think in the overall bigger scheme those responses to disturbance would be ephemeral and short-term in nature.

Q. What is the basis for your opinion that those responses would be ephemeral?

A. Whales can easily move away from the point of disturbance, they are incredibly tuned into the acoustic of an environment that they live in and they can easily move.

Q. And what is your opinion regarding the likely effects of an unsuccessful strike attempt on a gray

whale?

A. Could you repeat that question, I missed --

Q. What is your opinion regarding the likely effect on a gray whale of an unsuccessful strike attempt by hunters?

A. The same as what I just said, it could range from no or mild response to a more dramatic response. But in all cases those would be short term.

Q. What would you, how would you expect a whale to respond to a training harpoon throw that might actually hit the whale?

A. In that case, I think you would see a startle response, you might see more aberrant behavior in terms of chuffing, rapid ventilation cycle and actually acoustic noise, fast swimming away from the vessel and also possibly breaching, so it would be more impactful, and the disturbance would get a greater response.

Q. What sort of effect would that have on the subject whale's fitness, in your opinion?

A. An encounter like that would probably, I mean, it's hard for me to say. But the encounter could be anywhere from 10 minutes to 30 minutes or maybe 40 minutes long. And in that case, the impacts on the fitness would probably be small and something that could be easily recovered from.

Q. Doctor Weller, you stated that you also evaluated what effect the proposed ceremonial and subsistence hunt would have on PCFG whales, correct?

A. Yes.

Q. And what is your expert opinion regarding how the hunt would affect that group of whales?

A. It's the same as the Eastern North Pacific stock, is that the PCFG is a population segment of that stock and I also don't think that we would have any detectible impact at the ENP population level.

Q. Doctor Weller, were you also asked to evaluate the likely effects of the Proposed Hunt on the WNP gray whales?

A. Yes.

Q. And what is your expert opinion regarding the likely effects on the WNP gray whales?

A. I've, it's work that I largely have done in collaboration with Doctor Moore who you will hear from this afternoon or today. The effects also would be minimal.

Q. As a member of the International Whaling Commission or IWC Scientific Committee did you participate in any reviews of NMFS Proposed Hunt Management Plan?

A. Yes, as part of the Scientific Committee's

deliberations in review of the Proposed Hunt I was involved with that.

Q. What was your role and what did the committee conclude?

A. My role was to provide data that I had collected, synthesis of information that I was knowledgeable about and scientific opinion on the results. The conclusion of the Scientific Committee was that the hunt as proposed would have -- met the IWC's conservation objectives as to the ENP stock, for the Pacific Coast Feeding Group and for the Western North Pacific stock.

Q. Does the IWC consider the PCFG to be a stock?

A. No, they don't. But the work the Scientific Committee did do was they considered the PCFG to be a management unit, which is the way, they don't, the IWC does not involve itself in stock delineation or stock definition, but it looks at the spatial arrangement, the occurrence of animals in a given area, and impacts that may be related to that. So their modeling exercise took the PCFG as if it was a management unit which I think was very appropriate.

Q. Thank you. And you mentioned that the Committee concluded the proposal would meet IWC conservation objective. Could you briefly explain what

those objectives are?

A Yeah. They are largely in line with the objective of the MMPA. And that is to maintain a stock at 60% of its carrying capacity to allow a subsistence hunt to carry on forward for up to a 100 years, and to not bring the management unit in a direction that would bring it any closer to extinction.

Q. Thank you. Doctor Weller, in your written testimony you identify the most recent abundance estimate for ENP gray whales, could you explain how those estimates are derived?

A. The abundance estimates have been conducted since 1967, not every year from ’67 to 2019, but in many of those years. It’s been done the same way, it’s shore-based observers aided with binoculars and nowadays with computer assisted tracking software that we use. But it is a shore-based visual observer study in which we count whales as they are migrating from the arctic feeding grounds to Mexico. So during the southbound migration.

Q. When will the next estimate be available, if you know?

A. The next field program will start on the 2nd of December, we will deploy on the 1st of December, the field operation would start on the 2nd of December. That program will go until about the middle of February. The

data then will be cleaned and quality inspected and I expect that we will probably be able to produce the next abundance estimate for 2019/2020 late summer or early fall.

Q. Will that estimate help inform how the stock is responding to the current UME?

A. Yes, it should, um-hmm, if the numbers are significant we should see that in the overall abundance.

Q. Regarding the PCFG, I'd like to first ask you few questions about the new exhibit you were talking about earlier. Could you explain what that document is?

A. Yes, it's an updated assessment of the PCFG abundance. It was produced by Cascadia Research, I had about four minutes to look at it. But I did quickly scan through some of the very familiar tables and data outputs. It incorporates data through 2016 and 2017 which the previous assessment was through 2015.

Q. And just understanding that you did not have a chance to review the report thoroughly, what new information is included there that would be relevant to this proceeding?

A. The data point that I was most interested in quickly taking a look at was the abundance estimate for the PCFG. And that abundance estimate if I recall correctly is now 232, so it is slightly lower than the

past couple of abundance estimates. However, my concern of course was looking at whether the abundance had tripped the stop hunt trigger at 192, and it does not.

Q. Do you consider the drop in abundance from 243 to 232, I apologize, I don't remember what you just said.

A. I don't remember.

Q. 230 something, do you consider that to be significant, biologically?

A. No, I don't. It could easily be an artifact of sampling effort or variance within the estimate itself.

Q. How frequently are PCFG whales surveyed to provide abundance estimates?

A. They're surveyed annually.

Q. Okay. Are you familiar with how abundance estimates are derived for the WNP gray whale stock?

A. Yes.

Q. Could you explain that?

A. It's the same as the PCFG. That it's a photo identification based mark-recapture analysis.

Q. And how frequently are those abundance estimates undertaken?

A. Those estimates are done as a population assessment annually. And they are typically reported to the IWC Scientific Committee. And they are conducted by a researcher named Justin Cook.

Q. When is the next update expected of abundance for the WNP stock as far as you know?

A. It should be available for the Scientific Committee Meeting of the IWC in May of 2020.

Q. I'd like to go back and look at the NMFS Demonstrative Exhibit Number 1 that we were looking at yesterday, it's on the easel and I believe we are going to try to pull up on the screen. I was going to ask you, Doctor Weller to explain what the red dots represent?

A. Yeah, the red dots on that exhibit represent survey regions within the Pacific Coast Feeding Group range. So when I say, "Survey regions", it's where the primary data are collected on an annual basis.

Q. Are there certain whales that occur within those survey areas?

A. The exchange of whales between the survey areas is high, and I can't exclude the fact that one or two whales may show specific fidelity to one area over the course of a few years. But as we've looked through the sighting records for PCFG whales, it really is pretty convincing that they show no fidelity to an area that's smaller than about 60 kilometers.

Q. So you may have just answered this, but are there individuals PCFG whales that occur only within the Makah U&A?

A. Not that I'm aware of.

Q. Is there any genetic differentiation among the PCFG?

A. You would need to qualify that with the differentiation between the ENP, for example, the northern feeding stock and the western stock. And that's the work of Doctor Amy Lang who is part of our laboratory. And there are small but significant mitochondrial differences between Pacific Coast Feeding Group and the larger ENP, the Northern Feeding Group. But there are no nuclear differences.

Q. And how about within the PCFG group, for example is there any genetic differentiation between one PCFG whale and another PCFG whale?

A. No, there is no structure within the PCFG itself.

Q. If a PCFG whale were killed by Makah hunters, would that potentially reduce the number of PCFG whales that use the Makah U&A?

A. No, not over the long-term.

Q. Why?

A. There's -- well, one is the exchange and the inflow and outflow of animals using that area. It's also true that whales on a regular basis, there are whales that have not been seen there in previous years, there

are whales that are seen there within a year.

Q. Could you explain how new whales are recruited into or join the PCFG?

A. Yeah, two ways: one is non-PCFG whales move into the PCFG area and then are seen there in at least two years. And then there's internal recruitment -- that's called external recruitment -- and then there's internal recruitment in which calves of mothers are born into the PCFG and they stay to be sighted at least two times, which is the definition of a PCFG Whale.

Q. What proportion of recruitment, approximately occurs from whales recruiting internally, that is calves with their mothers --

A. Um-hmm.

Q. -- of the total recruitment?

A. It's about 50/50, the assessments that have been done to date, show that it's about 50/50. Half of it is internally recruited and the other half is external.

Q. About how many new whales recruit into the PCFG annually, if you know?

A. Yeah, that's work also done by Doctor Lang and a colleague Doctor Martien from Southwest Fisheries, and they did a simulation modeling exercise to try and address that question. And I think the range of external

recruitment that they came up with was something like between 1 and 8 new whales per year with the best fitting number for the model at 4. And then it's also estimated that approximately 4 new internal animals are recruited.

Q. So approximately 8 new whales, new meaning either internal or external recruits join the PCFG?

A Yes, the combination of the two, um-hmm.

Q. Have you reviewed the Calambokidis and Perez 2017 article that is referenced in Mr. Schubert's declarations?

A. Yes, I have.

Q. Does that article show that recruitment is actually more due to internal than external recruitment?

A. I think the discussion in that article is inconclusive and the authors say that themselves. And it may simply be an artifact of an increased awareness and an increased effort to try and detect and record calves with their mothers.

It may also represent an increase in the number of reproductive females that are having calves. And that is very much in parallel; the time period that Calambokidis and Perez have in their paper.

If you compare that to the ENP population as a whole, they found an increase in the number of calves observed. Which parallels what the ENP population was

going through. That is through 2012 and 2017 in the Eastern North Pacific. As a whole we've seen consistently high calf recruitment, over a thousand calves per year born into the population. And that fits squarely within the same time period that that analysis was done. And also I would just add that the abundance has increased as it has in the PCFG. The abundance was increasing as was the ENP population abundance.

Q. Doctor Weller, some of the parties have raised questions about PCFG Whale site fidelity, and I believe you mentioned that earlier as well.

A. Um-hmm.

Q. Could you just explain that for us in a little more layperson terms?

A. Site fidelity, the term? It's --

Q. What you mean specifically, sorry, in the gray whales or PCFG context.

A. Yeah, I'm confused as to what you are asking me, could you rephrase?

Q. Just to explain what you mean when you use the term site fidelity or when researchers use the term site fidelity reporting on PCFG.

A. Yeah, site fidelity is the annual return of individuals whether it's fish or whales to an area in which in most, in many cases that they were born into.

But they show a particular affinity for a given area and that would be site specific or site fidelity.

Q. By site fidelity does that mean whales would return exclusively to that site?

A. No, I think the overarching data for the Pacific Coast Feeding Group show that there is site fidelity to the range, the 41 degrees to 52 degrees north, to the range. But it's not true that there is a cite specific fidelity to particular regions within that range.

Q. Thank you. Ms. Newell asserts in her testimony that the loss of even a single PCFG Whale could result in a multi-generational impact because future whale generations would not be able to benefit from knowledge passed from mother to calf regarding feeding sites. How would you respond to that assertion?

A. I don't agree with it. It's an interesting notion, but I don't think there are data to support that. And when you do look at the available science and the available data to address that question, PCFG mothers, they are seen throughout the range, they are also, they don't show this site specific fidelity. Some of those mothers are seen well outside of the range, up to southeast Alaska and Kodiak Island on a regular basis.

And so what that implies to me is that those

mothers and their calves, they are behaviorally flexible. They are able to accommodate a lifestyle within the PCFG feeding on the type of prey that are abundant there. But they are equally as capable of surviving in other feeding habitats off of Kodiak Island or to the north. So, I don't know that there's a multi-generational transfer of knowledge because of the behavior that we see in known individuals.

Q. Ms. Newell is also concerned that the loss of any PCFG Whales will have adverse consequences for scientific research. Do you agree with that concern?

A. Ah, yeah. That, you know, that's, I agree that when you lose an individual from your time series of data, it is a loss to your data. But the question is whether that loss to an academic or scientific endeavor has any consequences at the population level and that's the question we are trying to address here.

Q. Do you believe the loss of the number of whales that could be allowed under the proposed waiver would have consequences for scientific research on PCFG Whales as a whole?

A. No, I don't. And that's because there is this recruitment that we've talked about. Is that whales that are removed are over time replaced?

Q. Thank you. I'd like to talk a little bit about

the MMPA's purposes and policies. In your testimony you discussed your consideration of how the Waiver might affect health and stability of the marine ecosystem and whales functioning within the ecosystem. Based on your expertise, what is your understanding first of what is meant by the term ecosystem in the MMPA context?

A. Ecosystem is where animals are aggregated and commonly distributed.

Q. So for purposes of the Proposed Waiver, you did evaluate how the proposed waiver would affect the functioning of gray whales within their ecosystems?

A. Yes, we did. It's not an easy task and you need to rely on available literature and information. But we did give it due diligence.

Q. What ecosystem did you consider when you were asked to evaluate how the waiver would affect the whales' functioning?

A. We considered several different ecosystems; the California current ecosystem covers the primary range of the ENP stock. The Northern California current ecosystem overlaps almost perfectly with the PCFG range. And then we also tried to look at potential impacts at a local level where it was not necessarily an ecosystem, but we had been asked to try and identify and understand whether there might be impacts to the hunt-specific area.

Q. What did you conclude regarding potential for ecosystem impacts to the hunt area or habitat impacts?

A. Yeah, we weren't able to conclusively say that there would be any ecosystem impacts. And the reason that we came to that conclusion was that those ecosystems are highly dynamic, they are driven by oceanographic and weather events. Annually they change from year to year and season to season. There are regime shifts within those ecosystems. And so to account for changes of the removal of 25 gray whales from an ecosystem, that's highly dynamic. We just weren't able to come up with anything conclusive.

Q. Some of the parties have alleged that NMFS did not fully account for the effects of climate change, it's in the analysis of how the proposed waiver might effect the ENP stock. Could you explain how the ENP stock has responded to climate change to date?

A. Yeah, I can give you my opinion on that. And climate change is poorly understood at this point. I would just add that as a caveat across sciences. We don't have a good handle on it. But despite that, climate change in terms of gray whales in the North Pacific, a couple of things that we are tracking closely and trying to understand is the reduction of sea ice, for example, in the Arctic.

And there seems to be a correlation with changing climate and the reduction of sea ice. That is sea ice is moving further to the north. It's not as extensive and as thick as it once was. The sea ice is an environmental variable that we've been able to tie to calf production. And so in years in the past when sea ice was heavy and it came far to the south, females that were ready to give birth were unable to access primary feeding ground. Therefore they weren't able to feed until later in the feeding season. That has changed, they now have open access to the primary feeding grounds.

So there is climate change impacts in the Arctic. We are watching what is happening with population dynamics. But in that same time that the Arctic has been changing and that's over several decades, it's not anything that's just, you know, overnight, it's several decades.

It's hard to reconcile an impact with a population that has grown significantly and high calf production. What those two things mean to me is that the food availability in the Artic is high and good and it allows the population to sustain itself. And not only that but to grow and to be putting out, to have reproductive output that is very high.

Q. Are you aware, Doctor Weller, of any scientific

evidence showing that carrying capacity for the ENP stock has decreased over the past couple decades?

A. No. It certainly has been proposed and hypothesized that some of the fluctuation we see in abundance in calf production, it might be relative to carrying capacity. But, I think, you can't put a hard line on carrying capacity and say that it's decreased over the past 20 years, for example because carrying capacity is fluctuating.

It's never the same from year to year. It's not a hard ceiling, but it's something that is moving. And so in years when carrying capacity, if it's the ceiling, when the ceiling comes down the environment's able to sustain fewer whales. When the ceiling goes up it's able to sustain more. So no, I am not able to say conclusively that the carrying capacity of the ecosystem has declined for gray whales.

Q. Are you familiar with a report, this was cited by Mr. Schubert, by Ronzon-Contreras, et al 2019?

A. Yes, I've read that report.

Q. Do you agree with the statement in that report that food availability for gray whales in the summer area in the Arctic is becoming a problem?

A. No, and for the very reasons that I just said. There may be short-term events that impact forage, and

the amount of forage for gray whales in the Arctic, but over the long-term I can't reconcile population growth and calf, high calf production with a decreasing or emergency in terms of food supply.

Q. In your opinion what does high calf production and increasing abundance signify for the stock?

A. That there's plenty of food to sustain them.

Q. Thank you. Doctor Weller, are you familiar with what has been described as the blob that happened some years ago?

A. Yes.

Q. Or occurred, I should say.

A. Yes, um-hmm.

Q. Could you explain what that is?

A. It's a marine heatwave; it's a layer of warm water that was essentially stationary. And that blob, the marine heatwave of 2013 to 2015 is what you are referring to.

Q. Yes. Are you aware whether that heat wave had effects on the ENP gray whale stock?

A. What I'm aware of is that the population from 2013 to 2015 grew significantly, the abundance continued to increase. It was a time of very high calf production, over a 1000 calves per year. And the PCFG abundance also grew during that time. So, I'm not able to put my finger

on it at a population level and say there was any impact from it.

Q. I'd like to ask you a couple questions about the rebuttal declaration filed by Doctor Villegas-Amtmann. She states in her declaration, well let me rephrase. She discusses potential energy costs to find prey as a result of climate change. She asserts that prey in the traditional foraging areas for gray whales is less abundant than it used to be. Have you had an opportunity to review her statements regarding prey and how it has been impacted by climate change? And referring specifically to prey for gray whales?

A. Yes, I've reviewed her work.

Q. Okay. What is your opinion regarding those statements?

A. It's the same, it's the same, not to be a broken record, but it's the same thing as, if you look at the population level, population dynamics an increasing population and a high calf production is really what I defer to as the scientific information that we have to suggest that it's not an issue.

Q. Doctor Weller, based on your experience, your evaluation of the record in this matter and the testimony and evidence that has been submitted, do you believe that the proposed ceremonial and subsistence hunt will have a

detectable effect on the ENP gray whale stock?

A No, I don't think there will be.

Q. Do you believe it will have a detectable effect on the PCFG? A. No.

Q. Do you believe it will have a detectable effect on WNP gray whales?

A. No.

Q. Okay, thank you so much.

MS. BEALE: That's all I have, Your Honor.

THE COURT: Very good.

MR. SLONIM: Your Honor, before we proceed with the cross of Doctor Weller, we are prepared to offer Maria Pascua, a Tribal witness if now is an appropriate time.

MS. BEALE: That's fine with NMFS.

THE COURT: There's no objection?

MS. BEALE: No objection.

THE COURT: All right, we have Doctor Weller, Doctor Weller will you please step down for a while, and we will take that other witness in your place.

THE WITNESS: Certainly.

(Witness Doctor Weller steps down and Makah Tribal witness called out of order Maria Pascua.)

Whereupon,

MARIA PASCUA,

a witness produced on call of the Makah Tribe was duly sworn on their oath, was examined and testified as follows:

THE WITNESS: I do.

THE COURT: Please be seated.

MR. GOLDING: I am Wyatt Golding for the Makah. Ms. Pascua thank you for being here today. Would you care to introduce yourself according to your custom and tradition?

THE WITNESS: Sure.

Makah witness, Maria Pascua presents introduction in Makah Native Language.

(See Attachment with the entire Makah text of Ms. Pascua's opening statement and English translation.)

THE WITNESS: So, I just wanted to, according to our custom to be 'ƛu·łsu·qƛ', to be respectful to this place they we are in right now. That it's the land of the Duwamish People before any other people, group were here, this is who was here. And I wanted to acknowledge this city that it's named after a chief that lived here and now it's all built up over where they were. And if they were in that kind of times today, that's, our custom is to say, acknowledge the people group where we are meeting on this land doing Makah business on this land.

And then introducing myself, my name is Maria

Pascua and I'm from the Parker family in Neah Bay. I'm Makah and I was born during gray whale season and I've lived in Neah Bay most of my life. And that I wanted to acknowledge my ancestors so it was 'Ċaqa·wiƛ', he was one of the treaty signers, and he's the one that said, "The sea is my country". Not just our land but the sea, because those were the resources we were seafaring people, and those were our resources.

And then his son after him was a whale hunter. And my grandpa also got to experience going out on a whaling expedition but it was in the time of boarding schools, so you know it forced him to go to boarding school nine months of the year and could not continue the training that would have normally been his if the times didn't change as they had. So I wanted to acknowledge my ancestry.

DIRECT EXAMINATION

BY MR. GOLDING:

Q. Thank you, Ms. Pascua. Could you please your address and occupation?

A. Um-hmm, so my address is 1661 Nursery Avenue, or P.O. Box 586; Neah Bay, Washington. And what was the other?

Q. Oh, your occupation.

A. Oh, so I worked at the Neah Bay High School, I

teach Makah language in the high school, Makah 1, 2, and 3. And then I'm part-time there. And then I work in our language program at the Makah Cultural and Research Center doing research on our language and culture and making curriculum.

Q. Thank you. And is the testimony you submitted on May 13, 2019 your testimony in these proceedings?

A. Yes, it is.

Q. Okay. You mentioned that you are a Tribal member; did you grow up in Neah Bay, and do you live there now?

A. Yes, um-hmm.

Q. Okay. And what education do you have in Makah language and teaching Makah language?

A. Well, I have a teaching degree from the Evergreen State College, and then I later added an endorsement in Makah. And then after the first people's language and culture and oral Tribal Tradition Certificate passed after a pilot program that has now become part of OSPI in the State teaching certification process and it is acknowledged by our Tribe and the State. And I am currently in a master's program at the University of Victoria, a master's in indigenous language revitalization.

Q. And you mentioned your ancestral family

connection to the treaty whaling right.

A. Um-hmm.

Q. Did you have family members on the 1999 hunt?

A. Yes, I did, I have cousins, four, um-hmm.

Q. And what was your experience of the 1999 Makah whale hunt?

A. Oh, it was an awesome experience, because I taught about, you know, we have a chapter in Makah 1, just about whaling, and it takes weeks to get through because it's the biggest part of our culture. And so, it was quite an experience to be involved in that. We were getting ready years before that, the hunt occurred.

And the different whaling crews that were training did a, kind of a, the traditional way that we went about things is called 'hi·dasubač', and it is to do things in an all-around way; spiritually, mentally, physically, emotionally getting yourself ready for doing that, for taking a whale.

And we have a sweathouse in the back of our house, and the crew would come over regularly to pray and then afterwards come in our house and we'd talk about our whaling traditions, our culture and just learning from each other things that have been passed down orally in each of our families.

Q. And did you take part or help prepare a

community feast from the whale that was landed?

A. Yes, we did. It was quite a thing because we were working, I worked my regular day 8 to 5, and then after going home just briefly to eat we'd go to the processing place, fish processing place is where it was stored and I was a blubber cutter.

Q. And could you describe how that, the whale that was landed was used to feed the community?

A. It fed more than just the community. But what we did is we prepared a big feast, because we knew many people were going to come. And so all the different shifts that worked on butchering and the cooks that helped to, you know, to cook the blubber to have it in edible pieces for serving and the meat as well. And then there was oil rendered out of it for dipping say dried fish or other things that would have been on the tables.

And when we started off I had a great honor to start it, by singing a prayer song which is one of the most important types of songs we have, because it's a, you are being thankful for the food that you are going to eat, all the people that worked to bring it in and were involved with the process. You are honoring that process.

And we then started bringing people in the gym and couldn't fit everybody in. So I had to tell the rest

of the people out there to wait. We fed one group and then they exited. And then another group came in and we fed that group and there was still more people outside who wanted to participate in the feast. So that group left and the third group, we fed three gym loads of people that day.

Q. And could you describe the subsistence importance of whale meat, whale blubber and other products in the Makah community?

A. The whale was the biggest thing we hunted and we used the blubber, the meat. Made oil out of the blubber for dipping fish, we had a lot of dried things, you know, before refrigeration so all kinds of dried salmon eggs, dried fish, dried halibut, dried whale meat. So it was kind of like used like butter, the way people use butter today is to have the oil in your diet; and it's a healthy oil.

Q. Do the Makah still utilize whale products?

A. Yes, whenever we can, um-hmm.

Q. Is there a recent example of that?

A. In 2018 in the summer, in August just the day before Makah Days, there was a humpback whale that was hit by a ship. And one of our fisherman were out on the water and it happened close by and so he called in to say that we were interested in bringing this whale home. And

so it was allowed; and so we brought to shore that night, it came ashore. And a ceremony was held on the beach with appropriate whale prayers and songs.

And this was a little different because the other hunt was for the community and all the visitors that came. This one, mostly Makah families took parts home to process as they wanted, whether to boil or fry, or barbeque. And just cook in the various ways that you can cook it.

Q. And you mentioned earlier teaching a portion of your curriculum dedicated to whaling.

A. Um-hmm.

Q. And I'm wondering if you could speak more about what terms there are that are specific to whaling and for instance place names or equipment that you teach?

A. Sure. So place names, there's one place named 'Č'i·ʔawa·ʔiyak', and it's close to the village of 'Biʔidʔa' Makah, is made up of five original villages, it being on the east side. And there was a small beach just around the corner from the main village and that was the place where they butchered whale, the 'Biʔidʔa' people.

And then in our high school curriculum, chapter four is just all about whale hunting. So you learn the 'ʔuʔu·taǩ', the term for whaling. And 'ʔuʔu·taǩiq' the whaler, the 'dupu·yaq' are the seal skin floats and 'ƛatawač̓ak' the

paddle and then we have various types of canoes, each one has their own name besides the generic term canoe. So 'ʔuʔu·ta x̌sac' is a whaling canoe specifically.

And in that chapter, besides just learning the terminology, you can't separate language from culture and you, so along with that, I would teach about the positions in the canoe. So there are eight people in the canoe, each one had a spot. And so 'pu·xʷaptiʔi·' is the person that would blow up the seal skin floats for the buoys, and then there was a 'ƛi·čƛičeyak' is the steersman, the 'hitakʷad' is the spearsman in the front, another person was a one float-tender, another one was a line-tender, person that was a watcher, they all have names in the language for each position and it has to be done in synchronization, just like that. And so they practiced and practiced to do that and that's why we were successful at it.

But along with the practice again the term 'hi·dasubač', prayer and preparation all the way around not just physically, but in your heart what you are intending to do to provide for the people.

They also, whaling stories that are told during that chapter as well as whale songs.

Q. And in your experience did the 1999 hunt help to strengthen interest and engagement in Makah language

and the culture you've discussed?

A. Yes, because, like I said we would learn terminology and learn about process, but it's like it became a part of what we were doing, actually, so a living culture rather than just talking about the culture, actually doing it. And so all the different practices in the 1999 whale hunt had to do with the couples that were, the female that was with the whaler and what she had to do.

There were specific restrictions and things that happened that the people learned about the rest of the people supported and a lot of prayer went before. Because it was against, it was done so differently with a lot of opposition. Where before it would have just been natural and the way we would do things.

So I also think more songs about whaling were used and just more in people's identity as far as, I mean, if you come to Neah Bay there's whaling scenes on basketry, if you view our weavers. There's carvings and people's regalia have whales, whaling scenes on them because of the, like I said, it was out main, one of our main food sources, or the biggest food source we had.

Q. Thank you. There have been suggestions from outside groups that the Makah could preserve culture through other means, such as whale-watching, or whale

viewing. Do you think actual hunting is necessary to preserve and strengthen Makah language and culture?

A. I do. I think that is something, it was a right that we secured specifically in our Treaty. And we never thought that it would not be held up. And I think that by doing these kind of things not only strengthening the language and culture but our health. I mean, I'm sixty and a senior citizen is fifty in Indian country because of our mortality rate and the diseases and things we had, you know, so many people died from, like smallpox, measles, whooping cough early on.

And then today due to our diet as well we struggle with diabetes and heart disease. And the whale and whale products are, they are good for you, they're healthy.

Q. Thank you. And you've mentioned whaling songs and family traditions several times, and as a final question I'd just like to ask you if you'd like to share a song with the Court today?

A. Sure, I can do that.

Q. Okay, go ahead.

A. So I'll just give a little bit of explanation about it. This song is a, it's a whale towing song. And it's about how we observe the whale and the all of the other components around the whale. So there's a little

bird even though you wouldn't think it would be very associated with the whale it is because it eats the same thing, has the same diet as the whale. So that little bird eats krill. And in our stories they say that it's like a partner to the whale, because they eat together. So he, the whale is looking for someone who is prepared to take its life, and it will live in a different form. It will be honored by our people, and comes to our village. So there's a big process for that.

But the words say that the little bird allowed it, the little bird also was in tune with the crew and who's harpooning the whale and that this group is in a good place spiritually, mentally, physically, emotionally and it actually gives itself to the crew for the people.

And so this song says the little bird was not home and the little bird allowed this to happen. And then parts of the song are to encourage the crew to pull hard on their paddles to be able to tow, because whales are heavy. And so even though it has all these floats on it they have a big job once it's done to tow it back.

So it says there's a storm coming, everybody paddle, that's what the words mean. So…

Witness, Maria Pascau Shares Native Makah song in the open hearing.

(SINGS NATIVE SONG 1:00 to 1:01)

THE WITNESS: And it goes on and on because you have a long way to pull.

MR. GOLDING: Thank you.

THE WITNESS: But it's, that's -- also the whale talks in the song, so the little sound that you heard was the sound of some of the whales and how they talk or sing or make noises, communicate.

MR. GOLDING: Well, thank you very much for sharing that with us. And that's all I have.

THE COURT: Okay, is there any cross-examination?

(NO RESPONSE FROM THE PARTIES.)

THE COURT: Okay, thank you very much for your testimony.

THE WITNESS: Thank you.

THE COURT: All right. Doctor Weller can resume the stand?

DOCTOR DAVID WELLER

CROSS-EXAMINATION

BY MR. SLONIM:

Q. Good morning, Doctor Weller.

A. Good morning.

Q. My name is Marc Slonim, I'm an attorney for the Makah Tribe. I'd like to ask you some questions this morning about the, what's referred to as the 2018 Western

North Pacific Stock Assessment Report, which was published, in I believe March of 2019.

A. Um-hmm.

Q. That's Exhibit, NMFS Exhibit 2-12, which attached to the second declaration of Shannon Bettridge. We'll have a copy on the screen, but I'd also like to provide Your Honor a hard copy to the witness and the parties so that he can refer to it.

THE COURT: You may.

Q. It might make it easier. Doctor Weller did you, were you one of the authors or did you contribute to this Stock Assessment Report?

A. Yes.

Q. And on the 2nd page of the report in the 1st full paragraph the report discusses two stock structure hypotheses, that relate in part to the whales that feed off of Sakhalin Island and Chukotka Peninsula, is that correct?

A. Yes, that's right.

Q. Okay. And the two hypotheses discussed in that paragraph were deemed most plausible in the International Whaling Commission's Rangewide Workshops on North Pacific gray whales; is that correct?

A. Yes.

Q. All right. Is it also correct that those

hypotheses were developed using all available data sources including photo identification studies, genetics, and tagging studies?

A. Yes.

Q. And is it correct that the International Whaling Commission's Scientific Committee accepted the hypotheses based on the last report of the Rangewide Workshop?

A. I don't know your term accepted. But they stated that they were the most plausible.

Q. Okay. And is it correct that you participated both in the Rangewide Workshops and on the Scientific Committee's review of their report?

A. Yes.

Q. Okay. Is it correct that they two most plausible hypotheses are premised on two historical breeding stocks or biological populations, a Western Breeding Stock and an Eastern Breeding Stock?

A. Yes.

Q. So, under the 1st of these 2 hypotheses which is labeled 3A, the historic Western Breeding Stock is extinct, and the whales feeding off Sakhalin and Chukotka are considered a feeding group of the Eastern Breeding Stock; is that correct?

A. Yes, under that hypothesis.

Q. Okay. So under that hypothesis, would it be fair to say that no members of the historic Western Breeding Stock migrate to the Eastern North Pacific, and more specifically, to the area of the Makah hunt because the historic Western Breeding Stock no longer exists?

A. Under that hypothesis, yes.

Q. Okay. Under the second hypothesis which is labeled 5A, both historic breeding stocks still exist and the whales feeding off Sakhalin include both, (1) whales that are part of the extant Western Breeding Stock and remain in the western North Pacific year round. And (2) whales that are part of the Eastern Breeding Stock and migrate between Sakhalin and the Eastern North Pacific; is that correct?

A. Yes.

Q. And then would it be fair to say that under this hypothesis no members of the historic Western Breeding Stock migrate to the Eastern North Pacific or the area of the Makah hunt because the members of the historic Western Breeding Stock remain in the western North Pacific year round?

A. Under that hypothesis, yes.

Q. Does the Stock Assessment Report disagree with the proposition that these are the most plausible hypotheses based on the information currently available?

A. I don't know if it necessarily agrees with them, but it's presented the best available science to inform the Report.

Q. Is there any place in the Stock Assessment Report where it says it disagrees with those hypotheses?

A. No.

Q. Does the Stock Assessment Report identify any other hypotheses that it considers more plausible?

A. No.

Q. Would you turn to the third page of the Report, and it is Bettridge Exhibit page 14. Near the bottom of that page there's a section called, "Status of Stock," can you see that?

A. Um-hmm, yes.

Q. And in that section the Stock Assessment Report discussed several lines of evidence to support the treatment of the WNP whales as a separate stock; is that correct?

A. Yes.

Q. I'd like to ask a few questions about how those lines of evidence relate to the question of whether the current WNP whales that migrate to North America are descended from the historic Western Breeding Stock as opposed to Eastern Breeding Stock.

A. Okay.

Q. So, first of all, was all the evidence that's discussed in this section available to and considered in the Rangewide Workshops?

A. As far as I know.

Q. As a general matter, does the Stock Assessment Report assert that these four lines of evidence demonstrate that the current Western North Pacific whales that migrate to North America are descendants of the historic Western Breeding Stock?

A. Could you repeat your question, please?

Q. Yes, does the Stock Assessment Report assert that these four lines of evidence demonstrate that the current Western North Pacific whales that migrate to North America are descendants of the historic of the historic Western Breeding Stock?

A. No.

Q. So, is it fair to say that the Stock Assessment Report does not address the question whether the current Western North Pacific whales that migrate to North America are descendants of the historic Western Breeding Stock?

A. No.

Q. It's not fair to say that? Or it doesn't?

A. It does not.

Q. It doesn't do that.

A. Right.

Q. It doesn't address that question. Okay. The Stock Assessment Report does assert that the current Western North Pacific whales that migrate to North America are listed as endangered under the Endangered Species Act; is that correct?

A. Correct.

Q. And what is the basis for that statement?

A. The ESA listing as endangered.

Q. That the, that the whales, the current Western North Pacific Whales that migrate to North American are the same as the stock that was listed under the ESA as endangered.

A. And what's your question?

Q. What is the basis for that?

A. I don't know the basis for that, I wasn't -- that was long before my time.

Q. What -- I'm asking about the statement in the Stock Assessment Report.

A. And what statement are you referring to?

Q. I think it is the first statement in the Status of Stock section.

A. Yes, um-hmm.

Q. So, by the WNP stock in that sentence, that's a reference to the whales that are currently observed in

the western North Pacific; is that correct?

A. Yes.

Q. Okay. And what is the basis for equating those whales with the whales that are listed as endangered under the Endangered Species Act?

A. Well, as I said, I don't know what the listing criteria were for the 1973 listing.

Q. So you don't know the basis for that statement?

A. I don't know the listing criteria for the 1973 listing.

Q. Okay. The Stock Assessment Report does say that at the time of that listing, that in 1994 when the ENP stock delisted, and the WNP stock was retained on the Endangered Species List, it was thought to be geographically isolated from the ENP stock; is that correct?

A. I believe so.

Q. And we now know that is not the case; is that correct?

A. That is correct.

Q. Do you know whether at the time, in 1994 when the WNP stock was retained on the Endangered Species List it was considered to be a remnant of the historic Western Breeding Population?

A. I believe that was the case.

Q. And do we know that that is still, do we still know that that's -- do we know that that is the case today, or is there uncertainty about that?

A. I don't -- can you go back and tell me what case it is, we want to know about?

Q. Do we know that the Western North Pacific whales are, that exist today are the remnants of the historic Western Breeding Population?

A. It really depends on the hypothesis that you are looking at. Some of the Western North Pacific whales continue to be thought of as a relic population, others are probably are not.

Q. But under the two most plausible hypotheses those whales don't migrate to North America?

A. That is correct.

Q. Okay.

MS. BEALE: I would object as to the vagueness, when you say, "Those whales," I don't know if the question can be answered appropriately.

Q. It referred to the whales that Doctor Weller said under some hypotheses might be the descendants of the historic Western Breeding Population.

MR. SLONIM: That's all I have thank you, Doctor Weller.

THE COURT: All right.

CROSS EXAMINATION

BY MS. LEWIS:

Q. Good morning Doctor Weller.

A. Good morning.

Q. Elizabeth Lewis for AWI. Have you ever accepted a grant or funding from the Makah Tribe as part of your scientific research?

A. No.

Q. Have you ever accepted a grant or funding from any other Native American Tribe as part of your research?

A. No.

Q. Would you agree that Doctor John Calambokidis is an expert on gray whales?

A. Yes.

Q. Would you agree that Doctor Jim Darling is an expert on gray whales?

A. Yes, he is.

Q. Thank you. Are you familiar with NMFS' stock identification criteria, the 2016 GAMMS?

A. Yes.

Q. Are you familiar with the criteria for identifying and managing populations used by the IWC?

A. Yes.

Q. Are those criteria, those under the MMPA and under the IWC, are those different?

A. Yes, they are.

Q. Can you explain how?

A. They IWC does not have a definition of stock. They look at the issue as a management issues, and so they have management units.

Q. Can you explain the difference between a management unit and a stock?

A. Yes, a management unit is a group of animals that has either been requested or could be requested to be hunted. And a stock is a spatially arranged interbreeding group of animals.

Q. And there can be, when you say, "interbreeding," that is under the MMPA's definition of stock; is that correct?

A. Yes, um-hmm.

Q. And there can be some level of external recruitment into a stock under the MMPA; is that correct?

A. Yes.

Q. In the 2013 Gray Whale Stock Identification Report; are you familiar with that Report?

A. Yes, I am.

Q. NMFS concluded that there was a quote "substantial uncertainty," end quote, regarding the status of the PCFG stock. Would you -- agree that there have been new studies regarding the behavior, genetics,

and distribution of PCFG whales since 2013?

A. Ah yes, there have been.

Q. Do you believe that there's any value in convening a workshop to reexamine the PCFGs population status?

A. The new information that I'm aware of, does not in my opinion change the conclusion of the task force.

Q. In your opinion, has NMFS consistently applied its Stock Identification Guidelines in regard to the PCFG population?

A. It's a little bit outside of my area of expertise.

Q. Okay. Is the designation of the WNP stock based on the best available science?

A. Yes.

Q. Would you agree that some members of the WNP stock migrate to the eastern North Pacific?

A. Yes, they do.

Q. In paragraph 32 of your 2nd declaration, you state that, "The increased number of WNP whales in the ENP range that are matched via photo identification is likely the result of additional data and increased efforts to match whales between the WNP and ENP." Would you agree then that based on this statement and based on the fact that the number of WNP whales that have been

identified in the ENP range has increased that it is likely that not all WNP whales that are present in the ENP range have been identified?

A. That's likely.

Q. So you agree that there could be additional WNP whales in the ENP range that have not been positively identified?

A. It's possible.

Q. In your 2013 Report, from the Stock Identification Workshop you note that PCFG whales spend more time near shore than other ENP whales, is that correct?

A. Ah, yes.

Q. Is it correct that PCFG whales generally have higher rates of scarring than other whales?

A. I don't think that's true. I think we evaluated literature that discussed that, and I think the conclusion of the Task Force was that it was not robust.

Q. Okay. Would you also agree that there is a risk that the proposed waiver and regulations would result in the unrecorded take of a WNP whale? If there are undetected WNP whales in the ENP range?

A. I think you need to rephrase your question for me.

Q. So if there are un -- if you agree that there

are undetected WNP whales present in the ENP range.

A. Um-hmm.

Q. Is there a risk that the proposed waiver and regulations will result in the take of a WNP whale that would go undetected because that whale has not been positively identified?

A. Let's see, that's a complicated question. No, I think the answer is no. Is if those animals, if I'm understanding your question correctly, the animals that have been undetected are known from the western North Pacific, it's just that we have not photographed them in the eastern North Pacific. So they are in the Western North Pacific Catalog.

Q. So they -- you have photo ID'd every single WNP whale and it is present in the catalog?

A. Close to it, um-hmm.

Q. Okay. Would you also agree that NMFS lacks the necessary data to calculate OSP for the WNP population?

A. Probably, we have very few data to calculate OSP for any population.

Q. Is it correct the MMPA defines take to mean to harass, hunt, capture or kill or attempt to harass, hunt, capture or kill any marine mammal?

A. I believe that's the right definition.

Q. So is it correct that the Marine Mammal

Protection Act defines harassment to include any act of pursuit or annoyance which has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns?

A. I don't know the definitions as well as someone like Dr. Bettridge does, so you might want to ask her.

Q. Thank you, that's, I understand. Do you need a MMPA permit when you conduct your scientific research?

A. Yes.

Q. Do you need this permit even if in the course of your research no whale actually reacts to your approach?

A. Yes.

Q. Would you agree that even temporary disruptions of behavioral patterns constitute take by harassment?

A. I don't know the definition well enough.

Q. So you would have that same answer then if I asked you whether you agree that even short-term disruptions of behavioral patterns constitute take by harassment?

A. I believe that's the case, but I would need to defer to Doctor Bettridge.

Q. How do you differentiate between members of different gray whale stocks?

A. You cannot.

Q. So you can't do that without comparing photos to a database?

A. You would need either photographs or genetics. But visually you cannot distinguish.

Q. Thank you. Of the estimated, I guess this number is different now, 232 did you say?

A. I think so, yeah, m-hmm

Q. How many are included in that photo catalog of the PCFGs?

A. All of them are in the catalog -- it's not my catalog, by the way.

Q. Ah yeah, it's Cascadia Research; is that correct?

A. And collaborators. But all 232 of those um-hmm.

Q. Do you know how many of those whales have been subjected to genetic sampling?

A. I don't know the answer. The expert is here in the room, but I don't know the answer, but quite a high percentage of them.

Q. Do you know how many photo ID databases there are for WNP whales?

A. There are two.

Q. Does the U.S. have access to those databases?

A. The U.S. has access, and when I say the U.S.

it's me as an individual researcher, has access to one of the catalogs.

Q. To just one of them?

A. Yes.

Q. So, are you aware of the concerns regarding the consolidation of those multiple WNP photo ID catalogs into one?

A. Yes, I've been working on that issue for a decade.

Q. Have these concerns been resolved?

A. Not yet, but we've made great inroads.

Q. Will they be resolved before any permit is issued if this waiver proceeding is successful?

MS. BEALE: I'm going to object on foundational grounds. I, we haven't established any, I don't know what the concerns are that you are talking about.

MS. LEWIS: We are concerned that the Proposed Hunt would result in the undetected take of a WNP whale. And so I'm asking Doctor Weller about the ability of the United States to identify the whales to their stock.

MS. BEALE: I still object to foundation and to concerns about consolidating the catalogs.

MS. LEWIS: If there are multiple catalogs, and this is mentioned in several of the declarations, actually. There are multiple catalogs and IWC and Doctor

Weller, as he just stated have been working to consolidate them to make the search more efficient and actually accurate.

MS. BEALE: Object that the questioner is testifying. I would ask you instruct her to ask the witness the questions.

THE COURT: Cross here is beyond the scope of direct. So, I will allow, if you can answer the question. Can you answer the question?

BY MS. LEWIS:

A. Ah yeah, can you summarize the question for me.

Q. Ah yes, of course. I was asking -- I had just asked you whether you were aware of the concerns regarding the consolidation. And I was asking you whether those current concerns will be resolved prior to the issuance of any permits if this waiver proceeding is successful?

A. Yeah, the only part of that question that I can really respond to, I don’t know the timing of everything else.

Q. Um-hmm.

A. But I can give you an update on this idea to reconcile and combine the catalogs is, we just came from a meeting last week where that was one of the main topics of our discussion; is how to go about that. The concept

is to take an industry catalog and a Russian catalog and combine them under the auspices of the IWC. Making those data available to anybody that requests them.

Q. Um-hmm.

A. We've made major inroads in terms of getting agreement from all data holders. Now, we are in the process of developing the template a memorandum of agreement and the signature on that so we can go forward with the project.

Q. Thank you very much for that update. Do you know whether every whale that is subject to an approach under this proposed waiver and regulations would be photographed for photo ID purposes?

A. That's the plan.

Q. Is this in your opinion feasible to photograph every single whale that is approached or subjected to a take?

A. I can't comment on that.

Q. Okay. Were you involved in calculating the risk to WNP whales posed by the Makah hunt?

A. Yes, I was in collaboration with Doctor Moore.

Q. Was this risk assessment based on the best available science?

A. Yes.

Q. So what is the chance that at least one Western

North Pacific whale will be subjected to an unsuccessful strike attempt or a training harpoon throw over the course of the ten year waiver?

A. I think it is one half of one percent.

Q. Subjected to an unsuccessful strike attempt, one half of one percent, is that what you said?

A. I believe so.

Q. Okay. In paragraph 49 of your declaration, you note that an unsuccessful strike attempt or training harpoon throw would likely result in temporary disturbance; is that correct?

A. Yes.

Q. Thank you. Would you agree that the primary objective of marine mammal management under the MMPA is to maintain the health and stability of the marine ecosystem?

A. Yes.

Q. So in paragraph 11 of your 3rd declaration, you report that, "Data regarding the impact of the UME on ENP and PCFG abundance will be available within 1 or 2 years. Is it consistent with that policy to waive a moratorium prior to obtaining and analyzing those data?

A. I don't know anything about that, I'm sorry.

Q. How many documented UME's for gray whales have there been?

A. At least one other.

Q. And is there any scientific evidence to support the assumption that ENP and PCFG population will respond to this UME in the same manner as the past UME?

A. We use the past UME as a guideline as to what we may expect this time; but we can't say for certain that it will follow the same pattern.

Q. All right, thank you.

A. Um-hmm.

THE COURT: Okay. Sea Shepherd?

MR. SOMMERMEYER: Yes, thank you. Brett Sommermeyer for Sea Shepherd. Thank you for the better microphone today.

CROSS-EXAMINATION

MR. SOMMERMEYER:

Q. Good morning, Doctor Weller.

A. Good morning.

Q. In your first declaration, paragraph 43, you testified that, "The United States has a longstanding practice of transferring any unused IWC quota for ENP gray whales to the Russian Federation for use by the Chukotkan Native hunters under the bilateral agreement between the two countries. As there is no reason to expect that the United States will alter its practice in the future, the net effect on ENP gray whale stock likely

will be the same with or without the proposed waiver and regulations." Do you recall that testimony?

A. Yes.

Q. And for the court reporter, IWC, International Whaling Commission, I will also use a term ASW, which it Aboriginal Subsistence Whaling.

And so you are part of the U.S. delegation to the IWC?

A. I am.

Q. As part of that delegation, you are familiar with the ASW quota assigned to the Russian Federation, correct?

A. Yes.

Q. That quota is then allocated to the Chukotkan Native hunters, right?

A. Yes.

Q. I believe that you testified about the U.S. agreement for the -- you did -- to the Russian Federation concerning the ASW gray whale quota?

A. Yes. I'm sorry, but the quota is actually Russia and U.S.

Q. Thank you. Under the current ASW quota for gray whales assigned to the federation a maximum 135 gray whales will be killed annually, correct?

A. Yes. But that's been updated and changed as of

2019.

Q. To what?

A. 140 per year.

Q. Okay. In 2016 the Chukotkan Native hunters killed around a 120 gray whales, right?

A. Approximately.

Q. They also killed about the same number in 2017, correct?

A. I believe so, but I can't say for certain.

MR. SOMMERMEYER: May I approach the witness just to refresh his recollection with a document?

THE COURT: You may.

Q. Just take a look at that and just let me know if you recognize it?

A. What year -- yes, I recognize this. What years are you referring to?

Q. So the last one -- I first referred to 2016. And then the second one was 2017.

MS. BEALE: I would just object and if we could identify what document.

THE COURT: Identify the document?

MR. SOMMERMEYER: Certainly.

THE COURT: Which exhibit?

BY MR. SOMMERMEYER:

Q. Do you recognize this document?

A. I recognize this from a website, yeah, it's the same website.

Q. And can you describe the document?

A. It's a list of aboriginal subsistence whaling catches since 1985.

Q. And for the purposes of the hearing, I obtained this from the IWC website. It's a list of the number of gray whales taken over the years for ASW.

THE COURT: Okay, so this exhibit has not been entered into the record?

MR. SOMMERMEYER: No, it's just for purposes of refreshing recollection, and for the witness.

THE COURT: Okay.

BY MR. SOMMERMEYER:

Q. I'm sorry. So, in 2017 they killed about the same number of whales; is that correct, 120?

A. Yes, 120.

Q. Okay. Isn't it true that the annual average kill since 2001 is about 124 gray whales in the Chukotkan hunts?

A. Something of that nature, yeah, um-hmm.

Q. If the portion, if the U.S. portion of the gray whale quota were reassigned to the Russian Federation the Chukotkan Native hunters would them have an annual quota of 140 gray whales; is that correct? That's been

updated.

A. They have a quota of a 140 gray whales, um-hmm.

Q. But again, historically they are catching less than about 125 whales a year.

A. Um-hmm.

Q. So as currently defined by the IWC and accepted by NMFS, National Marine Fisheries Service the range of the PCFGs does not extend into the waters of the Chukotkan hunts, correct?

A. As far as we know, yes, that is correct.

Q. However, using the U.S. portion of the gray whale ASW quota assigned to the Makah the Makah hunt would take PCFGs, correct?

A. Potentially, yes.

Q. So in paragraph 47 of your first declaration you testified that, "Despite over a 100 gray whales being pursued and killed in native hunts off Chukotka each year, many of which are killed during the summer feeding months, there has not been a discernable change in the availability and location of hunting whales in that region." Do you recall that testimony?

A. Yes, I do.

Q. Have you personally been involved in monitoring the Chukotkan Native ASW hunts?

A. No.

Q. So you based your opinion, that I just read in your first declaration, that the Chukotkan hunts do not have a discernable impact on gray whale availability and location in that region on reports by the IWC? By the Russian investigators?

A. That's true.

Q. Those reports do not document the same individual whales returning to the Chukotkan Native hunt area each year; is that correct?

A. No, they do not report that.

Q. Is it also true the reports do not contain any specific information about the actual effect of the hunt on the whales? Is that true?

A. I can't say, I don't know.

Q. But, you've reviewed --

A. I don't recall all the documents, I'm sorry.

Q. Okay.

A. Um-hmm.

Q. Your testimony this morning you spoke about the effects on PCFGs of approaches, attempts, hunts. You said that they will always be short-term; is that correct?

A. Yes.

Q. Okay. Why do you assume that they are only, that they will be short-term?

A. Based upon my own experience in the field conducting research.

Q. Okay. So in that, conducting that field research, do you follow-up, do you stay on the scene for a length of time to observe that whale for an amount of time?

A. I have done research and published on that.

Q. And that needs to be clarified. After a whale's been disturbed through a tagging activity, or a photographing activity, do you stay on the scene to observe that whale for a period of time?

A. We have.

Q. And what's -- how -- on average, how long do you usually stay?

A. It depends. It depends on the purpose of the research.

Q. Okay. And do you stay for the purpose of seeing how the whale will react to that disturbance, or other reasons?

A. A number of different reasons. It's to understand how long that impact might be.

Q. Have you ever been in the vicinity of a hunt, successful or unsuccessful of a whale?

A No.

Q. Have you had the opportunity to conduct more

long-term behavioral monitoring to determine if a disturbed gray whale returns to the area after a disturbance?

A. Yes. And this type of disturbance is in the form of a seismic survey.

Q. Can you describe that?

A. A seismic survey is, in this case it's off of the north eastern coast of Sakhalin Island. And there we have done a photo identification and distribution and density assessments that overlap with disturbance from seismic surveys, these are geophysical boats that are surveying on the bottom. It's one of the loudest sounds made on earth.

And what we have been able to determine is that the individual identification of whales remains generally the same. And the distribution may shift within a small area, but generally also remains the same.

Q. So you see the same whales returning to the same site despite the seismic activity?

A. They were -- they not only return the following year, but they stay.

Q. And do you know why they stay?

A. They're feeding.

Q. Feeding, okay. And did you see the same whales returning to these same site on multiple occasions?

A. Yes.

Q. Over multiple years?

A. When you say the same site, the site is quite large, it's, you know, 70 by a 100 kilometers. And there are two feeding areas in shore and off shore, so I, we would need to look at a map --

Q. Okay.

A. -- in order to --

Q. Okay, right. And you said there are two feeding areas, there are two specific feeding areas where you see more whales returning to each year?

A. This is off of Sakhalin Island.

Q. Correct.

A. So it's in the western North Pacific.

Q. Right.

A. There are two feeding areas, an offshore area and a near shore area.

Q. Okay. And you see the whales return to -- you were trying to determine which site, so using those as an example, you see whales returning to those two sites on multiple years despite seismic activity?

A. Yes, but not exclusively to -- they also have interchange between sites.

Q. You also testified earlier this morning about PCFG site fidelity. Are you saying, to clarify your

testimony, are you saying that no PCFGs have site fidelity to less than a 60 kilometer stretch of coastline?

A. According to the best available science, which is Calambokidis et al.

Q. Which is what?

A. Calambokidis, et al.

Q. All right. Would you agree that there are PCFGs that exhibit site fidelity?

A. There are PCFG whales that will return to an area for multiple years, but it doesn't mean they stay in that area. So they visit the area and then they'll leave.

Q. And why do they visit the area?

A. To feed.

Q. All right. So using your definition of site fidelity, just to make sure I understand, you equated it, site fidelity to a range.

A. Um-hmm.

Q. So is it your opinion that site fidelity never involves a specific site that it is a range only, or…

A. In this particular case, yes.

Q. In what particular case?

A. In the Pacific Coast Feeding Group.

Q. Only with the PCFGs?

A. Well, if you want to talk about mammals in general, there's a lot of stories there. But if we are talking about this particular issue.

Q. Gray whales.

A. The fidelity is to the Pacific Coast Feeding Group.

Q. Okay.

A. Or the Pacific Coast Feeding Range, I'm sorry.

Q. And you testified earlier that you reviewed Ms. Newell's testimony.

A. I have.

Q. How do you explain the numerous whales that she meticulously identifies in Depoe Bay, Oregon that come year after year and she actually has a descriptive book that has them all carefully described and named, how do you -- how does that -- how do you explain that?

A. That's not unusual or unexpected. But it doesn't mean those whales stay there the entire time. So they return year after year it might be for a single day. And she may see them. I don't know her data, but it may be the case that they are seen on a single day, they go elsewhere, they come back, they go elsewhere, they come back. So I can't explain her data without seeing the book or….

Q. Okay. The, so National Oceanic and Atmospheric

-- NOAA, defines site fidelity as the degree to which individuals utilize the same site year after year, does that comport with your definition using range?

A. Depends on the scale of site that you are referring to. And in the case that I'm referring to the site is 41 to 52.

Q. Degrees, okay. So this only refers to the full range of PCFGs it's not just individuals, but feeding group sites, feeding sites?

A. Can you tell me what that context of that, where that statement is coming from? What the context is?

Q. Yeah, it was in a, sorry, it was in a recent 2019 paper from NOAA on climate change effects on cetaceans. It came out in July of 2019.

A. Um-hmm.

Q. And they used that definition of site fidelity. I was just curious how --

MS. BEALE: I would object to foundation, with --

MR. SOMMERMEYER: I just provided foundation.

MS. BEALE: Without the opportunity to overview what you are referring to.

MR. SOMMERMEYER: I was just replying to his question, giving him a little more detail about the --

MS. BEALE: Is there a document we could refer to?

MR. SOMMERMEYER: We can. But, I just can go back to the, do you acknowledge the general definition that NOAA uses of site fidelity as the one that I read. I can read it again, if you'd like. But the degree to which individuals utilize the same site year after year.

MS. BEALE: I would object, again as to foundation, that I'm not aware of NOAA had any general definition of a word. What do you mean? A legal definition? A biological definition? Or, I don't know (inaudible few words) definition.

THE COURT: It would be better if we could get a copy of the website to see if this is just a comment or is it a documents from NOAA?

MR. SOMMERMEYER: One second, Your Honor, I have to look.

MS. PRUETT: The document is entitled, A Method for Assessing the Vulnerability of Marine Mammals to a Changing Climate. It comes from the NMFS site, SPO.NMFS.NOAA.gov. It is longer than that, do you want me to --

MS. BEALE: Is there any author, or, I don't --

MS. PRUETT: Yes, it is Matthew Lettrich,

Michael Asaro, Diana Borggaard, Dorothy Dick, Roger Griffis, Jenny Litz, Christopher Orphanides, Debra Palka Daniel Pendleton and Melissa Soldevilla. It is, has the NOAA technical, it is considered a NOAA Technical Memorandum. NMFS-FSPO-196, July 2019.

MR. SOMMERMEYER: Is that sufficient? I apologize for not providing it in advance. We just, and based on the testimony this morning, we were just looking at site fidelity, we were surprised by the definition used today.

MR. SOMMERMEYER:

Q. You testified early this morning that, correct me if I'm wrong, that food is plentiful for the gray whales currently.

A. It appears to be based upon population abundance and calf production.

Q. Given that opinion, how do you explain why, for example in the article referred to, the Raul (Ronzon-Contreras, et al) article that was DJ Schubert attached --

A. Um-hmm.

Q. How, that document, emaciated whales, how do you explain the presence of emaciated whales if there's in fact plentiful right now?

A. Well, there's a couple of things there. That

document, it's not emaciated whales.

Q. Emaciated.

A. It's actually whales in good condition, fair condition and poor condition. And I pointed this out in several documents that the difference between a whale in poor condition and emaciated condition are really night and day. Poor condition they can recover from. And these animals that are being reported from Mexico are in poor condition. So by no means does that mean that they are headed towards dying.

Emaciated whales are very different. In most cases I would say that emaciated whales are likely to perish.

So how can I explain the occurrence of that?

Q. Emaciated whales, yes.

A. We've seen it before. And so this may be a result of a temporary change in food, right? And we talked about the carrying capacity, sometimes the ceiling is high sometimes it's low. And that food may vary between times. So, if this is a 1 or 2 year cycle in which the food base is not as high as it once was whales may end up to be in skinny condition.

But I would say that my own work from Sakhalin Island in 1999 we were some of the first researchers to identify the skinny whale phenomenon. And we watched

those whales very closely and we watched them recover from that event. So I do know that whales in poor body condition as it's phrased in that paper can recover from that. So I would say that it's probable that either behaviorally they didn't feed as well as they normally would have or that where they were feeding the food was not as abundant.

Q. In your opinion, in your expert opinion do you think it is a coincidence that there's, a UME has been declared now and we have appearances of emaciated whales? Do you think there is any connection?

A. I think that's probably connected, um-hmm.

Q. All right, thank you.

THE COURT: All right, MMC? Peninsula. Okay, you -- okay.

MS. OWENS: (Inaudible).

CROSS-EXAMINATION

BY MS. OWENS:

Q. Margaret Owens Peninsula Citizens for the Protection of Whales. I really have so much to react to. That I'm going to try and just hit, hit the hot spots. NMFS exhibit 1-10 page 22, is the chart of the likely and maximum mortality of PCFGs under this current plan that's proposed regulations. So the maximum number of PCFG whales that may die in 10 year period by hunting is 25.

That may seem unlikely to happen, but anything can happen, it could happen that all 25 in 10 years would be PCFG whales. Do you think that would be a sustainable hunt pattern --

A. Yeah, just --

Q. -- for the PCFG whales? The Makah U&A whales?

A Yeah, there is a limit of the number of PCFG Whales in that ten year period which would limit it to 16.

Q. Well on this chart, it says, "Likely PCFG Mortality is 16," with 8 can be females. But the maximum if everything went wrong for the local whales, if everything went wrong, the number is 25. Which you, is pointed out that that is slightly below PBR of 28.5. So the possible number is 25 every ten years. Do you think that is a sustainable take from the Oregon/Vancouver Island general area population?

A. Yeah. I'm a little bit confused about the, I don't know what exhibit you referring to, so I'm a little bit confused about --

Q. It's submitted by NMFS under Chris Yates' exhibits.

A. Um-hmm.

Q. And it's a chart just like this, showing the number of strikes, likely PCFG mortality and maximum PCFG

mortality. So 25 is the maximum number of PCFG that could lose their lives in a hunt. I just think, I'll just say it, I think that's unsustainable.

THE COURT: Do you know what number that is?

MS. OWENS: It's NMFS exhibit 1-10 page 22 of 76.

THE COURT: 1-10, NMFS Exhibit 1-10.

MS. OWENS: It's a batch with 76 pages, page 22.

BY MS. OWENS:

A. I'm not --

Q. If it's true, what do you think? Doesn't that sound like a lot of whales? It's been worse in the past because when there were hunt plans allowed 20 every 5 years that seemed unsustainable. By now that would have been 80 whales by now with -- I, my opinion a heavy take on our local whales. They could be extirpated by now with 80 gone in the last 20 years.

Do you stand, did you stand behind every hunt plan that was ever put forward in an EA or an EIS including the inside the strait hunt, any time of year? Did you, do you approve of each and every one of the NMFS plans?

A. I did not. I was not involved in approving those plans. I was most recently involved in the latest

plan that we have in front of us today.

Q. Okay. I think in your declaration, you said that the 8 strikes in 10 years on female PCFG was a precautionary move and I think this is a direct quote, "Because recruitment may be internal," and I react to the word, "May".

A. Um-hmm.

Q. And I would just like you to explain why you used the word may? Is it because a portion may not be, or the whole thing's in doubt? Why do you say, "May be internal"?

A. I think the best available science we have is that recruitment is split about 50/50 between external and internal recruitment.

Q. So when you said, "May" you meant in total you don't know if all PCFG whales --

A. I would need to read the context for that, I'm sorry.

Q. Is there a way to know if a PCFG whale has both parents from the PCFG group?

A. There is a way to do that.

Q. Is that being done?

A. Genetic relatedness. I believe there is a study that's underway that is looking at relatedness within --

Q. So, there is a way to know if a particular whale has both parents, if it's true internal recruitment?

A. Yes, you can determine paternity for --

Q. Ah -- well, and so that is something that NMFS is pursuing the answer to?

A. It can be done, and I believe that that study is underway, but I can't confirm that.

Q. So in the meantime NMFS is assuming that there is a portion of the PCFG whales that have ENP fathers. I mean we can know the mothers, but we don't know the fathers. So with the internal/external debate you're sort of assuming that PCFG females mate indiscriminately maybe with a -- more likely with an ENP male?

A. Well, that's what the genetics data actually show.

Q. Well, if genetics data does show father why is that study still -- I mean, how do you -- you said those studies are underway.

A. Um-hmm. So --

Q. So how can you state that?

A. There is maternally directed mitochondrial DNA that shows a signal for the PCFG when you compare it to the broader ENP. But when you look at the biparental alleles from nuclear DNA there is no signal there which

suggest outbreeding that they are mixing during the breeding period that they are mixing, ENP and PCFG.

Q. And so, what do you think the proposition is?

A. I don't --

Q. Both parents PCFG and only mother PCFG?

A I don't think we have the, we don't have those data.

Q. So you, you are making a big assumption though in the management of these whales by not giving them any kind of stock status because of external breeding. But with a small population, you know for them to be genetically viable in the long-run they do have to have some genetic mixing, don't they?

A. Yes. But --

Q. So why are they being punished because they are not undermining their own viability genetically?

A. I don't think they are being punished. I just, I want to -- my job as a scientist is to look at this from a population level not at the individual level. And so the data that were used to inform our assessments and out analyses have to do with consequences at the broader population level.

I'm sorry, I know the individual animals are very important to you and I respect that.

Q. Well --

A. But I have been asked to look at it from a different perspective.

Q. The whole policy is important to me too. And the denial of stock status after 20 years of saying it's up in the air just seems unreasonable at this point. It seems unreasonable, and it seems like a tactic to preserve a Makah quota possibility. But that's my opinion.

Okay. I'll jump to something else. Speaking about the UME and potential causes and you said maybe it's not a food problem. Have you heard about the PVD virus that have moved from the Atlantic Ocean to the Pacific and is moving up into the mammals? There's an article came out the 11th of this month from CNN called "There's a Hidden Consequence of Climate Change. A Deadly Virus that's Killing Key Marine Species"?

A. I --

Q. It's called a PVD virus. It outbreaks every 5 to 10 years.

A. I --

Q. Are the whales are the necropsy checking for that virus?

A. That's an area of science that I'm not an expert in. And they may likely be doing that, but I can't confirm that, I don't know.

Q. Okay. And as far as the loss of sea ice, are you saying that's a positive for the ENP whales as far as expanding their feeding and contributing to higher calf counts? Are you saying that's a positive, the loss of sea ice?

A. So far that seems to be the correlation.

Q. But since there's a correlation between sea ice, the algae that grows under the ice that drops down and keeps the invertebrates healthy, don't you think maybe in the longer term it will be a great negative because the quality of the food without the ice, the algae from under the ice diminishes, it becomes less healthy. So is it possible that that could reverse? It's not just going to be a pure positive with all these calves being born due to low sea ice?

A. I can't speculate on the future of climate change. All that I can do is use the best available science that we have today and form my opinion based on that.

Q. Okay. I'll go to my other favorite topic.

A. Um-hmm.

Q. Why isn't in any discussion of analysis of the harm, the potential harm to ecosystems to the removal of whales, why isn't the Salish Sea ever even spoken? You know, it's such a big area.

A. Um-hmm.

Q. It's heavily used it includes South Vancouver Island, you know, includes a big area that's a completely different ecosystem from the California current ecosystem. But nobody will say the word Salish Sea.

A. Um-hmm.

Q. Why not?

A. Well it's, in our analysis we actually did consider the strait and the area where I believe you live and some of those animals that are at Neah Bay and in the southern part of the strait, we did consider that ecosystem. And when we looked at the Hunt Management Plan there are data from Calambokidis et al which show that the whales that utilize that part of the strait are predominantly PCFG whales.

So as part of the Management Plan in order account for and try and regulate the number of PCFG whales that might be taken we excluded that portion of the strait from the hunt area. And so it's just the oceanic portion of the U&A and not within the strait itself.

Q. Well --

A. And it was specifically to try and avoid PCFG whales.

Q. I understand why the hunt was moved out of the

strait, there were a few problems, including the 50 caliber gun use right along the shore.

A. Um-hmm.

Q. Which our group really opposed. But a question was asked of a witness yesterday, is it true that there will be no hunting inside the strait, inside the Salish Sea and the answer was yes. Well, that's sort of an irrelevant point.

A. Um-hmm.

Q. Because the whales that are in the Salish Sea are the very same whales that also are on the outer coast. You know, we're not proposing the concept that there are whales that only live and feed, you know, in the Salish Sea. We are saying it's part of their route. Part of their tour of food sites. What's ready to eat and when and they utilize the strait, they utilize south Vancouver Island. I mean, we are not stupid. We've been studying all this for 20 years, reading all your papers.

A. Um-hmm.

Q. Trying to keep up on everything. We don't think there are 33 whales that live in the strait period, that's, you know, that's silly.

A. Um-hmm.

Q. Of course they travel around. Of course it's about where the food is. But it's patchy food and it

comes and goes, and it blooms and dies, and there's a lot here and a little there. And they move around and the straits are a big part of that whole interaction with this area. And the Salish Sea is an extremely important and sensitive ecosystem.

A. Um-hmm.

Q. You start removing whales in the hunt area who also show -- know about the feeding sites in the strait, you're diminishing the whales from the feeding sites in the strait. And I know that you said you that you don't think there's a big site fidelity tie in to feeding sites. But, you know, and the cultural memory loss thing that, you know, I've said before too.

But are you familiar with the study of humpback whales small or sub-populations of humpback whales who were heavily decimated during commercial whaling and the sites that were never reoccupied once those mothers with their memory and knowledge of those sites were killed, those sites were never found and known by other whales. Are you familiar with that study? It's out there, it's --

A. Only in a very cursory manner.

Q. But, well it, it's important, it's relevant. There is such a thing as cultural memory passed down. I think you said there is no pass down. There is pass

down.

And the thing that was incorrectly phrased earlier and I, it's a struggle to find -- oh, here it is. You were asked about the annual return to an area that calves are born in. Do they return to that site? Well, that's an incorrect statement as we know. They are born, you know, in the warm waters down south. What they do is accompany their mothers because they are nursing babies. So they are going with their mothers where the mothers are feeding. The mothers are hungry, babies are hungry, they've got to produce 80 gallons or something a day, I mean, a big quantity of milk. They need to eat and the calves are with them. So the calves experience the locations where the mother feeds. And you know, along the coast, in the strait, up Vancouver Island, wherever that mother's mother took her --

A. Um-hmm.

Q. She takes her calves. So they become familiar with all kinds of areas, you know, by following their mother for eight months or so to her feeding areas.

A. Um-hmm.

MS. BEALE: Your Honor, with due respect I would just ask that a question be posed.

MS. OWENS: Um --

THE COURT: I --

MS. OWENS: I --

THE COURT: We need to have a question.

MS. OWENS: We can leave it at that.

BY MS. OWENS:

Q. Do you basically agree with that scenario?

A. I have, you know, the greatest respect for your dedication and passion for the animals that are in your area. And with your last statement that calves accompany their mothers, there is no doubt that they do. And you described essentially the same thing that I said, is that they go to multiple different areas. They are not faithful to just one area, the first place that they appear in the PCFG. It's very likely that they'll also then explore and take advantage of feeding sites within the PCFG range.

MS. OWENS: So there is knowledge that is passed from mother to calf and that's what helps create the site fidelity complex or whatever we call it. I mean, that is site fidelity, mother bringing calf to her feeding areas where her mother brought her, and that mother brought her, it's the natural lineal passing on of information. And if you kill that mother, you know, who knows how many other mothers know the same information about the little pockets of food that seasonally bloom and die, you know. There's a lot of little places along

the strait.

THE COURT: All right.

MS. OWENS: Okay. I'll have one more thing. Two more things.

BY MS. OWENS:

Q. One think that will kind of condense is there's so much uncertainty, I mean, I've circled every word that has to do with uncertainty: we don't know, we are not sure, the task force, even the uncertainty about stock status is a big uncertainty. There's so much uncertainty it seems so unprecautionary to just charge forward with a plan with so much uncertainty. I'll just say that, you don't have to react to it.

But I'll just say one more thing. When you talked about the IWC goals being, don't cause a group to go to extinction, and you said that's comparable to the MMPA. I don't find that really comparable, because the risk of extinction sounds different than, you know, the famous preamble to the MMPA. Marine mammals have proven themselves to be resources of great international significance, esthetic, recreational as well as economic. And it's the sense of Congress that they should be protected and encouraged to develop to the greatest extent feasible you know, et cetera. That doesn't sound like just don't let them go extinct. I don't think it's

the same.

MS. BEALE: I would just object to --

THE COURT: Well, it's again, ma'am, a speech, yeah.

MS. BEALE: I believe you are mischaracterizing his testimony.

MS. OWENS: I think the risk of extinction is different than allowed to flourish to the greatest extent possible within the confines of the --

THE WITNESS: That is the key tenant of the IWC conversation, 60% of their carrying capacity.

MS. OWENS: That doesn't sound like the fullest flourishing of a group. But, thanks a lot, sorry.

THE WITNESS: Okay.

MS. OWENS: Thanks a lot. Sorry.

THE WITNESS: Thank you.

THE COURT: Do wish to take a break before your begin your cross here. We've been sitting for a while. So we will take a ten minute break and then we will continue with MMC's cross and redirect.

(At 2:04 a brief recess was taken.)

THE COURT: Good afternoon, if we will come back. And, Doctor Weller, please take the stand, please.

CROSS-EXAMINATION

BY MR. GOSLINER:

Q. Good morning, Doctor Weller.

A. Good morning.

Q. Let's see, can you give us a brief description of the plans of the IWC's Scientific Committee to continue to review gray whale management issues?

A. Yes. There will be an implementation review to review available science in May of 2020, so this coming SC meeting. The committee will be tasked with an implementation review for gray whales in the North Pacific. That review entails reviewing any new information that may fall outside of the space which has already been tested in the last implementation review; they are done every 5 to 6 years. So the next one is just a few months from now.

Q. And then the next one after that wouldn't be for another 5 or 6 years?

A. 5 or 6 years. And I would add that we just finished a five year review of gray whales which essentially was a super intense implementation review, just a different terminology used. So the body of work that we did over the past five years will feed directly into this implementation review in May 2020.

Q. And would the implementation review be gray whales across the entire North Pacific, or would it be

Makah specific?

A. It's gray whales across the Pacific.

Q. So, western, eastern, however you want to characterize, all of them?

A. Yes.

Q. Are you aware of any studies that are ongoing, or plan that might give insights into the status and trends of the prey resources for the, used by the PCFG whales?

A No, I am not aware of any type of benthic sampling of other type of food based sampling that is going on, not to my knowledge.

Q. And is that something that the National Marine Fisheries Service might be interested in doing as it relates to this rule-making in particular?

A. It has been done in other places. I don't know whether the Agency is interested in doing that. But it has been done in other places for different purposes, but in order to understand the food base here for whales.

Q. Okay. In your initial testimony you indicated that the matches from PCFG whales could be made in 24 hours, I believe it was. Do you have any inclination what the turnaround time would be for the Western North Pacific cohort?

A. Under some scenarios it could be the same

depending on who is tasked with doing that actual work.

Q. And those would be done by Cascadia as well, or something you would do, you said you had access to it, to at least one of the catalogs.

A. One of the potential plans, it has not been confirmed, would be for Cascadia to do all of the matching. They are capable of doing that. I have collaborated with matching their catalog to the west in the past. So they are capable of doing that.

Q. Okay. And your testimony also talked about a 20% error rate in the matches for the PCFG. Can you briefly or kind of expand upon that? What kind of errors are we talking about and what the implications for that might be?

A. Yes, so that error rate is, (1), it's not a quantitative assessment of what the error rate was, it was a personal communication that then became part of an IWC report from Cascadia. And that was John Calambokidis best assessment in his opinion.

What that means is that, there's a couple of different things. Either you are looking for a PCFG whale and you don't find it and it is a false positive or a false negative the opposite way. That 20%, I believe is relative just to the winter/spring when there are a lot of other animals in the area, when young animals are

in the area which may be not as easy to distinguish. And so it's not across the board. And in this case, the error rate during summer period hunt would be zero, because we assume all of those to be PCFG whales.

Q. Right. And would you expect a similar error rate for the Western North Pacific matches?

A. It's lower, I think. The catalog is smaller and we don't have the inflow of you know the entire eastern population flowing by and photographing them. So it's an easier task. The comparisons are fewer and so I would estimate something more like 1% error.

Q. All right, thank you. In your view how important is it to the management strategies and the proposed rule to be able to maintain the current photo ID catalog for both PCFG and for the western North Pacific?

A. The PCFG, maintenance of the PCFG catalog is under the direction of NMFS and is partially funded for that, is that what you are asking?

Q. I don't, you are kind of assuming where I'm headed.

A. Oh, I'm sorry.

Q. But the question was how important do you think it is to have adequate catalogs for --

A. Oh, it's very --

Q. -- for your management strategy?

A. -- it's very important.

Q. And then as you anticipated that my next question is how reliable are the funding sources available to maintain those catalogs?

A. Yeah, I think the, the -- Doctor --

MS. BEALE: I would object. This is not within scope of Doctor Weller's testimony. I don't believe, if I am mistaken, please answer. But I don't, I recall that that was in the testimony at the --

THE COURT: Well again, under the APA this was, that's not, we are not limited to the scope of direct, so that he can ask that question.

MR. GOSLINER: Thank you.

THE COURT: It's enough information, the examination, your cross-examination is to bring out the facts and especially given this is a rule-making versus adjudication, I would allow that question.

MR. GOSLINER: Thank you.

BY MR. GOSLINER:

A. Could you repeat it for me?

Q. Yeah, the question is, you were starting to say that NMFS does fund the PCFG catalog or at least in part contributes to that. So, I'll let you finish your answer to that. And then the follow-up question to that would be, how reliable are the funding sources and what

influences does NMFS have for, or the U.S. generally have in ensuring that the Western North Pacific Catalog is also well maintained?

A. Yeah. So, I think the assurance that the PCFG work will continue is high. And I would defer to Chris Yates, to follow-up on that if you need.

For the western North Pacific that project is no longer under the auspices of the U.S. really in any way, it's all Russians. And because of that there is no funding that's channeled from our agency to that catalog. So while there is some assurance that environmental monitoring will continue there, there's no guarantee that it will.

Q. And do you think that in light of your statement that it's really very important that we maintain that ability to identify those whales, do you think that there should be a contingency or condition that this rule is conditioned on maintaining an adequate catalog?

A. I think maintaining the catalog is an important component of how we thought about this.

Q. Okay, thank you. In Doctor Bettridge's testimony yesterday, she was talking about human caused mortality reported in the stock assessment reports. And I may not be quoting her directly, but essentially she

said that to be included in the stock assessment report it kind of has to be demonstrably and directly related to human cause. So I'm just wondering if in your experience you are aware of any additional sources of human caused mortality that may not be captured in that application?

A. Not that I am aware, no additional that I am aware.

Q. Okay, thank you. The Mexican lagoons that are at the southern end of the migratory range are kind of referred to as calving grounds or breeding grounds, which of those terms would you use, or would you use either of them?

A. I don't use either one; I refer to them as the wintering area.

Q. Okay. Could you, in your testimony you talked a little bit about this, but could you elaborate on what you think the best available science is as to where the whales are actually conceiving, giving birth and nursing their young along that migratory route?

A. Yes, so this is based upon research whaling data from the 1960's and 1970's collected off the coast of California by Dale Rice and Alan Wolman. It's published in a book and we use that as kind of our guide because it's the best available science that we have.

The mean date of conception in gray whales in

the eastern North Pacific is thought to be in the kind of mid-December period. I think there are the mean date of birth is somewhere around the middle of January I can't say exactly, but something like that. So calves are being born off of central California, for example. And then some of them are born slightly later as well.

Females go through an estrus period that has got about a 40 day delay between the cycles. And so if they are not impregnated the 1st time, they'll continue to migrate and they may become. So they may give birth, it's slightly asynchronous not all calves are born at exactly the same time.

Q. Right. And then, how does that play into the, your theories on separation of Eastern North Pacific and Western North Pacific whales? And specifically I think if Western North Pacific whales are migrating, the Eastern North Pacifics spend all or part of their winter months in Mexico, then, but how can you explain that they were nevertheless genetically differentiated from the Eastern North Pacific whales?

A. Yeah, that's then one of the most perplexing but also fun questions that I think has come up in gray whale science in the past many decades. But, the explanation that we have, well to backtrack, it comes from this genetic differentiation at both the

mitochondrial and nuclear level.

Q. All right.

A. There's been a lot of work done recently Doctor Bickham and his colleagues and others. But I think in a nutshell, what we are thinking is there may be selective breeding happening. So you've got animals in the western Pacific over here off of Sakhalin, and in the eastern Pacific up here. And as these guys are migrating this way they are mating mid-December. What we know from satellite tags is that these guys coming over here, if they are mating at the same time of year they are all the way over in the western Pacific off of Chukotka.

So our hypothesis is that those animals that are coming to the eastern Pacific from the west are mating with each other primarily, despite the fact that they then join the eastern population in the migration and get to the wintering grounds.

Q. Thank you. Since you talked about the satellite tagging, I presume that's the Bruce Maith work that you are referring to?

A. Yes.

Q. Let me ask another question about that, which is, based on that study the telemetry studies are -- is there any information from that study that would inform questions about the mobility and site fidelity of PCFG

whales?

A. No, there's, I don't think I'm understanding your question entirely. But, the animals that were tagged were all animals tagged off of Sakhalin Island.

Q. Okay.

A. And we followed some of them over here to the eastern North Pacific. But I don't think it informed us about Pacific Coast Feeding Group whales. There was a separate study done by Mate and colleagues by request --

Q. Okay.

A. -- on PCFG whales that were tagged.

Q. Okay, that --

A. IS that what you were referring to?

Q. Yeah, yeah.

A. Yeah, so in that study despite some caveats with the timing and when the tags were placed and where they were placed. But I think it, in summary what that study showed is that the PCFG whales range quite extensively within their range, from 41 degrees north to 52 degrees north and even outside of the range as well.

Q. Okay, thank you. You talked a little bit about the difference between management units and stock delineations under the IWC management regime. And I'm a little confused and just looking for clarity here, is that did you say that the IWC doesn't identify stocks or

that it does identify stocks but that's different than management units?

A. It does not identify stocks.

Q. Okay.

A. It uses management units.

Q. Let's see, and I guess one last question for you, is there any direct evidence that females with calves of the year are migrating from Mexico all the way to Sakhalin in that birth year?

A. There is evidence of that, yes.

Q. And what is that evidence?

A. Female whales accompanied by a calf, photo identified in the lagoons of Mexico have been reidentified off of the coast of Sakhalin Island.

Q. Okay.

MR. GOSLINER: That was all the questions I have, thank you.

THE WITNESS: Thank you.

THE COURT: I believe that concludes cross-examination. All right, redirect?

MS. BEALE: Thank you, Your Honor. I have just a couple questions. And then to clarify we do request to submit the new exhibit that Doctor Weller spoke to earlier which we have circulated to the parties and marked as NMFS Exhibit #3-101.

THE COURT: Okay. All the parties have had a chance to review. Have the parties had a chance to read the new exhibit?

MR. SOMMERMEYER: Partially.

THE COURT: Okay, just -- again, we will mark it for identification, we will have the witness just identify it now, and again if there are any issues with it we bring that up later in the hearing.

MS. BEALE: Okay.

REDIRECT EXAMINATION

BY MS. BEALE:

Q. Doctor Weller, there was some, some of the questions -- let me rephrase. Some of the question referred to a lot of uncertainties in the hunt proposal. So I'd like to ask you generally in your experience as a whale biologist, how would you characterize the state of gray whale science?

A. It's very advanced.

Q. Would you elaborate on that?

A. Yeah the, we have a terrific data set for both the Western North Pacific stock, the Eastern North Pacific stock and then the feeding group in the Pacific Coast Feeding Area.

Q. Doctor Weller we talked about your opinion regarding the potential effects of the proposed

ceremonial and subsistence hunt on the health and stability of the marine ecosystem. Just to clarify, what is your opinion as to how the hunt would affect the health and stability of the marine ecosystem?

A. I don't think it will have an impact on the ecosystem in which the Pacific Coast Feeding Group exists.

Q. So what ecosystem are you referring to when you say that?

A. The northern California current.

Q. And did you also consider health and stability within the hunt area and what effects that might have?

A. Yes, the same conclusion.

Q. Could you go ahead and state that in your words?

A. No detectible impact at the ecosystem level.

Q. Okay, thank you. And I wanted to give you an opportunity to clarify one thing, you were asked about the chance that at least one WNP gray whale would be subjected to an unsuccessful strike attempt and I believe your answer was one half of one percent. Is that what you meant to say?

A. I would like Doctor Moore in his testimony to discuss that with you.

Q. Okay. You also discussed your personal

research and field experience regarding your opinion that the effects of approaching whales are short-term. Is there other information that you rely on to inform your opinion that effects of approaches from the Proposed Hunt would be short-term in nature?

A. There are other examples, it's not necessarily from hunting information. But there are, yeah, a long list of studies on marine mammals looking at disturbance impacts and responses to those impacts.

Q. Do you give any examples or just a summary?

A. Yeah, I gave an example earlier on some of the work that I have done and my colleagues have done assessing response to seismic survey off the Sakhalin Island coast.

Q. Yes, thank you. And just a final question. You were asked about the proposal for how photographs would be taken in the course of hunt activities. Would you like to clarify your understanding of what the proposal would require in terms of photographs?

A. Yes, I may have misunderstood the question that was asked of me. And photographs, every effort would be made to take photographs during the hunt but not necessarily during training approaches or other related.

Q. And as far as your understanding of the Hunt Proposal, is are there measures other than photographs

that provide for how whales will be identified and accounted for under the Hunt Management Scheme?

A. Yes, in the case of whales that are struck by a harpoon, and the harpoon does not implant, tissue samples could potentially be gleaned from that. And from landed whales tissue samples can be collected. And then genetic genotyping or "fingerprint matching", essentially could be done.

Q. And in your direct testimony you also explained the proportional accounting for whales that would occur during the even year, which are the winter and spring hunts, is that right?

A. I'm not sure what you are --

Q. Accounting for PCFG whales that are -- how are whales that are not able to be identified, how will those be accounted for under the Proposed Management Plan?

A. Oh, in the summer it would be 100% of those animals would be assumed to be PCFG whales.

Q. In your opinion is that a conservative assumption?

A. Yes, it is.

Q. Why?

A. Based upon the data that we have been able to look at and that have been collected, about half of the animals in the PCFG range are PCFG whales during that

time period.

Q. Okay, thank you. And then, during even year hunts, what is your understanding of how unidentified whales will be accounted for?

A. I don't recall the specifics. But the mixing proportions show that about 28% of the animals during that times period would be PCFG whales.

Q. Okay, thank you.

MS. BEALE: That's all the questions I have.

THE COURT: Any cross?

MR. SLONIM: Your Honor we have limited recross.

THE COURT: All right.

RECROSS-EXAMINATION

BY MR. SLONIM:

Q. Doctor Weller, during Ms. Owens' cross-examination she asked you about NFMS Exhibit 1-10 and a table that showed maximum number of PCFG strikes during the ten-year hunt period, do you recall that?

A. I do.

Q. Okay. What we have on the screen is the first page of exhibit #1-10. This, exhibit 1-10 was a document that was sent to the Marine Mammal Commission in May of 2017, does that seem correct?

A. Who is it sent from?

Q. From the West Coast Region of NOAA.

A. Yeah, okay.

Q. Asking for comments on proposed regulations.

A. That's (inaudible word) I'm not involved in those types of communications.

Q. Okay. Do you know whether since May of 2017 additional provisions were added to the proposed regulations?

A. I don't know the answer to that.

Q. Do you know whether the limitation on the number of PCFG whales that could be struck was added sometime after this letter was written?

A. I don't know the timing, I'm sorry.

Q. All right. If those, if there were additional restrictions added after this letter was written that would affect the maximum number of PCFG whales that can be hunted, struck, is that correct?

A. If that is true, then it is likely, yes.

Q. Okay. And do you know whether the abundance threshold for PCFG whales, do you know when that was added to the Proposed Regulation?

A. I don't know the timing, I'm sorry.

Q. You don't whether that was added afterwards or not?

A. I don't.

Q. Okay. You were also asked, I believe by Mr. Sommermeyer, about the Russian Hunt. Were you on the U.S. Delegation at the 2018 IWC Meeting when the current catch limits for gray whales were approved?

A. Yes, I was.

Q. Okay, and do you recall what the change was from the previous catch limits?

A. I think it went from 135 with a maximum of 140 in any given year to 140 uniformly across all the years.

Q. So and, did the average increase to 140? Is it an increase in the average number?

A. The total per year went to 140.

Q. And that was an increase?

A. That was what?

Q. That was an increase from the previous catch limit?

A. Yes, it was, um-hmm.

Q. Okay. And do you recall the basis for the increase?

A. At the request of the Russian Federation. They have increased need.

Q. Okay. Did the Scientific Committee evaluate whether the increased catch limit met IWC's conservation objectives?

A. Yes, I believe so.

Q. And what did they conclude?

A. That it did meet their conservation objectives.

Q. Do you have any reason to doubt the Russian's stated need for additional whales?

A. I have no doubt.

Q. And do you have any reason to doubt that the Russians will expand their hunt to take the additional whales?

A. I can't comment on that, I don't know.

Q. No --

A. They've asked for it based on need.

Q. Okay. All right, thank you, Doctor Weller.

A. Um-hmm.

THE COURT: Any further Re-Cross?

(NO AUDIBLE RESPONSE.)

THE COURT: Oh.

MS. OWENS: Well, I would just say one quick one, very quick.

THE COURT: Okay.

MS. OWENS: Margaret Owens, Peninsula Citizens for the Protection of Whales.

RECROSS-EXAMINATION

MS. OWENS:

Q. I would just give you one reaction to your confidence in the high state of whale science knowledge.

And my one comment would be that you don't know what you don't know. And as an example I would say that the day before Bruce Mate's tag started indicating that that whale they called Flex was taking a turn and coming east across the Pacific Ocean toward North America, the day before every whale scientist on earth would have as they say in Hawaii bet house and lot that that was not going to happen.

You now there -- it's good to be a little humble and to acknowledge that you don't know everything, and there's a lot to learn. And that you could, you could bumble into a big mistake inadvertently by thinking you know all there is to know. I'm not saying you said that. But, just in general. Just a little momism.

A. Um-hmm.

Q. You don't know what you don't know.

A. Thank you.

THE COURT: Okay. Nothing further, then again, thank you for your testimony.

THE WITNESS: Thank you, um-hmm.

THE COURT: And right now we just made it to the lunch hour so we will be in recess until 1:00 p.m. and then we will start, we would have NOAA's next witness. We are in recess.

(At 11:58 a luncheon recess was taken.)

THE COURT: Good afternoon, we are back on the record. Okay, you can call your next witness.

MS. IMAKI: Thank you, Your Honor, NOAA Fisheries would like to call Doctor Jeffrey Moore. Whereupon,

DOCTOR JEFFREY MOORE,

A witness produced on call of NOAA was duly sworn on their oath, was examined and testified as follows:

THE WITNESS: I do.

THE COURT: Please be seated.

DIRECT EXAMINATION

BY MS. IMAKI:

Q. Good afternoon my name is Caitlin Imaki on behalf of NOAA Fisheries. Doctor Moore would you please state and spell your name, for the record?

A. I'm Jeffrey Moore; last name M-O-O-R-E.

Q. Thank you. And what is your address?

A. 8901 La Jolla Shores Drive; La Jolla, California 92027, that's my work address.

Q. Thank you. And where are you currently employed?

A. At Southwest Fisheries Science Center, NOAA.

Q. Thank you. And what is your current title at the Science Center?

A. I'm a research biologist and leader of our California Current Marine Mammal Assessment Program.

Q. How long have you worked for NOAA Fisheries in that role?

A. In this role since 2015. I've been with NOAA Fisheries in that Program since 2010.

Q. Thank you. And what are your major duties?

A. The program I lead is responsible for publishing, we are the lead author and editor of the U.S. West Coast SARs, or Stock Assessment Reports for marine mammal stocks off the west coast of the U.S. We do a lot of the research to provide a number of inputs to many of those SAR's. We advise the regulatory side of our agency on issues related to MMPA and ESA related management issues.

Q. Thank you. In what way have you participated in NOAA Fisheries development of the Proposed Rule and Regulations that are subject of this hearing?

A. As a risk assessment scientific advisor to the process.

Q. And what declarations did you submit in support of the Proposed Rule and Regulations?

A. Two declarations one initial declaration and a rebuttal declaration.

Q. Thank you. And in general terms, would you

please describe your overall academic, scientific or otherwise technical training that qualifies you to opine on the contents of your declarations?

A. Yes. I have a bachelor's, master's, PhD degrees in wildlife and fisheries science. My research has involved quantitative ecology, population dynamics, risk assessment for 10, 20 years.

Q. Your declarations describe two types of models that you and your colleague, colleagues developed. I'd like to first ask you some questions about your Western North Pacific gray whale stock risk analysis model.

A. Okay.

Q. Would you please explain the purpose of that model?

A. The primary purpose of that was to estimate the likelihood that a WNP whale would be struck or that there would be an attempted strike or approach to those animals during the hunt.

Q. And I'd like to discuss the most significant effect that you evaluated.

A. Um-hmm.

Q. What did the model predict about the possibility that one or more Western North Pacific gray whales would be struck during the Proposed Hunt?

A. Um-hmm. For an individual encounter I

estimated that there would be one and a half of a one percent chance that that encounter would be on a WNP whale. Over the course of a one year hunt where the maximum, if the maximum of three strikes occurred during an even year, that there would be a one and a half percent chance that a WNP whale would be in there. And over the course of the ten year hunt would be a seven, about seven and a half, 7.4 percent chance that a WNP whale would be struck.

Q. So putting that in perspective in terms of what the probability, what assumed probability there is of a gray whale being struck out of how many years, if the hunt were to continue?

A Sure, so if you did ten year hunt after ten year hunt after 10 year hunt we -- the expectation would be that that an animal every 135 years would be struck, a WNP, on average.

Q. Doctor Moore, what is the probability that two or more gray whales would be struck during the hunt?

A. Effectively zero. Most of, I'll clarify, the vast majority of the probability that's in the estimate of one or more is exactly one.

Q. Thank you.

A. Um-hmm.

Q. In testimony earlier today by Dr. Weller, I

believe there may have been some confusion about your joint model results as it relates to unsuccessful strike attempts.

A. Um.

Q. Would you please tell us what your model showed related to the possibility that an unsuccessful strike attempt would be on a Western North Pacific whale?

A. A unsuccessful strike attempt, I estimated a 9% chance that that would occur in a year. Or a 37% chance that it would occur over the ten year period.

Q. Thank you. So next I would like to turn to your forecasting model that you developed for the Pacific Coast Feeding Group and I would like to ask for permission to display an exhibit. This comes from NMFS Biological Report, which is Exhibit 1-7, and this is page 52 of that exhibit. Before we get to the details of this particular graph, Doctor Moore, would you please explain the purpose of your PCFG forecasting model?

A. Um-hmm. The principle purpose was to examine whether the, whether the hunt would have any appreciable impact on the population dynamics for the PCFG group. And then a secondary purpose is, was to evaluate through a forecast whether, to gain any insights about the likelihood that the population would be heading towards the triggers that are in the regs.

Q. And when you say, "the triggers", what are you referring to?

A. The 192 I think, yeah, 192 value and 171 that are shown as the horizontal lines, the horizontal black lines on the graph. So if the population size estimate, if the estimate for the PCFG were to dip below 192 that would trigger a stop in the hunt. Or if the minimum estimate for the PCFG size dropped below the 171 that would trigger a stop to the hunt.

Q. Thank you, and I believe Mr. Stone handed you a pointer, if that's useful.

A. Thank you.

Q. Doctor Moore, can you comment on what those numbers represent in terms of how they relate to the historic abundance of the PCFG?

A. The 192 and 171, right? Is what you are referring to?

Q. Correct, that's correct.

A. Um-hmm.

Q. Thank you for clarifying.

A. So the 192 is the lowest estimate that has been in the times series since 2002. And 171 is the lowest minimum abundance estimate that's been in the time series. And both of those come from, I think, 2007.

Q. And what's the significance of 2002 onward?

A. The PCFG numbers have been relatively stable slightly increasing since that time period. So it was kind of a conservative measure. Because if we'd included this part of the time series then our growth estimates here would, you know, wouldn't be going up much higher, and that's not reflective of what's going on in recent history, so we want to include that.

Q. Thank you.

A. Um-hmm.

Q. So what did you learn from this model?

A. Mainly that the impact of the hunt is small in terms of our expectation for what the population dynamics trajectory's going to do, that's the key, the key message. And also based on the data we have to date we wouldn't expect, and based on the assumptions and law, we wouldn't expect that the population is going to be heading toward the triggers in the next several years.

Q. Right. Would you mind just expanding on that just slightly just pointing to the blue line and the red line and --

A. Yeah.

Q. -- explaining what those two lines represent.

A. Okay, so the green line is the data, the blue line is the median projection forecast in the absence of hunt, and then the red line is the expectation in the

scenario of an average of 1.6 animals being removed per year.

And then similarly, this is our minimum population estimate without a hunt and with the removal of 1.6 animals per year.

Q. And the 1.6 animals per year, where did that number come from?

A. The regulations provide for a limit to the number of PCFG animals that can be taken over the ten year hunt period, and that's 16, 16 divided by 10 is 1.6 on average per year.

Q. And so, did your model account for the removal of 16 PCFG whales?

A. Yes.

Q. Over the 20, over the --

A. Ten years, um-hmm.

Q. -- ten year period.

A. Yeah, um-hmm.

Q. Thank you. Doctor Moore, would you be able to comment on whether this model accounts for the, any cumulative impacts that are affecting the PCFG mortality from, for example other predators such as killer whales, ship strikes, other environmental changes or sources that may affect PCFG abundance?

A. It does somewhat. It's, the data in the time

series to date implicitly are driven by all of those factors. So to the extent that the future predicted dynamics follow the same drivers that have been shaping the dynamics for the past 15 years. To that extent, yes it does.

To the extent that the system might change it wouldn't capture those changes except through updates to the data. So as it's been discussed quite at length we'll expect annual or near annual updates to the abundance time series. We have the one paper submitted last night, for example, that give us two new data points. So the model can incorporate that, those new data as they come in and so there's always a little bit of a time lag, but it should always be reflecting fairly recent impacts to the system.

Q. Thank you. And speaking of the new exhibit that was introduced today by Doctor Weller, and my colleague Ms. Beale.

A. Um-hmm.

Q. Have you had a chance to review the numbers that were included in that new report?

A. I've seen the table of new population numbers. I haven't had a chance to read the report, but I've seen the new numbers.

Q. And how do the new PCFG abundance estimates for

the 2016 to 2017 period align with your model projections?

A. Yeah, they are consistent. I can point out, so the most recent number on here, right, there's 243 that datapoint itself, with the new analysis is revised upward to 250. And then there are two new datapoints that dip down a little bit so that the most recent estimate for 2017 is around 230 here or 235, somewhere in there. And so, you know, I mean you can see that there is a lot of uncertainty projected forward so it fits squarely within, within all of that.

Q. What impact if any do you expect these new numbers will have on the conclusions that you've been able to reach from your PCFG projection model?

A. So given that the last, the most recent two datapoints are a little bit of a down tick the average annual population growth rate is expected to go down a little bit. The growth rate is still expected to be positive because the trajectory's still a bit higher than it was in the earlier part of the time series. But it will probably be less positive than it is now. So I don't know how much, but maybe the line will look like that instead of like that, if that makes sense. So look at that one, it's not easier to get in there.

But, it will go down a little bit. The whole,

so everything would shift down a little bit. But not, not in a way that, you know, is, that I would expect to be radically different from what we forecasted to date. But I have to rerun it to know that precisely.

Q. Do you have any expectations of how those new numbers may affect your projections of the anticipated impact of the hunt on the PCFG population group?

A. Yeah, I would expect the difference between the red and blue lines to look similar.

Q. Thank you.

A. Um-hmm.

Q. So, circling back to the PCFG abundance triggers, would you please remind us why NMFS elected to use low abundance triggers to, instead of PBR to manage impacts to the Pacific Coast Feeding Group?

A. Yeah, there are several reasons, really. I'd highlight a few that I think are the most important to me as an assessment scientist. One is that the, the whole PBR framework was performance tested using computer simulation approaches that used, you know, that make certain assumptions about how populations behave under certain situations. And the PCFG is, if we were to call it a population for the sake of conversation, it's an open population. So animals are coming into the system and going out of the system and the population dynamics

of such a system are not going to conform to the same assumptions, if you will, that the whole PBR framework was based upon.

Another reason is that PBR is a long-term management framework. So PBR is a limit reference point such that if human caused mortality and serious injury is kept below that level then, and over the long-term. So in the case of an animal, a long-lived animal with this kind of life history, the dynamics, you'd be thinking like can we take a certain amount of animals from the system per year over the course of many, many decades, a 100 years, for example.

And if you keep the removals below that level then there would be a very, very high probability that you would achieve your OSP management objectives in the long run.

It's not really applicable in my view to assessing short-term impacts on populations. We are not, the question that we are evaluating is not whether you can take 1.6 animals per year from the PCFG for the next 50 to 100 years, the question is whether you can do that for the next 10 years and PBR is not the tool to evaluate that question.

There is a third thing that PBR is also essentially a data-poor management tool. Which is what

is needed for most marine mammal stocks. It relies on just a few fairly simple inputs and some assumptions. And it's designed to work under a situation where you don't necessarily have a good idea in real time what is happening to the population. You know, it's kind of a black box system and you just, as long as we're -- we don't really know what's going on with the population but as long as we are taking only so many, removing so many animals from the system, we are pretty sure things are going to be okay.

But in systems where you have the sort of data that we have for all of the stocks and groups that we are talking about, where you have almost real-time feedback on what a population is doing in response to a UME, in response to levels of mortality, you can see if the population is going up or down. And in those circumstances there are better ways to, more precise ways to manage population than to rely on PBR.

Q. And is one of those more precise ways these abundance figures?

A. Yeah, absolutely. I mean, that's, it's a really conservative measure, right. So if, if the population dips below a certain level you stop the hunt. And you don't even really need to know what's going on, you don't need to know what the cause of that decline

was, you don't need to know whether a certain amount of take was, quote unquote "sustainable" for a long time. You see the population has gotten to where you don't want it to be and you stop. So, I mean, I can't see a more sort of failsafe approach, to be honest.

Q. Thank you. In yesterday's testimony, Doctor Bettridge was asked whether the single stranding of a PCFG whale was indicative of the UME related impacts to the PCFG.

A. Um-hmm.

Q. And whether it was possible that there could be dozens of PCFG deaths occurring. I'd like to ask you a few follow-up questions related to that subject based on your expertise.

A. Okay.

Q. Based on the single stranding that we know about, do you thinks it's possible that dozens of PCFG whales have died as part of this UME?

A. I think it's highly unlikely.

Q. And why is that?

A. Well, for one thing it's important to remember that animals die every year anyway. And for a population of about 250 animals there's going to be 3, 5, 6 animals per year that die of natural causes. For adults, natural annual survival rate for gray whales is probably on the

order of .97, .99 a year whatever. So it's still out of every 100 animals, one or a couple or a few dying per year.

So to make inference about whether a stranding is indicative of something going on in the system, you really need to kind of compare that to what's been going on through time. And in this particular case it's one animal and it's going to be very difficult to ascertain whether one animal is higher than our baseline.

But the other thing is that we've heard a number of times in the last couple days that for every animal that we see stranded, 4 to 13, that that might only be 4 to 13 percent of true mortality in the system.

And it's important to note and this is mentioned explicitly in the 2018, the most recent SAR for the eastern, the ENP gray whales that that multiplier, correction factor applies only to, it's a stock-wide multiplier. And let me explain what I mean by that. So, the way that number was derived is that there's a certain number of strandings that were, have been observed.

And then there are independent estimates of how many animals died from the Punt and Wade OSP assessment analysis. So, for example, the analysis says a 1,000 animals died, we saw 20, okay, then you can get a correction factor there. But those correction factors

are always going to be geographic location stock specific.

And in the case of the ENP, in case of the ENP range-wide there are animals dying, probably most of the animals that are dying in remote areas, off coastlines of Canada and Alaska where they are not going to be seen. And most of the animals that are being detected and reported are in more populated areas.

The PCFG exists entirely in human, along human populated coastlines. And the expectation would be that a much higher proportion of those animals that die will be detected. I don't know what the correction, what the appropriate correction factor would be, but it would be something higher that the 4 to 14 percent. So that correction factor is just not applicable to the PCFG specifically.

The application of any correction factor to a small sample size using these sort of, what are called ratio type estimators. So you have one animal observed and you estimate that the detection that your detection rate for dead animals is some small probability, 10%, 20%. And the tendency is to say, okay, 1 divided by .2, we think 5 animals die. That's a very biased approach for when you only have one or two animals and a small detection rate and that's something that I've written

about. There are a number of recent analyses, there are recent analyses that Jim Carretta who works in my lab and I have co-authored applying that to estimating fisheries really, and mortality for Cetacean stocks in drift gillnet, and fisheries off the west coast. And we've come up with better methods of extrapolating true mortality from rare event data, I call it.

Q. Thank you.

A. So no, I don't think -- so for all those reasons, I don't, I think it's highly unlikely that dozens of animals have died. And I think if dozens of PCFG animals had died in this UME to date, we would have seen a lot more than one so far.

Q. Thank you. So I'd like to turn now to asking you a few questions about testimony that has been submitted by other parties.

A. Okay.

Q. Specifically, I'd like to ask you questions about Doctor Villegas-Amtmann's declaration and her supporting exhibits. Her testimony draws conclusions based on certain energetic models. Have you had a chance to review her declaration and associated exhibits?

A. I have. The, in particular the 2015 and 2017 research papers.

Q. And I believe those were Exhibits 3 and 4 to

her declaration, does that sound correct?

A. Yes.

Q. Doctor Moore, what's your overall opinion of the energetic models that Doctor Villegas-Amtmann presents in Exhibits 3 and 4 of her declaration?

A. I think they are good. I think the work that's presented in those papers is impressive and does a thorough and comprehensive, gives a thorough and comprehensive treatment to developing a conceptual framework for understanding how disturbance can potentially translate into energetic consequences and which can potentially translate into demographic consequences. Yeah, I'll leave it at that for right now.

Q. In your opinions are there any shortcomings or limitations of Doctor Villegas-Amtmann's research in terms of how her models might inform our understanding of the energetic consequences, the potential energetic consequences of the Makah hunt on migrating ENP or WNP whales?

A. So I wouldn't say the work is flawed in any way, I mean, there -- I'm sure it's imperfect as all science research is; but it's good. But there are a number of limitations that the authors themselves very clearly, and thoroughly, and transparently lay out. I'm not bringing any additional criticism to their work other

than what they provide of their own work. Their work falls within the context of a big push of research over the last decade or so to understand the behavioral consequences of disturbance to marine mammal populations.

It's an important area of work. It's a difficult area of work. A lot of progress has been made for some marine mammal species and populations in understanding how certain human activities effect behavior of individuals. A lot of progress has been made in understanding how certain amounts of energetic loss or certain types of stress can translate into demographic consequences, such as reduced reproductive rates or reduced survival rates.

But there's still a ton that is not known. The -- how activities effect the behavior of individuals is still not known for a lot of populations including, I would say for gray whales. And then most importantly, how, I mean the real kind of missing link that a lot less progress has been made on is understanding how disturbance, behavioral modifications translate into impacts on energy budgets.

So in the case of gray whales we can say that certain activities might translate into the whales doing this or that. But we don't really know how this or that translates into energy loss or how, the extent to which

animals are able to compensate for that. And therefore, how that translates into demographic consequences and that, that remaining, large remaining uncertainty is, like I said, is clearly stated in those research papers.

Q. So in the case of gray whales, are there any circumstances under which the results of Doctor Villegas-Amtmann's model may not accurately predict the consequences of disturbance on a population?

A. Right. So the papers predicted, for example, I think the 2015 paper predicted that a 3 to 4% loss to the energetic need of an animal in a two year migration cycle to successfully have and wean a calf that a 4% loss to that would result in them not being able to successfully wean that calf.

But the authors note for example that if the animal just feed a little bit more, that that could alleviate that problem. Or if the disturbances that translate into that 4% loss can be evaded by going somewhere else, for example, that those consequences would be overestimated.

In the 2017 paper they elaborate on that quite a bit more. They changed some assumptions compared to the 2015 paper about how animals might essentially reinvest resources when necessary if energetic reserves are not there to a calf in one year that they can

essentially abort the process early, reinvest those energy, rebuild on those energy reserves and have a calf in the following year.

So essentially, I think the conclusions are ultimately that a really good conceptual framework has been put together by the authors. They've explored the types of scenarios under which energetic, against which net, certain levels of net energy losses can translate into some demographic consequences.

And they've kind of given some useful order of magnitude values for the levels of energy losses that would be important. So for example, if the animal is losing, has a net energy loss of 30 to 40% or something like that, that that's, starts resulting in adult mortality for example. It's a useful magnitude difference compared to what would cause reproductive loss, for example.

But in terms of being able to make direct inference about what the impacts are of particular activities, or particular behavioral modifications on gray whale population dynamics, I think there's not -- we haven't learned a whole lot from the work on that.

Q. Thank you. Doctor Moore, I believe there is, may also be discussion in those papers about potential effects of temporally or spatially limiting certain

disturbance and how that may affect resulting energy loss. And I wanted to ask you a few questions about that.

A. Um-hmm.

Q. The Proposed Hunt Regulations allow hunting during different months of the year, different months depending on the year; is that correct?

A. Yes.

Q. And during the even year hunt, which would be over the winter, what will the whales principally be doing?

A. Migrating.

Q. And how will the fact that most whales would be migrating influence the significance of any disturbance during those even year hunts?

A So during migration the animals are on the move anyway. And so the expectation would be that if an animal didn't like a boat approaching it, that it would swim a little faster, or move out of the way.

Q. And during an odd year hunt, what activities would whales that are encountered principally be involved in?

A. PCFG animals would be feeding.

Q. Okay. And how would the fact that, at least in terms of the PCFG whales, if they're involved in feeding,

how would that influence the significance of any disturbance during the odd year hunts?

A. So, I think we can say that feeding disruption is more important than a migrating animal just having it swim a little faster and move out of the way. So presumably the animals would have to go feed elsewhere.

Q. And do you expect they would be able to do that?

A. Based on the testimony of Doctor Weller, I would say yes.

Q. Does limiting the hunt spatially, to the Makah U&A influence the impact of any disturbance?

A. The MU&A is, as I understand it about a 4% area of the entire PCFG area, so animals should be able to find somewhere to feed that's not inside the MU&A.

Q. Thank you. And do you have an opinion about the potential levels of disturbance that may be caused to the ENP or to any of the whales that may be subject to the hunt in terms of the overall potential disturbance to those animals?

A. Well, I guess I just draw on broader context for these animals, right. So they are subjected to a more intense hunt elsewhere in the system. They're subject to approaches by whale-watching vessels, they are subjected to killer whales chasing them. So, the idea of

a smaller vessel approaching them and chasing them out of an area that they want to be in seems small in relation to the suite of disturbances that they are exposed to throughout their cycle.

Q. Thank you.

MS. IMAKI: I don't have any further questions.

THE COURT: All right.

CROSS-EXAMINATION

MR. GOLDING:

Q. Good afternoon, Doctor Moore.

A. Afternoon.

Q. Regarding the PCFG, and specifically the PCFG population forecast model, you helped develop that model, correct?

A. Um-hmm, yes.

Q. And that model omitted population abundance data from prior to 2002, correct?

A. Correct.

Q. And the reason for that is that there was relatively rapid population growth in the period preceding 2002; is that correct?

A. Correct.

Q. Had you included the earlier data, say going back to 1998, would that have resulted in a greater projected population growth?

A. It would have.

Q. So is it fair to say you took a relatively conservative approach?

A. Sure, I think it's just a more accurate approach.

Q. Regarding the PCF trigger in the Hunt Management Plan, did you help choose those population triggers, or develop those triggers?

A I honestly don't recall.

Q. Okay. Are those values chosen on the, based on the lowest population values from the years 2002 to 2015?

A. Yes.

Q. And is that a precautionary approach that you based the triggers on the lowest values?

A. Sure.

Q. Now the trigger is a population level at which the Makah hunt would be stopped. And as I understand it there are three ways in which that trigger could be reached: (1) would be an abundance estimate of less than 192 PCFG whales, is that right?

A. Um-hmm.

Q. The second would be a projected population estimate for the hunt year based on your forecast model of less than 192, is that correct?

A. Um-hmm.

Q. And the third would be if N min is less than 171?

A. Yes, estimated if, yes either from a new estimate, from a new survey or from the projections.

Q. Okay. And if any one of these three events occurred, that would be sufficient to trigger the hunt stoppage?

A. I believe so.

Q. Okay. And is the purpose of having these different means of assessing the trigger to safeguard against lags in data collection and assessment?

A. Different means of assessing, let me think about, on your question for a second. Could you repeat it please?

Q. Is the purpose of having, or maybe an easier way is to ask you, what is the purpose of having these three different ways of assessing the trigger?

A. Well the different, yeah so the expectation is that survey data will continue to come in so that we will, you know on an every, I don't know couple years or so get new information to be able to assess directly whether the population is below, whether the best estimate if below the upper trigger, or whether the minimum estimate is below the lower trigger. Keep in mind the minimum estimate is essentially a description of

our uncertainty in the population size.

Right, so you have a quote/unquote "best estimate" but it may not always be good. And so, you have also a lower estimate that says we have a certain amount of confidence that the population is at least above this number, right? And we want to have confidence that the population is above the lower trigger level. All right, so if either, if either the best estimate exceeds the high trigger or the low estimate exceeds the low trigger, then we kind of say well it's not where we want the population to be let's just be safe and not take any, remove any more whales from the system.

So then the question of whether, you know, where do the projections come in? Those are essentially to be used in the case where we don't have survey data anymore. And those sort of become a backstop describing our best inference about what the population might be doing if we are say seven years past the most recent survey. I don't think we're expecting that to happen.

Q. Okay. So including the forecast population, that's a safeguard against insufficient data?

A. Yeah, we wouldn't want to just stick with the most recent estimate and assume the population has remained at that level.

Q. Okay. And towards the end of your first

declaration you, based on your forecast model, you state that with the Hunt Plan, assuming permits are issued and the hunt takes placed over ten years, there will likely be 281 PCFG at the end of the plan; is that correct?

A. From the projection model that is the best inference from that model.

Q. Okay. And that's more than the current, the understanding of what the current abundance of PCFG is, correct?

A. That is. I would state that as you look further into the future the lower estimate becomes a lot more important than the median estimate.

Q. Okay. Regarding PCFG and the UME, in your declaration, you referenced your own paper, Punt and Moore, from the 2013. And I believe that there -- you identified a pulsed immigration event of PCFG between 1998 and 2001; is that correct?

A. Um-hmm.

Q. And that coincided with the most recent UME: is that correct?

A. Yeah.

Q. Okay. Regarding WNP whales, as part of your work, you assessed the likelihood that there would be approaches to WNP whales over the 10 year waiver period, correct?

A. Um-hmm.

Q. Now your assessment of the likelihood of those approaches assumed that all approaches could potentially be to WNP whales, correct?

A. No, it assumed, no it did not assume that. It did not assume that all approaches could be to WNP whales, no.

Q. What did it assume with respect to WNP whales?

A. As was the case for all aspects of that WNP Risk Analysis, the assumption is that the WNP whales and the migrating ENP whales are essentially randomly sorted together. So your likelihood of encountering a western whale during any given encounter with a migrating gray whale is based largely, not entirely, but largely on the ratio of population sizes of the WNP to the ENP.

The reason that the, the reason that we estimate such a high likelihood that a WNP whale would be approached, is simply due to the large number of approaches that are allowed for in the regulations, 353 a year, or 3,530 for ten years. So if all of those approaches did occur and importantly, if those were all occurring during the winter and spring which they probably won't, then just by the sheer number of approaches that are occurring it would be quite likely that at least one of those approaches would be to a WNP

whale.

Q. And you mentioned that likely it won't be the case that all those approaches would be in the winter and spring, if training approaches and training's more likely to occur in the summer and fall months, isn't it less likely a WNP would be present in the hunt area during that time?

A. That is correct.

Q. And finally, you reference in your exhibit, you reference in your declaration NMFS Exhibit 4-10 which is the Calambokidis 2014 Whale Surveys conducted through months March to May from 1996 to 2012.

A. Um-hmm.

Q. Do you recall that?

A. Um-hmm.

Q. Now over that period, within the northern Washington portion of the Makah U&A, there were recorded 181 whale days and none of those were WNP sightings, correct?

A. Right.

Q. Thank you.

THE COURT: Okay.

CROSS-EXAMINATION

BY MS. LEWIS:

Q. Good afternoon, Doctor Moore.

A. Hi.

Q. Have you ever accepted a grant or funding from the Makah Tribe in the course of your research?

A. No.

Q. From any other Native American Tribe?

A. No.

Q. Okay. So was your risk assessment based on the best available science?

A I do believe so.

Q. Did you account for variability in the estimated mixing proportions of the three different types of whales?

A. Yes.

Q. How so? Can you describe that process?

A. Sure. So there's two parameters in the model that the terminology gets a little mixed up, so I'm going to talk about both of them. What I refer to as the mixing proportion, is the proportion of animals during the winter/spring hunt that are PCFG versus non-PCFG animals. And for that parameter the value is 28% PCFG, 72% non-PCFG. And then conditional on an animal being a non-PCFG animal, there's another proportional parameter in there that's the proportion of WNP whales that might be traveling with the ENP whales. And there is, those parameters are both represented by distributions.

Q. Thank you. What is the risk of approaching from your risk assessment at least one WNP whale in one year of the event?

A. In one year, I think it's -- so that's 353 approaches. And again, based on the assumptions that those are occurring in winter and spring I think it is 80 something, is that what I?

Q. Ah, 82 yeah, for that.

A. I'll take your word for it.

Q. And then what the risk , when you expand that out to the full 10 year course of the Waiver, that is a 100%, is that correct?

A. Um-hmm, um-hmm.

Q. Thank you. So it is accurate that when you are developing these mixing proportions in your risk assessment you relied on surveys that were conducted between 1996 and 2012 in the Makah hunt area?

A. Partially.

Q. Can you describe what those survey methods were?

A. So I'll preface this by saying that Doctor Weller and I worked on these analyses together. I was the principle analyst, Dave was my primary advisor, you might say on gray whale data, relevant papers, biology and so on. So, he would be a better person to ask that

question to.

But generally speaking, it's based on photo ID data from the MU&A during the, during spring months over the years you mentioned, 1996?

Q. Six, yes.

A. Yeah. And during the course of that time, as in my last conversation, there were 181 whale days and of those 40% were PCFG animals, none were WPN animals.

Q. Um-hmm. Were those surveys primarily land-based, or were they from boats?

A. Boat based.

Q. Boat based.

A. Um-hmm.

Q. And do you, what proportion of the Makah hunt area did those surveys cover?

A. I don't know the answer to that.

Q. So, you report that there were 181 whale days. So that is a day that a whale was seen; is that correct?

A. Yeah. A little more specifically, if you saw two different individuals on a day, that would be two whales days.

Q. Okay.

A. But then if you saw the same two individuals multiples times in that day it's still just two whale days.

Q. Um-hmm.

A. But then if you saw them again the next day, it would be two more whale days.

Q. So that amounts to about, so you had 181 out of -- in that very long period that was what, 1996 to 2012?

A. Um-hmm.

Q. 16 years?

A. Um-hmm.

Q. Does that seem a little bit low?

A. The time period there, I don't think is very relevant, what's relevant is the number of whale days that were observed and how many of those were from different stocks or groups.

Q. Is it possible that there are more WNP whales that migrate to the western North American coast that are not detected?

A. So that's, you are, that's a different, you are going on a different topic there, I'm not sure of the context, so --

Q. I am just wondering if we are able to, if we've identified every single WNP whale that has migrated from the WNP area over to the United States coast.

A. Has it -- I, we probably have not.

Q. Okay.

A. And I think Dave Weller answered those types of

questions.

Q. Thank you. Is it correct that the risk that a gray whale would be approached, pursued, hunted or harassed increases with the amount of time that it spends within the Makah hunt area?

A. Sure. For any individual, the longer it's lingering the more risk it might incur, sure.

Q. Did your risk assessment account for the risk that, for example a WNP whale would stop in the Makah area or spend more time?

A. Only if, there would only be an issue there if the WNP whales are acting differently than the ENP whales and spending more time than the ENP whales.

Q. Okay.

A. So to the extent that all whales are doing some of that that's what's accounted for.

Q. Thank you.

A. Um-hmm.

CROSS-EXAMINATION

BY MR. SOMMERMEYER:

Q. Good afternoon, Doctor Moore.

A. Hi.

Q. Brett Sommermeyer from Sea Shepherd. Just a couple of questions.

A. Um-hmm.

Q. You testified earlier that there would less chance of a disturbance in the even year hunts, correct?

A. Less chance of a disturbance, no, I don't think I --

Q. A disturbance on the PCFGs, sorry.

A. I don't recall saying that.

Q. You, not to restate your testimony --

A. Please, do.

Q. Yeah, okay. You were saying that during even year hunts the PCFGs are more likely to be on the move and therefore they have more energetic ability to avoid disturbance I think is what you were testifying.

A. What I would have --

MS. IMAKI: Objection -- paraphrasing --

Q. Yeah, if you can clarify, that would be helpful.

THE COURT: Okay, yes. You can answer the question, if you can answer the question. Do you want him to repeat it?

BY MR. SOMMERMEYER:

A. No, I think I understood the question. So during the winter and the spring most of the animals that are encountered are migrating animals and will be on the move.

Q. And is that, and that's beneficial with respect

to the disturbance, if they are on the move?

A. I would think so. I'm not really the expert to say so.

Q. Who is the expert?

A. I imagine Dave Weller would have a better assessment of that.

Q. Okay. A portion of the even year facts, the even year hunt, a portion of the even year hunt is during the migration to the feeding grounds, isn't that correct?

A. During the migration to the feeding grounds?

Q. The northward migration, yes, okay.

A. Yes, um-hmm.

Q. So during that early portion of the migration back northward.

A. Okay.

Q. Isn't it more likely to encounter a pregnant whale?

A. Than?

Q. Than during the, during the migration to the south earlier in the year, say December, January. So say May, April, May.

A. I honestly don't know off the top of my head if that's true.

Q. Okay. Do you know if it is possible, it's not possible to identify a pregnant female during a hunt or

other related activity; is that correct?

A. I believe that is correct.

Q. Okay. Do you not agree that noise and other disturbances during the hunt will in fact alter the behavior and impose negative energetic costs on the whales that are subject to those activities?

A. I would certainly agree that certain types of disturbances or certain types of human activities, I should say is potentially, noise included will disturb some animals to some degree. And that any disturbance that causes a, like a movement response, for example, there will be energy used for that.

Q. Okay, thank you.

A. Um-hmm.

THE COURT: All right.

CROSS-EXAMINATION

MS. OWENS:

Q. Margaret Owens, Peninsula Citizens for the Protection of Whales.

A. Hello.

Q. Okay, I'll give you a chart. In your analyses, you are not making any distinction between the near shore, the migratory corridor. The hunt's going to be near shore, very near shore. Most of the ENP's going north and south are migrating at various distances

offshore. So, I remember saying in one of my comments, that the image of a needle in a haystack, you know to hit a PCFG isn't realistic because in the near shore will be the mothers, the calves of all the denominations of whales. They'll be hugging the short, avoid the orcas let the moms eat, let the babies nurse and be protected.

A great majority of the migrating ENP's will be further offshore cutting that corner. You know, they are over the shallow continental shelf they can just cut up. And so, I think that proportions that you come up with are you taking that into account? That the hunt will be very near shore?

A. So, a quick clarification, the Risk Model is for the probability of taking out a WNP animal. There is no estimate of risk to taking a PCFG animal in that Risk Model. For the WNP Model, the mixing proportion parameter, essentially, I think does take that into account. The reason that we estimate 20%, 28% of the animals encountered in the MU&A would be for PCFG animals is probably in part due to that effect, of it being more coastal. If that weren't the case, then we would expect a much lower encounter rate for PCFG animals.

Q. I couldn't put my hands on a piece of paper with me, but I'm surprised at that low mixing rate, because I thought it was more like 48% in the spring.

A. So there was a 40% value used in an earlier version of the analysis. And then based on a more recent IWC report which acknowledged that the sighting data on which the original mixing parameter was based did not adequately contain data from other areas of the PCFG. And based on that IWC recommendation, that mixing parameter was revised from 40% to 28%.

Q. And my --

A. And that is, and that was in part a conservative measure given that the purpose of that model was to estimate risk for the WNP. So using 28% instead of 40% increases the likelihood of encountering a WNP animal.

Q. You lost me a little bit.

A. Sorry.

Q. But we'll let that go. Am I understanding you to say that the 28% mixing statistic for encountering a PCFG in the near shore in the spring in Makah U&A is actually based on the whole, an average of the whole migratory corridor?

A. No, it's --

Q. Or is it specific to the Pacific Northwest Coast?

A. It's specific to the PCFG area.

Q. I really don't understand why it would be that

low. When PCFG whales, they're coming up from Baja, they're homing in. They're coming in.

A. Um-hmm.

Q. The main herd is cutting out, up. You know, I don't understand why it would be that low.

A. Um-hmm.

Q. You own the numbers, I can't argue with you about it. I'm not out in a boat counting whale noses, you know.

A. Um-hmm.

Q. I don't have a basis to argue with you. But I think that's really low. And I think what you are going to be encountering in the spring in the near shore off the coast are pregnant whales, nursing whales, and PCFG whales to a greater degree.

THE COURT: Okay.

MS. OWENS: Thank you.

THE COURT: Thank you.

THE WITNESS: I'll comment.

THE COURT: Okay, you may comment.

THE WITNESS: Yeah. -- we don't own the numbers. But I also want to, but I do want to point out that a fairer explanation of the interpretation of those data could be provided by Dave Weller. So, I'm, my --

MS. OWENS: Oh, you mean --

THE WITNESS: My hesitation to better explain why those are the numbers that are, I think you could get a better to that answer that by talking to someone other than me.

BY MS. OWENS:

Q. Well if it is the same answer then --

A. Yeah, I don't know.

Q. -- you know, I, I still would not believe it. Thanks.

A. Yeah. Those are the data we have.

Q. I get it.

CROSS-EXAMINATION

MR. SCHUBERT:

Q. Good afternoon, Doctor Moore.

A. Hello.

Q. For the record, this is Donald, or DJ Schubert. Doctor Moore, my colleague asked you some questions about mixing rates, or mixing proportions.

A. Um-hmm.

Q. And thank you for your response to that. I just wanted to dig a little bit deeper into the portion of Western North Pacific gray whales that migrate to the eastern North Pacific, if you don't mind.

A. Please.

Q. How important is that measure, that migration

rate, I guess you could call it, in your model?

A. How important is the mixing rate parameter to the estimates of risk to the WNP Model?

Q. Yes, specifically the migration rate, the proportion of Western North Pacific gray whales migrating to the eastern North Pacific? How important is it overall in the context of the, developing your Model?

A. Yeah, it's important. I couldn't give you a quantitative answer.

Q. Okay. In your 2013 Risk Analysis.

A. Um-hmm.

Q. The very first one.

A. Um-hmm.

Q. You used a .15 to 1 as the proportion of Western North Pacific gray whales that migrate to the eastern North Pacific; is that correct?

A. I -- for the -- that's going back a ways, I think that sounds right, um-hmm.

Q. Okay. Thank you. When you updated that Risk Analysis in 2018 you used .37 to 1.

A. Um-hmm.

Q. As the proportion; is that correct?

A. Correct.

Q. Okay, a little more recent. Easier to remember.

A. Right.

Q. So, and going even more recent, in your 2019 Risk Analysis, you referenced Cook, et al, 2019 as providing a migration rate of 0.60; is that correct?

A. Yes.

Q. So in that Risk Analysis when you conducted the calculations did you use the .37 or .60 migration rate?

A. In the most recent analysis?

Q. Yeah.

A. Yeah, .60.

Q. You did use .60?

A. With -- yeah. Um-hmm.

Q. Okay.

A. And with the uncertainty that's, that accompanies that parameter as well.

Q. Okay, I -- that, to me that wasn't clear from your paper.

A. Sorry.

Q. But one last question. No, that's okay. So the table that's at -- close to the end of that 2019 Risk Analysis, those numbers are based on the .60 migration rate?

A. Yes.

Q. Is that correct?

A. Yes.

Q. All right. Thank you very much.

A. Um-hmm.

THE COURT: Okay.

CROSS-EXAMINATION

BY MR. GOSLINER:

Q. Hi, Doctor Moore.

A. Hello.

Q. Just a, 1 or 2 quick questions here. One of which is, you said that your Risk Assessment Model was largely proportional. So the -- if you have, let's say rather than 27,000 Eastern North Pacific gray whales, you have half that number, the ten year risk assessment would show that there's twice the likelihood of taking a Western North Pacific, in your assessments, is that basically what you said?

A. It wouldn't be twice, because that's not the only one which the estimates are based, but you are on the right track.

Q. Okay, and that was really my question. You said it was largely proportional, I'm just wondering if you could explain what those confounding factors are that makes it not directly.

A. Ah yeah, not, nothing, yeah, nothing confounding. But it's based on -- so first of all you have that important mixing parameter that is the

proportion of animals in the MU&A that are PCFG versus non-PCFG animals, right. So then conditional on an animal being a non-PCFG animal, then there is the, then there is the ratio of WNP to ENP. So, it's a conditional probability. But the overall assessment also depends importantly on that mixing rate.

Q. Okay, thank you.

A. Um-hmm.

THE COURT: No further cross? Redirect? Please be seated, thanks. There are still more questions.

THE WITNESS: Okay.

MS. IMAKI: I have a few more questions.

THE WITNESS: Oh.

MS. IMAKI: You are not off the hook yet.

REDIRECT EXAMINATION

MS. IMAKI:

Q. Doctor Moore, during your cross-examination by Mr. Golding representing the Makah Tribe, you were asked a few questions about the abundance triggers. And specifically you were asked some questions about the significance of N min. And that's sort of a term of art that I was hoping you could explain.

A. Okay, sure. N min, we refer to it, it's a lower abundance estimate. It's in a PBR framework which

is where the Agency usually uses that, we use a 20 percentile for the distribution of abundance to represent N min. So it's a, essentially a lower confidence limit a 20 percentile confidence limit is how we tend to use N min in the Agency. It could be some other percentile limit. But basically, it's a value such that we have high confidence that the true population size is above that value.

Q. Thank you.

A. Okay.

Q. You also testified on your cross that we have data on the PCFG Group, the PCFG every two years or so. I believe we heard from Doctor Weller earlier that data is collected every year on the PCFG.

A. Um-hmm.

Q. I was hoping you could explain what you meant be receiving data every two years or so.

A. Sure I was simply referring to the frequency with which estimates are published. Or at least in the most recent years. So, for example, we just got the new report, Calambokidis, et al 2019 a day or two ago and the prior report had been two years before that. I don't know how much before that had been the prior one. So the data are collected annually as of recent history, they may or may not be published as frequently as that.

Q. Thank you. I would also like to follow up on some questions that Mr. Golding was asking you regarding your Model and how you viewed the assumptions within the Model.

A. Okay.

Q. And I'd like to direct you to your first exhibit, excuse me, your first declaration at paragraph 15.

A. Um-hmm.

Q. This is the first declaration you submitted in this matter. And he was asking you about how you considered approaches and whether all of those could be on Western North Pacific whales. Hopefully we'll get this up. Okay. So if you could make that a little bigger please, Rachel.

So about the middle of that paragraph it starts with, "And finally, the regulations limit". Could you review this section of your declaration, please. And explain to us what assumptions you made in terms of the number of approaches that could be made on Western North Pacific gray whales?

A. Okay. Perhaps I could start by reading the statement?

Q. Sure.

A. (Reads). "Finally the regulations limit

hunters to no more than 353 approaches per year. Because approaches are not limited by season, that is, during an odd numbered year hunters could make training approaches during the migration season when the WNP whales might be present."

"The analysis examined the potential for hunters to approach WNP gray whales a total of 3,530 times across all ten years. This assumption is conservative, likely to overestimate risk to the WNP since many approaches would likely take place during the summer months of both odd and even years when WNP gray whales are not expected to be present."

"Realistically, we would expect a substantial number of approaches to occur outside this period, such as during the summer when ocean conditions are more favorable. And in odd years when hunting approaches are restricted to July through October."

Q. So did the Model take a conservative approach to estimating how many approaches would be made?

A. Yes.

Q. On Western's?

A. Yes.

Q. Thank you. You were asked by Mr. Sommermeyer about whether disturbances would in fact cause any kind of negative energy costs.

A. Um-hmm.

Q. To whales. Do you recall that part of your testimony?

A. Um-hmm, yes.

Q. And I believe you agreed that there would be some kind of negative energy cost of any disturbance; is that correct?

A. Well, I think I agreed that energy would be used.

Q. Energy would be used. Is that the end of the inquiry? Or does it matter whether the cost is biologically meaningful?

A. Of course, it matters whether the cost is meaningful. The amount of the cost and whether it can be compensated for by, for example, eating a little extra food or resting.

Q. Thank you. And I understand you were asked some question about the 28% mixing proportion for PCFG within its range. And I understand you did defer some of that to Doctor Weller. But is it your understanding that the 28% is the best available science as we understand it today for the mixing proportion of PCFG within its range?

A. Yes.

Q. Thank you.

MS. IMAKI: No further questions.

THE COURT: Okay. Any re-cross?

(No audible response.)

THE COURT: Okay. All right, thank you, you are excused.

(Witness steps down.)

MS. BEALE: Your Honor, no other witnesses at this time.

THE COURT: You have no further witnesses at this time, okay.

Does the Makah have any witnesses at this time?

MR. SLONIM: Thank you, Your Honor. We call Doctor John Bickham.

Whereupon,

DOCTOR JOHN BICKHAM,

A witness produced on the call of the Makah Tribe was duly sworn according on his oath, was examined, and testified as follows:

THE WITNESS: I do.

THE COURT: Please be seated.

MR. SLONIM: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. SLONIM:

Q. Again, for the record my name is Marc Slonim I'm an attorney for the Makah Tribe. Doctor Bickham,

could you state your full name, address and occupation?

A. My name is John Bickham. My address is 31526 Lower Oxbow Trace; Fulshear, Texas. My occupation is, I'm a Professor Emeritus Texas A&M University, which means I'm retired and currently working as private consultant.

Q. Did you prepare written testimony for this proceeding consisting of a declaration, attached written testimony and exhibits?

A. I did.

Q. And what did you attempt to do in the testimony you submitted in this proceeding?

A. Well, the goal of my testimony was to explain issues related to stock structure of North Pacific gray whales, and to fairly characterize the certainties and uncertainties as I see it that pertain to those stock structure hypothesis.

Q. Can you describe your educational background and experience as it relates to the stock structure issues addressed in your written testimony?

A. Yes. I have a Bachelor's and Master's Degree in Biology from the University of Dayton. And a PhD in Zoology from Texas Tech University. I served on the faculty at Texas A&M in the Department of Wildlife and Fishery Sciences as a professor for 30 years. I left

Texas A&M in ’06 and went to Purdue University where I was a faculty member in the Department of Forestry and Natural Resources, which is where they have their wildlife program and also served as the Director for the Center for the Environment. Following that I spent three years, I moved back to Texas, I spent three years as a, working for a private research company, called Patel Memorial Institute and since then, as I said, I’ve been a private consultant.

Q. And can you just summarize the areas in which your work as a professor and a consultant have focused?

A. Yes. So my area of expertise is genetics, genet cytogenetics, molecular genetics, and genomics focusing on natural populations of wildlife. I’ve published about 245 papers in the peer reviewed scientific literature and those papers have been cited approximately 10,000 times. I -- anything else?

Q. Can you summarize just briefly the work you’ve done in studying whales and gray whales in particular?

A. Yes. So in the later part of my career I focused quite a bit on marine mammals including, such as Steller sea lions in the 2003. I began a project with the North Slope Borough of Alaska on bowhead whales and as a result of that I, since that time have worked as a member of the Scientific Committee of the International

Whaling Commission.

That work led to connections with people like Jon Scordino and an interest in gray whales and so for the past approximately 5 years or 6 years I've been working on gray whales. That work is genetic work, as I said, I'm retired, I don't have a lab. But the genetics that we are doing is funded by industry. It's funded by Exxon and Shell as part of their Sakhalin Gray Whale Monitoring Program. And the actual work is done at Purdue University, Doctor Andrew DeWoody is the Director of that lab, so you'll see his name and his post doc's names on our publications.

Q. So you have been involved in the scientific study of what are referred to as the Western North Pacific gray whales?

A. Yes, that program, our genetics project focuses on the issue of what exactly is the western gray whale and how does it relate to other populations of North Pacific gray whales.

Q. And were you a co-author or a contributor to recent research involving the use of Single Nucleotide Polymorphisms or SNPs involving that population?

A. Yes, I was.

Q. Okay. In preparing your testimony for this proceeding did you understand your role to be an advocate

for the Makah Tribe?

A. No. I didn't understand it that way. I'm not an advocate for the Makah Tribe or for industry or for whales. I'm an advocate only, I think for science.

Q. I'd like to ask a few questions to help provide a summary of your written testimony.

A. Okay.

Q. First, in your opinion, does the best available evidence indicate that the Pacific Coast Feeding Group or PFCG is a population stock as that terms is used in the MMPA?

A. I don't believe that the PCFG is a stock, no.

Q. And can you briefly summarize the basis for your opinion?

A. Yes, in fact it's been already well-described by Doctor Weller. The PCFG appears to be a classic example of a feeding group. The reason I say that is because the genetic studies primarily of Lang et al, have clearly shown that the PCFG differs in mitochondrial DNA frequencies between and comparisons made to various strata of eastern gray whales. Mitochondrial DNA tracks maternal lineages. And so the idea there is that females bring their offspring to this area and the young learn about this feeding area from their mothers.

They do not differ in nuclear gene markers

including microsatellites according to the data of Aimee Lang et al. And also in SNPs according to our data. That means that they are not primarily mating within their own group. And so they have not differed. Those markers have not differed, they are biparentally inherited.

That means that they are mating more broadly with the general eastern gray whale stock as we, in the terms of the range-wide review of the Northern Feeding Group.

Q. And from what we know about the migratory routes of the whales are there opportunities for the PCFG whales to breed with the larger population?

A. Yeah, one particular study has shown that groups of whales, which have included a PCFG, one or more PCFG whales also frequently include non-PCFG whales which we can surmise are northern feeding group whales.

This means that notwithstanding the fact they have the opportunity to mate within their own group, they also frequently have the opportunity to mate with the northern feeding group males -- whales, I should say. So that, I think, explains why you have no difference in the biparentally inherited nuclear markers.

Q. Are the hypotheses developed by the International Whaling Commission's Rangewide Workshops on

the Status of North Pacific Gray Whales consistent with your opinion regarding the PCFG?

A. Yes, they are. The two hypotheses that are identified as 3A and 5A, which are considered to have the highest plausibility and serve as the base cases in the modeling, both considered the PCFG to be a feeding group. In fact, all of the other hypotheses which are being, which have been judged to be plausible and are being used as sensitivity tests also conclude, or include the PCFG as a feeding group.

So I think we can conclude from that and that panel of experts generally, universally agree that it is a feeding group.

Q. Okay. Let me, I want to shift gears now to the, what are referred to as the Western North Pacific whales.

A. Um-hmm.

Q. Or the Sakhalin whales.

A. Um-hmm.

Q. In your opinion, Doctor Bickham, does the best available evidence indicate that the Sakhalin whales, and by that I'm referring to the whales that feed in the summer near Sakhalin Island and off Chukotka are a descendant or remnant of the historic western gray whale population?

A. It's possible they are. But, I think that the, that the best evidence to me suggests that in fact they are not descendants of the true western gray whales that were hunted in Korea and Japan and migrated along the coast of Asia.

Q. And can you summarize the basis for your opinion?

A. Well, I think that is true because, first of all the western population, the Sakhalin population, what we call the Western North Pacific gray whale, when we look at them genetically they do in fact differ both by mitochondrial DNA and nuclear markers, including both the SNPS and microsatellites.

They differ significantly from various comparisons that have been made with eastern gray whale. So it does appear to be a population stock in the usual sense of the word and the way it's used in marine mammal, the MMPA.

But knowing the two things differ doesn't necessarily mean that we know what they are. So, the question is, what exactly are they? There's two options here, potential options: one is that they are the descendants of the western gray whale. The other is that they are a sub-population or a segment of the eastern gray whale population.

We've done studies that show that, and you can refer to Figure 3 in my testimony, that figure shows that there, within the Sakhalin population are two identifiable groups of whales. We referred to these two groups as the eastern genotype and the western genotype.

The eastern genotype whale type predominates in the Mexico samples that we have. And those, and the western genotype predominate at Sakhalin. But at Sakhalin what we have is a situation where there, where most of the whales are western genotype whales. But a fair number of whales are an admixed status. That is they appear to be hybrids, or of admixed ancestry with the eastern genotype whales. And there's a fair number of eastern genotype whales in the Sakhalin population.

Therefore, the Sakhalin population is in fact a mixed stock aggregation of both eastern and western types. The, now the question, and it's tempting to say well those western types are the descendants of the western gray whale. When we look at the photo ID information we find out that both the eastern genotype whales and the western genotype whales and the admixed whales migrate to Mexico, or at least some members of it do. Obviously we don't have data on all those, all those whales.

So you then have to explain why is it that

these western genotype whales would migrate to Mexico if they are the descendants of the western gray whale? We explored that question by looking at mitochondrial DNA, extended mitochondrial DNA sequences of those same whales, the whales that we had identified as being eastern and western genotypes from Sakhalin. And we were unable to find any unique haplotypes, or at least sets of related haplotypes that are unique to the western genotype samples.

So what that means is that the western gray whales that occur at Sakhalin do not have any haplotypes, mitochondrial DNA that are not found in the eastern population, in the eastern gray whales. So, there's two possibilities for that. One is that the western gray whale that migrated along the coast of Asia was in fact not very different than the eastern gray whales despite the fact that they were known to be a distinct stock based upon hunting records and how they responded differently to the hunt than the eastern gray whales.

And because they were isolated across an ocean basin we would expect them to be rather different. We are not finding that. Rather we see a pattern which is more consistent with the whales at Sakhalin today being the result of perhaps a, what we call a founder event from the eastern gray whale population.

So think of reaching into the eastern gray whale population, this very large population, pulling out a small number of whales, plopping them down in Sakhalin, and what would have you have? Well, you might have differences in mitochondrial DNA frequencies and even nuclear gene frequencies simply as a result of sampling like that. But you would not have unique haplotypes. So what we see is exactly what we'd expect from the founder event. That doesn't mean that's the way it is. But that's, that to me is a better explanation.

So, I'm sorry for this longwinded diatribe --

Q. So --

A. -- here, monologue, but it's a difficult thing to, you know, to wrap your head around it's not a simple answer.

Q. So is it fair to say that in part your thinking is that the kinds of difference that have been seen in mitochondrial and nuclear DNA are more consistent with a recent founding of the Sakhalin Whales, by a group, a small group of eastern gray whales than with them being a remnant of a population that was separated by an ocean basin over a long period of time?

A. Yeah, that's very well put.

Q. And the kind of theory that they were, they are a group that was recently, relatively recently founded by

a small group of eastern gray whales but there's been as a result of founder effect or genetic drift some differences that we now see in the genetic evidence, is that consistent with Doctor Weller's testimony about preferential mating occurring during the migration among the Western North Pacific whales?

A. Yes, it is. So, I think that is a good point that Doctor Weller made, that in fact the Sakhalin population, the whales possibly tend to breed more among themselves because they have such a long distance to travel and they start out and they are with their own population and they are more likely to breed then than later when they are, when they join up on the west coast over here with the larger eastern population.

But, keep in mind that there are animals within the Sakhalin population that are eastern gray whales, that is genetically, I mean, this group that I'm referring to as the eastern genotype Group. They are not genetically distinct from eastern gray whales, again.

Q. And those could be animals that have joined that population more recently?

A. Exactly. And what this means is that the western genotype whales are migrating with eastern gray whales. They are mating with eastern gray whales, they are reproducing with them and within the Sakhalin

population we see those hybrids, or admixed individuals. And that means that these gray -- that these western genotype animals have migrated into the eastern gray whale population and should be considered part of it. At least in the broader sense. It doesn't mean there's no differences, but it's, in the broader sense they are part of that population.

Q. Now in addition to your evaluation of the mitochondrial and nuclear DNA evidence, does the fact that the whales are migrating from the western North Pacific to the eastern North Pacific, is that migratory pattern itself significant in terms of assessing whether they're descendants of a historic western breeding population? Or the eastern breeding population?

A. Well, I think that it is significant because we have to ask ourselves -- we have to explain why the, if they are descendants of whales that migrated along the coast of Asia, why they would change their migratory behavior. And it's been suggested that well they are following, that they learned that from following the eastern gray whales. And you can see how that could be, particularly for males, because males would follow females during mating season.

It's more problematic to explain it for females, although some could do that. But then you have

to, also have to explain the fact that not just a few of them do that. But apparently the majority of the population have switched. It seems to be much more parsimonious to conclude that those whales were always part of the eastern population and never had to make that switch.

Q. And in, is one factor in that conclusion that, as I think it's pointed out in the Stock Assessment Report that there's a functional cost. If a whale had been a Western North Pacific whale and switched to migrating to the eastern North Pacific there'd be a substantial functional cost associated with that?

A. There'd be a substantial functional cost because it's a, the trip would be about 4,000 kilometers farther so, there has to be, you know, there would have to be a strong reason for them to do this. I'm not saying there's not. But it's just something that would have to be considered.

Q. So, I know there's more detail on this in your written testimony, but based on what you explained here, and in your written testimony, it is your opinion that the best available evidence that we have today suggests that those whales are the product of a founder effect from Eastern North Pacific gray whales and possibly the admixture with other Eastern North Pacific gray whales

more recently?

A. Yes, I think that's probably the best way to explain it. And it's really a, more of a weight of evidence decision, you know, there's no one single part of this that would say disprove they are, absolutely that they are western gray whales in the original sense of the word. And there's no, nothing that would disprove what I'm saying is that they are probably western feeding group whales which may be part of the eastern gray whale population.

Q. If, these, the Sakhalin Whales, at one point it was thought the Western North Pacific whales were extinct; is that correct?

A. That is correct. And then the --

Q. And then the Sakhalin whales were discovered when?

A. In the 80's. And at that time, they were discovered and they were declared to be western whales. And the reason for that is because that's what they expected to find there. That is, it was in the same summer, summering range as the previously thought to be extinct western gray whale.

And just imagine though if Bruce Mate had been around at that time, and he had put satellite transmitters on Flex and Agent and Varvara, and those

whales, and they had known that those whales went to North America would they be, would we today be calling them western gray whales, probably not. It's, so there's a lot of inertia, if you will, in our terminology in calling them, and assuming that they were, were those.

Q. Do either of the hypotheses that were considered most plausible in the International Whaling Commission's Rangewide Workshops involve descendants of a historic Western North Pacific population migrating to North America?

A. In Hypothesis 3A the western, what they, in the lexicon of the Rangewide Review, the Western Breeding Stock is extinct. And in 5A, the Western Breeding Stock is extant but does not travel to North America. So in terms of the, of the implications for the Makah hunt, under both of those scenarios which again were judged to be the most plausible hypotheses the whales from Sakhalin that might be hunted accidentally by the Makah Tribe would not be descendants of the western gray whale.

Q. And what significance do you attach to the hypotheses that were developed and considered most plausible in the Rangewide Workshops?

A. Well I, I attach high plausibility to that. I think that, you know, I was part of the Rangewide Workshop and went to every one of those five workshops.

Spent a great deal of time discussing all of these issues with these various experts. And I think that those are the best explanations that we have at this time. And those are the best hypotheses that we would come up with at this time.

Q. Okay, thank you, Doctor Bickham.

A. Thank you.

MS. BEALE: We have no questions, Your Honor.

THE COURT: You have no questions?

MS. BEALE: No questions.

CROSS-EXAMINATION

BY MR. EUBANKS:

Q. For the record, William Eubanks for AWI. Good afternoon, Doctor Bickham.

A. Hello.

Q. When were you first retained by the Makah Tribe in any capacity?

A. I don’t remember the year. So, I have a contract with them now for this work that’s been ongoing for about two and a half years. And I had another contact with them probably 10 years before that and it was to review the SAR that was being developed at that time, and to advise them on that.

Q. And so this current contract, you said that was about two and a half years ago?

A. Yeah, I think that's right, um-hmm.

Q. Your declaration states you are presently consulting for Exxon, you mentioned a little bit of that earlier. Can you just describe that work more generally?

A. Yes. So, as I said it's part, Exxon and Shell have this program called the Western Gray Whales Monitoring Program, that's not the exact title, but's in my testimony. And it's a big program, they've invested over the years I don't know how many millions of dollars in monitoring and doing various kinds of studies, including photo ID.

Remember that earlier in this hearing I talked about there being two photo ID catalogs for the western gray whales. This is one of those catalogs. They've done benthic studies and movement studies and so forth. And a few years ago they decided to do this genetics study. And the goal of the genetic study is to better understand exactly what it is that they are monitoring.

Q. Okay, thank you. And does Exxon or any of your other consulting clients have a financial or other stake in this outcome of this waiver proceeding?

A. No.

Q. Is it fair to say that your present consulting portfolio, you talked about how you are private consulting, working in a private consulting capacity now?

Is it fair to say that you're portfolio is made up mostly, or exclusively of clients who are using or extracting resources?

A. Well, I guess it's fair to say that. I wouldn't characterize them as solely extractive. I mean yeah, sure, the oil industry. But the Makah Tribe and the Alaska Eskimos they're subsistence, they live by to some degree by subsistence. So is that extractive? I don't, I don't know.

Q. Sure. Sorry, to clarify the question, you are not currently consulting for scientific advocacy organizations or other conservation organizations?

A. No, no.

Q. Okay, thank you. Approximately how many hours have you spent preparing for this hearing, and that would include preparing the direct written testimony that you submitted?

A. Probably including the travel up here and all of that I would say probably 80 to 90 days, so multiply that times eight for me and…

Q. Okay. And approximately when did you start preparing that written testimony that you submitted, if you remember?

A. We started this in 2017, as you recall, we had hoped that this hearing would be held back in late 2017

and then hopefully 2018, and now it is late 2019 we are finally here.

Q. And do you remember when the Tribe or its counsel alerted you that this Waiver Proceeding was going forward and that your testimony would be submitted?

A. I'm not sure I exactly understand what you are getting at?

Q. So you started preparing it in 2017.

A. Um-hmm.

Q. I guess what I'm trying to find out is when did the Tribe learn that, and when did you learn that this Waiver Proceeding would be occurring? It was published in the *Federal Register* in April of this year. But did you know before that time?

A. Yeah, I mean I was given a contract in 2017 and I am pretty sure that's when I learned of it, probably at the IWC meeting in 2017 through Doctor Scordino. But I, I can't recall exactly.

Q. Okay. You don't remember when the actual word came down that the proceeding would be happening this year?

A. In 2017, think it's this way. I think in 2017 I heard that this was going to happen. I didn't, we didn't think it was going to happen this year. We thought it would be happening earlier.

Q. Sure.

A. Yeah.

Q. And what is your hourly rate that you charge the tribe?

A. $500 a day.

Q. A day. And is that similar to what you charge your other consulting clients?

A. It's the same as what I charge the North Slope Borough. But not the same as what I charge industry.

Q. Understood. And what is your understanding as to the source of the funding that has paid for your work for this proceeding?

A. I have no idea.

Q. And did you personally write the direct testimony that was submitted on May 20th?

A. Yes, yes.

Q. Can you please describe the level of involvement that the Tribe and/or it's counsel had in assisting with that written testimony?

A. Sure the Tribe didn't have any directly, but the lawyers have and so have the other witnesses that I work with. And we would have, we would produce drafts of our testimony, we would share them and we would talk about them and discuss them. And so, it was both, you know, a lot of work but it was also a learning process.

Q. And what level of editing and review did the lawyers and or Doctor Brandon and Mr. Scordino have in assisting you with that process?

A. You know, I would say in most of it was sort of clarification work, editing, making things clear. Or asking me to address certain topics that I might have overlooked in that. But really this, you know this testimony that I have developed here is just sort of an outgrowth of the work I've been doing for Exxon and Shell, the genetics project, publishing these papers, and that we have reviewing the papers, all of this stuff that we have reviewed over the five years of the Rangewide Review, it's all sort of intertwined. And it's in, the testimony is really the outcome of that learning process, if you will.

Q. Um-hmm. And I assume that there is no bonus or any other compensation tied to the outcome of this hearing?

A. No.

Q. And does your contract require you to take any specific positions as part of this Waiver Hearing?

A. No. And that's, you know, one of the questions that I was previously asked is am I an advocate? No, I'm not advocating for the Makah. And my responsibility is to present clear data and to fairly interpret them. And

really, and that's the same for the, for my consulting with industry or with the North Slope Borough.

And really the beauty of this genetics work is that you know all of the data that we've produced and we are continuing to work, we've recently done whole genome sequences of seventy gray whales, which is a huge database. All this either has been published or will be published. And the data will go in the public databases. And if you don't like my interpretations of it or what we conclude anyone is welcome to download that data and to re-analyze it and publish their own conclusions about it. So, it's a very open process.

Q. At the conclusion of this Waiver Proceeding, assuming that it is granted, do you anticipate continuing to work with the Tribe?

A. Well, I have no idea if they like me maybe, but, you know, I don't know.

Q. And why did you chose not to file any rebuttal testimony in this proceeding?

A. I don't know I guess I didn't see anything that I needed to rebut in written testimony.

Q. And was that decision made by you or by the Tribe, by its counsel, do you remember?

A. I don't think we really discussed it, so I guess it was made by me.

Q. When you've attended meetings of the IWC Scientific Committee have you done so as an independent scientist, or have you done so under contract with the Tribe?

A Never with the Makah Tribe. But, for all these years the Alaska Eskimo Whaling Commission and North Slope Borough has funded my travel and work there to some degree. And in the last five years or so Exxon and Shell have funded a major portion of it.

Q. Okay, thank you. All right, so in your declaration you state that you, quote, "Have concerns about some of the direct testimony NMFS has submitted". You've already explained some of that during your direct testimony. Is there anything else you'd like to say in terms of whatever concerns you might have with the Government's testimony?

A. Concerns may be a little strong there. But it's not unusual for scientists to have different opinions or come to different conclusions and so forth. I think that I've outlined my, what I think is going on with North Pacific gray whales clearly. And tried to explain why I think the way I do and to justify it based upon science and to make things clear.

I think that the body of work that's out there, that's been done by NMFS scientists is, work is excellent

and in some cases I differ in how I would interpret it, but I think I've already made those points.

Q. Okay, thank you. Based on the direct testimony that you just provided a few moments ago, is it your view that NMFS has failed in certain respects as part of this proceeding to rely on the best available scientific evidence?

A. No, I wouldn't say that.

Q. Okay. You are aware that the Marine Mammal Protection Act and the Endangered Species Act, I know you are not a lawyer, but I assume you are familiar with the fact that they are both precautionary in nature?

A. Um-hmm.

Q. At page four of your declaration, you state that, "Inadvertent takes of WNP or PCFG Whales could have significant conservation implications depending on the number of takes and the status of these populations".

A. Um-hmm.

Q. What did you mean in terms of the conservation implications you referred to there?

A. Well, I think it's clear that we are all concerned about preserving and conserving the, these small populations of gray whales that we recognize the PCFG and the WNP Whales. And inadvertent takes would, could have an impact. But at the same time I think that

the likelihood of any WNP whales being taken is very small as well-explained by Jeff.

And the PCFG seems well-protected, I think by the hunting strategy that's been proposed here. So, all of that sounds good. That doesn't mean if situations change that it might be different. In other words, if, you know, if populations were reduced and the probability of hitting a western gray whale, a WNP whale would increase then that would be of concern. But, of course that's what the hunting strategy is designed to prevent.

And so, I'm, the IWC is the same way, they are highly precautionary. And I've been through this with, especially with the bowhead whales and now with gray whales.

I hope I've answered your question.

Q. I think so, I just -- it wasn't described more fully, so, thank you.

A. Yeah, yeah.

Q. That's helpful. And just to clarify, when you say the, you said there's a very low risk of a WNP whale being taken, I assume you are talking about lethal take. You are talking about one actually being struck and killed?

A. Yes, right.

Q. Thank you. You understand that the WNP whales

are currently listed as endangered under the Endangered Species Act?

A. Yes, yes.

Q. And unless and until they are delisted, regardless of any theories about their genetics or stock structure, you understand they are fully protected by the ESA, correct?

A. Absolutely.

Q. And no waiver could be granted under those circumstances. That's your understanding, correct?

A. That's my understanding.

Q. And because of the endangered listing for the WNP whales, a decision by NMFS to delist the WNP whales under the Endangered Species Act would be very helpful to the Tribe as part of their pursuit of this waiver, correct?

A. I guess it could be. But, I don't think that's a central issue here, is it? I don't know.

Q. The potential take of a WNP whale is certainly something that is central, certainly central to the proceeding. I guess, you know, so my, the follow up question to that is you know, you were, based on your direct testimony, if I understand it correctly, you do not believe that the WNP whales should be, you know, are a stock to the Marine Mammal Protection Act. I'm sorry -

–

A. No, that's not what I said.

Q. Okay. Sorry, yes. Let me, let me back up there.

A. Yeah, I think they are a stock under the MMPA, no matter how we, no matter how we slice it or dice it, it's a stock.

Q. Sure. Sorry, let me back up on that. We were talking about the ESA. So, I don't want to jump over to stock just yet.

A. Okay.

Q. Have you ever, have you, the Tribe, or its counsel submitted a delisting petition under the Endangered Species Act for the WNP gray whales?

A. No. Not that I know of. You know, not that I know, if the Tribe has done something I'm not involved in it and I don't know about it.

Q. And do you believe that the evidence exists to support a delisting petition of that kind?

A. Well, I think they should reconsider it, not because they should delist it but because they need to correctly identify exactly what it is that they are listing. They listed it as a western gray whale and assuming that that population was in fact the western gray whales of tradition, if you will. But today we know

it's something different. And that doesn't mean that they, that this new understanding that we have of the population won't qualify it for being listed under the Endangered Species Act. They just need to correct, you know, to get, to update it if you will.

Q. But you have not actually submitted a petition asking for that update?

A. No. No, No.

Q. And to your knowledge the Tribe and its counsel also have not, correct?

A. As far as I know they have not, yeah.

Q. You've concluded that the, in your view the PCFG is a feeding group but does not qualify as a separate population stock under the MMPA, correct?

A. That's right.

Q. And in reaching this conclusion, you've relied primarily on the fact of inter-stock breeding between the PCFG and the ENP Whales, is that right?

A. Yes.

Q. And are you familiar with the 2016 GAMMS, the Guidelines for Assessing Marine Mammal Stocks?

A. I'm fairly familiar with it. I'm no expert at it.

Q. And is it your understanding that they, those 2016 GAMMS, they allow for some inter-stock breeding for

stocks, correct?

A. Yeah, yeah, sure.

Q. Okay. You are also, is it your understanding that the IWC has no obligation to comply with or administer the Marine Mammal Protection Act?

A. Yes, it's -- yes.

Q. Also I'd like to ask you about something that I don't think has come up for any of the other witnesses yet, are you familiar with the recommendations made by the Committee on the Status of Endangered Wildlife in Canada called COSEWIC. That the PCFG would be listed as an endangered designable unit that is both discrete and significant?

A. No, I'm not fam -- sorry, I'm not familiar with that.

Q. Okay. I was curious because I was wondering if you had objected to that based on, you know, your different view of PCFGs, but we can move on since you are not familiar.

A Well, the fact that it's not a stock in the biological sense doesn't mean it's not, it doesn't merit conservation protection.

Q. And there's been some discussions I believe all today, possible some yesterday as well that tagged WNP whales have been tracked going into the ENP. Do we know

if the reverse situation has happened? Have we ever had a tagged ENP whale tracked going to the WNP?

A. Not that I know of. But we do at least, we can at least look at that from a genetics perspective and as I said in, you know, in the paper by Bruniche-Olsen, et al in 2018 in *Biology Letters*, they do, we do conclude that some of the whales at Sakhalin are genetically the same, undifferentiable, however you would say that to eastern gray whales. So that would be evidence at least indirect evidence of such movement.

Q. So you think it is possible?

A. Well, I think it's highly likely, and really if you look, for example at the study, Meshersky who looked at mitochondrial DNA sequences as you sort of come down the Asian coast from Chukotka all the way down to Sakhalin basically is, there's sort of a cline of variation if you will with the, and moving gradually, more and more out of the eastern stock and into the western stock haplotypes. So, yeah.

Q. Okay, thank you.

MR. EUBANKS: I have no further questions.

MR. SOMMERMEYER: No questions.

THE COURT: No questions? All right. Any questions?

CROSS-EXAMINATION

BY MR. GOSLINER:

Q. Good afternoon.

A. Hello.

Q. The testimony from you and others have indicated that there are several possible theories as to the origins and separations of the WNP and ENP gray whale population, you would agree with that?

A. Yes.

Q. And do you have any thoughts or suggestions on what additional studies or research might be done to further resolve that issue?

A. Yes. Well, I'll tell you what we're doing currently, I mentioned it a minute ago. We, through Doctor DeWoody's lab have completed analysis of 70 whales approximately even in number between Western and Eastern, full genome sequences of 5X coverage, it's low coverage, but we already have high coverage of 5 individuals. So there's 75 gray whale genomes there to study and that's an immense database that can be studied for many, many years. And so that's one thing. And clearly the science is moving into the science of genomics. I assume you are asking about genetics, right?

Q. Um…

A. I'm a geneticist, you know?

Q. Well, anything else you can suggest that you

think would be relevant.

A. So we're delving deeper into the genome and it's really exciting work. There's the, there's amazing stuff to be discovered there. We're delving deeper into the genome. But we also need large sample sizes of some of these, some of these groups. And we haven't had an opportunity to look at PCFG Whales. There's a lot of work still to do in the area of genetics.

What we're going to have with this population, you know earlier it was asked what the state of science is with gray whales, and I think it was Dave Weller who said it is really good, it's incredible. It is, I mean this is going to be one of the greatest, best studied gray whales, gray whale population there is.

And so we are going to know a tremendous amount about that. We, but there are still lots of holes. And I would say the main thing is, is that as we move into the genomics world we need to have even bigger sample sizes than we have, that's one thing. Gosh, I can think of all kinds of, you know, of things to do. We need, we need satellite tracking.

We need to figure out whether there is a, through western gray whales as Justin Cooke suggests, you know in his paper he suggests that not all of the Sakhalin whales go to North America, there must be some

that stay there, if they are where do they go? You know, it's -- in 1914 Roy Chapman Andrews was working on gray whales and published his monograph. He knew that there was a wintering grounds somewhere in south, in Asia. A 100 years later we still don't know where it is.

We need to find out whether there is still migrating population and where do they go so that it can be protected if it exists.

Q. Presumably tagging studies would be the way you would get that kind of information?

A. Yes. We also, to get at some of these stock structure issues, you know, we are doing the best we can with what we have. But we don't have any samples from pre-whaling. So if we could find a place where there were bones and so forth somebody could go in and do sort of archeological genetics, if you will and figure out how that pre-whaling population relates to what we are calling the western genotype group. And, you know, all these things. Yeah.

Q. And I'm -- the genomics work, do you have any idea what an adequate sample size might be? You're suggesting that, so a potential limitation in the near term.

A. Well, yeah. It would be bigger, you know, we'll have 75 whales which is a very respectable study

of, at this point in the genomics literature, you know, there's no other study of gray whales like that. But we would like more. And I'm a geneticist, I always want more.

Q. But that would be 75 ocean basin-wide, not necessarily, or those, or would that be 75 western North Pacific?

A. That is currently about 35, and 35, something like that of Sakhalin and Mexico.

Q. Okay, thank you. And then you also talked about the theoretical founder event. That these are in fact ENP Whales that have, that are being seen over in Sakhalin. Do you have any estimate, or any idea how long it would take, how long ago that founder event would have to have occurred to see the kind of genetic differences that you are seeing between the Western and the Eastern stocks that were, the putative Western and Eastern stocks?

A. Yeah, well, it couldn't be too long ago otherwise it, otherwise you would see unique haplotypes. So it, so you can kind of figure that it could be on the order of 15,000 years but couldn't be a 100,000 for example. You would, yeah, at that point we would have expected to see, you know, significant divergence if you will and unique haplotypes found in the west.

It's probably not real recent, it's not, you know, post-whaling or even, you know, 18th Century or something like that, I don't think. Because we, in the DeWoody, excuse me in one of the papers by Bruniche-Olsen et al, where we looked at the three whales, two western and one eastern, that we sequenced the genomes of and we did some analyses in there.

One type of analysis was looking for evidence of inbreeding and it's an analysis called runs of homozygosity. And what we found was that the two western gray whales, the two animals from Sakhalin had higher runs of homozygosity, more inbreeding. So this population has been inbred at least for a while, for a few generations. And so that probably predates whaling. You know, so that's the only, those are guesses, you know, those are really inferences from scanty data.

Q. Okay, thank you very much.

MR. GOSLINER: That concludes my questions.

THE COURT: Just before returning for redirect. I just want to clarify on thing. These admixed Sakhalin whales, right now you are considering them still Western North Pacific gray whales as their stock? Or is it --

THE WITNESS: Since they are located in Sakhalin they would be considered WNP whales in this context. But if you wanted, but in terms of their

genetics, they appear to be whales of mixed ancestry between eastern and -- between the western genotype group and the eastern genotype group. And that eastern genotype group is the same as the eastern gray whales genetically as far as we can tell.

THE COURT: Okay.

THE WITNESS: Is that clear?

THE COURT: That is clear.

THE WITNESS: Okay.

THE COURT: And then, there has been no move at the International Whaling Commission to change their position on their stock?

THE WITNESS: Well, in 2020 there will, at IWC there will be the implementation review for gray whales and at that time we would have the opportunity to present, I think, new stock structure hypotheses and that would be the time for it to happen.

THE COURT: Okay.

MR. SLONIM: Thank you. I think I just have one question.

REDIRECT EXAMINATION

BY MR. SLONIM:

Q. So in response to Judge Jordan's question, and I think in response to other questions, you've, in referring to the Sakhalin whales you've said that there

are some that have the western genotype some that have the eastern genotype and some that are admixed; is that correct?

A. Um-hmm.

Q. And by the western genotype, your opinion is that the genotype for the whales that were founded by Eastern North Pacific gray whales at some time in the past and have diverged due to the founder effect or genetic drift?

A. Um-hmm.

Q. Not the historic Western Breeding Population; is that correct?

A. Yes.

Q. Okay, thank you.

A. That's my best interpretation of it. But even if I'm wrong, if those are, if that western genotype group do, does in fact correspond to western gray whales those whales have still migrated into the eastern gray whale population. And my feeling is that they would be considered as part of that population now.

Q. Okay.

A. Is that -- yeah.

Q. Thank you.

THE COURT: Okay, any re-cross?

(NO AUDIBLE RESPONSE.)

THE COURT: All right, thank you, sir. you may step down.

(Witness steps down from witness stand.)

THE COURT: I think it's time we need to take a break. And we will take a 15-minute recess and then call the next witness.

(At 3:11 a 15-minute recess was taken.)

THE COURT: All right, you may call your next witness.

MR. GOLDING: All right. The Makah Tribe calls Doctor John Brandon.

Whereupon,

DOCTOR JOHN BRANDON,

A witness produced on the call of the Makah Tribe was duly sworn on their oath, was examined, and testified as follows:

THE WITNESS: I do.

THE COURT: You may be seated.

DIRECT EXAMINATION

BY MR. GOLDING:

Q. Good afternoon, Doctor Brandon.

A. Good afternoon.

Q. Are you feeling nervous today?

A. Does it show?

Q. It will be fine. Could you please state your

name, address and occupation?

A. My name is John Brandon. My work address is 201 Mission Street in San Francisco, California. And I'm a biometrician for ICF International.

Q. Thank you. And do the declarations bearing your signature submitted to this proceeding on May 16, 2019 and July 30th, 2019 along with the attached exhibits constitute your direct, your testimony in these proceedings?

A. They do.

Q. Doctor Brandon, please describe your educational background.

A. My educational background is in biometrics, application of statistics and quantitative methods to biological data with a focus on population dynamics modeling and simulation modeling of population dynamics. I have a PhD from the University of Washington School of Aquatic and Fishery Sciences. And my dissertation title was, "*Quantifying Uncertainly and Incorporating Environmental Stochasticity in Stock Assessments of Marine Mammals.*" And that research focused on incorporating environmental covariates in population dynamics models related to expected outcomes of climate change with a focus on calculating sustainable limits for aboriginal subsistence hunting of marine mammals.

Q. Doctor Brandon, in addition to the dissertation you just described, could you please describe your relevant experience?

A. I have served as a population dynamics and statistical consultant for Palumbi Lab at Stanford University, National Science Foundation Initiative for Marine Fishery Sciences. A consultant for the International Whaling Commission and the Makah Tribe.

Q. And are you also on the Scientific Committee?

A. Yes. I've been an invited participant to the Scientific Committee since 2006. And in 2018 I served as a co-chair for the Subcommittee on the Aboriginal Whaling Management Procedures.

Q. And how did you come to be on the Scientific Committee?

A. Through my graduate studies and my major professor, and my research into population dynamics modeling and aboriginal subsistence science.

Q. Okay. And could you, we've kind of referred to the IWC and the Scientific Committee throughout these proceedings, but just for the benefit of reminding the Court, what is the Scientific Committee?

A. So the Scientific Committee is composed of international experts in large whale population biology, or genetics or aspects of science of large whales. And

the Scientific Committee provides management advice to the Commission, the International Whaling Commission or the IWC.

So for example with the proposed Makah hunt we, the Scientific Committee was presented with the proposed rules of the hunt and requested to evaluate that. And then the Scientific Committee performs that evaluation then presents its scientific recommendations to the Commission who would set the quotas.

Q. And does the Scientific Committee evaluate other aboriginal subsistence hunts besides the Makah?

A. Yes. So the, the other gray whale hunt in Russia that I think has been mentioned before, there's also Greenlandic hunts for humpback, fin whales, bowhead whales, the Alaska hunt for bowhead whales and then I think down in the Caribbean with humpback whales.

Q. And is it fair to say the Scientific Committee is comprised of some of the world's foremost gray whale scientists?

A. Yes.

Q. Okay. In terms of evaluating an aboriginal subsistence hunt, what are the relevant IWC objectives?

A. There are three main objectives. The first is not to increase the risk of extinction of the stock. That one's give the highest priority.

The second objective is to allow whales to reach or maintain the highest net recruitment level that they can.

And the third objective has to do with aboriginal subsistence need sustaining that into perpetuity.

Q. And with respect to the reaching or maintaining highest net recruitment, how does the Scientific Committee evaluate whether a hunt plan meets that objective?

A. The Scientific Committee uses population dynamics models and simulation and fishery science, it's a method know as management strategy evaluation. And would you like more detail?

Q. No, that's plenty for now. I think we'll get into more specifics applied to the Makah hunt.

A. Yeah.

Q. And so we reference for the IWC objective that, being reach or maintain highest net recruitment. How does that evaluation relate to the OSP requirement of the MMPA?

A. So the OSP requirement under the MMPA is bounded below by the max net productivity level and above by carrying capacity. And under identical assumptions for population dynamics modeling and the math behind

that, the maximum net productivity level and the highest net recruitment level are identical.

Q. Okay. So if a hunt plan meets the highest net recruitment objective of the IWC evaluation it also meets the OSP objective of the MMPA?

A. That's right.

Q. Okay. Now do the Scientific Committee's evaluations strive to take into account the best available evidence?

A. They do.

Q. And once formed, do the Scientific Committee's evaluations comprise best available evidence?

A They do, yes.

Q. Okay. Could you please explain how the Scientific Committee developed final model specifications to evaluate the proposed Makah hunt?

A. Yeah, so in 2014 the Scientific Committee initiated a series of workshops, now known as the Rangewide Review. The goal of those workshops was to gather expert scientists from all of the range states for gray whales across the North Pacific. So, from South Korea, Japan, Russia, U.S., Mexico. And to compile all of the evidence across that whole range including natural mortality rates, the evidence from satellite tagging and everything else under the sun that they could. And one

of the main goals of that was to investigate alternative stock structure hypotheses.

And so given that framework, an operating model was developed. And under those alternative stock structure hypotheses, taking into account human caused mortality or cryptic levels of mortality as well, and that operating model represents our best model of the state of nature, you might -- so, the state of nature under one stock structure hypotheses versus another, et cetera.

Then during that process as well trials were developed, the trials can be thought of as stress tests for catch limits or Proposed Hunt Rules. So for example, a trial may take into account a certain level of cryptic mortality, so 10 times, or 20 times what is seen for an animal that strands on the beach, we might subtract that from the population dynamics model.

There's a whole range of trials. They have different factors, cryptic mortality might be one, the stock structure hypothesis is another, immigration rates into the PCFG is another one that was important. And then those factors, and those levels and those factors are crossed and so you end up with a whole long list of trials or stress tests. You can think of that as a matrix of the plausible kind of parameters faced that you

are testing or evaluating the hunt plans or catch limits over.

Q. And how does this approach of having, you know, these kind of many factors and then the interaction between these factors and the matrix as you've described, how does that approach account for uncertainty? Both as to current, the current state of affairs and to, you know, future conditions.

A. It accounts for uncertainty on different levels. So I mentioned we have some uncertainty about the stock structure. We also have uncertainty in maybe more commonly understood kind of like history parameters like survival rates or things like. We have uncertainty about what the future is going to bring, so whether there is future mortality events or things like that. There's uncertainty, I mentioned immigration rates into the PCFG, there's uncertainty about that.

So those are examples of the uncertainty that we take into account.

Q. So is it fair to say in kind of layperson terms that your modeling's able to take the range of conditions that might exist and futures that might occur and account for that range of possibility?

A. Yes.

Q. Okay. And what were the results of the

Scientific Committee's evaluation of the 2018 Makah Hunt Plan? And specifically, how many trials were run?

A. Right. So when all was said and done, crossing all those different uncertainty factors, there were 106 trials and crossing different stock structure hypotheses, 106 trials total.

Q. Okay. And of those 106 trials, how many trials met the IWC Aboriginal Subsistence Hunt Objectives?

A. Right. So how many met the, basically the OSP objective?

Q. Yes.

A. Yeah, 102 and four of them did not. The four trials that did not had very high, had high levels of cryptic mortality, 10 to 20 times and/or low levels of immigration into the PCFG. And those four trials were discussed within the Scientific Committee and it, the Scientific Committee agreed that those trials and those combinations of those factors had low plausibility.

So for example I think it's illustrative to think there's been some discussion about cryptic mortality and those rates. So if you have a cryptic mortality rate of 20, so for every one animal that you observe you, there are 20 out there that you don't. And if you think of that in terms of the PCFG with the population size of, I forget what it is now, 220 or

whatever it is. And that, the abundance of the PCFG has been pretty stable. So if you're -- and the average estimated bycatch and human caused mortality for the PCFG is about one animal per year. So if you are now subtracting 20 animals per year, biologically that's just not consistent with the observations of abundance. And so that, that's an example of a trial that we've given low plausibility.

Q. Thank you. And in these four trials that did not meet the objective, was the reason for not meeting the objective the hunt?

A. No. The Scientific Committee, there's the OSP kind of management objective and the highest net recruitment objective in the parlance of the IWC. There is, that is, serves as a performance metrics for the simulation evaluations. But there are other performance metrics that are evaluated too. I described some of these in more detail in my written testimony.

But one of them is known as relative depletion. And basically that is the depletion of the stock so the percentage of the stock relative to carrying capacity compared between what it would be without hunting compared to what it would be with hunting. And so, for that performance metric, if you have a very high number, near one, which for those trials, the relative depletion

was near one, that indicates that it's not hunting that is causing the stock to perform poorly in those cases, it's something like cryptic mortality.

Q. Okay. And so was the Makah Hunt determined by the Scientific Committee to meet IWC objectives for all affected populations of gray whales that is ENP, PCFG and WNP?

A. That's right, yeah.

Q. Okay.

A. I think there was some discussion, in those stock hypotheses the WNP was split up into different groups, but yes, that's right.

Q. And was that determination agreed to by the Scientific Committee and passed on as its recommendation to the Commission?

A. That's right. So it goes through the Aboriginal Whaling Management Procedures subcommittee. Which then passes on its recommendation from the evaluation to the full Scientific Committee. The full Scientific Committee then looks at the report from that subcommittee and reached agreement in this case and passed on the recommendations to the Commission.

Q. Okay. And is it your opinion based on the best available evidence that the Makah hunt meets the objectives equivalent to the OSP objective of the MMPA?

A. Yes.

Q. Okay. Now earlier you mentioned the Scientific Committee's evaluation of other aboriginal subsistence hunts. Relative to those hunts, how would you characterize the Makah hunt?

A Very conservative in terms of conservation.

Q. Is it fair to say that the 2018 hunt is the most or among the most conservative hunt that the Scientific Committee has evaluated?

A. Yes in terms of low catch limits and also the time period is only 10 years, usually we, the time periods are longer for the other hunts, I think. And so it's possible to take more animals out of the population over a longer period of time.

Q. Thank you. Now you also provided later testimony relating to the ongoing UME. And I'd like to discuss that a bit, first in relationship to the modeling we've been talking about. Did the Scientific Committee's modeling consider the 1999 to 2000 UME as part of its evaluation?

A. Yeah. The 1999/2000 UME was baked in, if you will, just like it was, we use the, the evaluation used the same methods that Punt and Wade used. So, that UME happened in the past and the decrease in abundance for the ENP stock was taken into account. And the

evaluations involved forward projections of abundance for the ENP the WNP and the PCFG given the uncertainties in the trails that we discussed. And one of those, and some of those trials included future mortality events, I think 2 and, to 2 future mortality events.

Q. Okay. And so, you know, given what we know about the ongoing UME so far, did the range of plausibility considered by the 200, the 2018 modeling consider the ongoing UME as a possible event?

A. It did, yeah.

Q. Okay. Could you briefly summarize your testimony as to the potential cause of the UME and the state of knowledge about that cause?

A. Sure. So to start with as has been noted before, the cause of the current UME is currently undetermined. Given the previous UME it's not certain whether there will be a determination. If there is a determination it might be several years before that happens. I think it was about five years between the end of the previous UME and the final kind of report that came out from NOAA whether or not they could determine a cause for that.

My testimony also describes how the ENP stock is estimated to be, at least before this UME is estimated at or near the carrying capacity of its environment. And

for populations that are at that level we would expect volatility in population dynamics which I think we've seen with the ENP with calf counts going up and down and now, mortality -- and volatility in mortality as well. And that can be caused when you are near carrying capacity be even relatively small changes in environmental conditions.

Q. Thank you. And is it your opinion that the IWC modeling of the Makah hunt remains valid in the face of the current UME?

A. Yes.

Q. And so is it still your opinion knowing what we know about the UME that the Makah Hunt meets the OSP objectives of the MMPA?

A. Yeah, I'm glad you said that. So knowing what we know now about the UME it's, looks like the stranding reports are on par with 1999, for example. So yeah, knowing what we know now then, yes.

Q. Great.

MR. GOLDING: That's all I have, thank you Doctor Brandon.

THE WITNESS: Yeah.

MS. BEALE: We have no questions.

THE COURT: NOAA has no questions, okay.

CROSS-EXAMINATION

BY MR. EUBANKS:

Q. Good afternoon, Doctor Brandon.

A. Good afternoon.

Q. Still nervous?

A. I'm always nervous.

Q. Well, you've heard most of these questions before, so…

A. Sure.

Q. Nothing too new here. First of all, can you tell us about ICF International, what it is and what you do there?

A. Yeah, I just started there about six months ago so I probably can't tell you quite as much about ICF International in particular as I could in a year from now. But what I do there, I can tell you about that. I study basically listed and threatened fish in the San Francisco Bay and Sacramento Rivers.

Q. And so it is a non-profit organization or a consulting firm, what exactly is it?

A. It's a consulting firm, yes.

Q. And since you just joined ICF pretty recently, I imagine that your contract with the Makah Tribe is in your personal capacity, not through ICF?

A. There's two contracts. So my work, like preparing written testimony --

Q. Correct.

A. -- was in my personal capacity. My time here now is through ICF.

Q. And you were first contracted around 2010; is that correct?

A. Yes. Yeah, I finished grad school in 2009, got a contract.

Q. Okay. And what other kinds of clients do you consult for on whale-related issues?

A. I do some work, I think I mentioned at the outset here with the U.S. National Science Foundation Initiative for Marine Science. And so that has involved, we published a paper related to PBR. So, I'm trying to think of actual, I think you mentioned whales. So, I can't think of anyone but the Makah off the top of my head for whale work. Yeah, just the Makah.

Q. So what sorts of clients do you, do you work for on the fisheries related issues that you mentioned?

A. It's a variety of clients from, including state and federal agencies, so state agencies in California. And also state water contractors which oversees the water districts in California. A lot of the work is related to water exports from the San Francisco delta down to southern California and the central valley for agriculture there.

Q. Okay, thank you. And have you spent a pretty equivalent amount of time preparing for this proceeding that we heard from Doctor Bickham?

A. Yeah, I --

Q. He said about 80 to 90 days?

A. Yeah, sounds right.

Q. Okay. What hourly rate are you charging the Tribe as part of this proceeding?

A. $80 an hour.

Q. And is that similar to your normal rate that you would charge any client for this type of work?

A. Yeah, on a personal capacity it’s a little different.

Q. For ICF?

A. Yeah.

Q. And can you please describe the level of involvement of the Tribe and its counsel in preparing your written testimony?

A. Yeah, they provided helpful editorial type of comments. The, but the testimony is my own. I think really in a similar, I could repeat kind of some of the things that Doctor Bickham said, you know, we had phone conversations and discussed ideas and things like that to make sure that what, our testimony was accurate.

Q. Um-hmm. And so you had pretty extensive

discussions with Doctor Bickham and Mr. Scordino as well?
. A. Over the course of the last two years, yeah. And you know, we also, it's a small world, we work together in other capacities on the Scientific Committee for the IWC or whatnot.

Q. And I assume there's no compensation or bonus that's contingent on the outcome of this Waiver Proceeding?

A. That's correct.

Q. And I asked this to Doctor Bickham, I'll ask you as well: do you anticipate being retained by the Tribe in the future after this Waiver Proceeding is concluded?

A. So this is my first time participating in a procedure like this. My understanding is that there might be some post-hearing briefings or paperwork that might be done, and I would think I would be involved with those. But beyond that I don't know.

Q. Okay, I didn't know if you have any ongoing work that you thought would extend past this hearing.

A. I couldn't tell you.

Q. And I don't believe you filed and rebuttal testimony in this proceeding; is that correct?

A That is correct.

Q. And why -- did you make that decision or was

that decision made by the Tribe's counsel?

A. I think it's probably best characterized as a joint decision. If I was requested to look at someone's testimony and provide a rebuttal on it, I would have, my expertise being in population dynamics modeling weren't, I don't know that there was a whole lot of other testimony that overlapped with my area of expertise.

Q. Okay. And --

A. If I had seen something that stood out I would have probably said hey, I don't think this is right, and you know…

Q. And so that's the basis for not submitting a rebuttal, is that you didn't see anything that warranted a response?

A. I'm not sure that is -- I think it is a little bit of both, yeah.

Q. All right. Has the Makah Tribe paid you previously to represent it at the IWC meetings?

A. Yes.

Q. If so, on how many different occasions?

A. So, as was mentioned before, there's an implementation review coming up in, I think it's scheduled for 2020, in the IWC. And the previous implementation review occurred over the course of 2 or 3 years, 2010 to 2013. And I was under contract for the

Makah I know for 2012 for sure. I think, I think, basically when I started with them in 2010 that was, I went to some IWC meetings under contract with them.

Q. And when someone is there in a capacity representing a particular client, is that something that you have to announce or you know, somehow explain that affiliation to the IWC Scientific Committee staff?

A. There -- it's no secret. You know, so the North Slope Borough which is interested in aboriginal subsistence hunting for bowhead whales up in Alaska has consultants there, so it's, it's not something that you have to necessarily announce. But it's certainly not a secret or hidden in any way.

Q. It's well known who people are affiliated with?

A. Yeah, I think that's fair to say.

Q. Okay, thank you. Let's move on to some more substantive questions.

A. Sure.

Q. Which I'm sure you'd appreciate.

A. Yeah.

Q. You opine in your declaration that the probability of striking a WNP whale over 10 years is low, correct?

A. I'll take your word to it, I'll take your word for it to a point. I'm not sure that that was

necessarily my opinion. I think I would have been citing, you know, a document.

Q. Okay.

A. The goal of my testimony was more to review available evidence, yeah.

Q. Okay. But it's, so it's your understanding that there is some risk, it's not a zero risk situation, correct?

A. Absolutely.

Q. And if you were to add addition forms of disturbances such as approaches and pursuits that the risk goes up significantly when you are talking about, you know strikes in addition to all those other forms of disturbances?

A. Well, I wouldn't want to conflate the risk of a strike with a disturbance. I'm not sure how to quantify the risk of a disturbance, I think that might be an open question. So, I'm not sure I'm totally following you.

Q. I can rephrase that.

A. Yeah.

Q. You spoke in your declaration about strikes, and I just wanted to clarify that although the risk of a strike of a WNP whale is relatively low. The risk of an attempt or a pursuit is much higher, I assume you agree

with that basic proposition?

A. I would agree if we can agree to the wording that the probability of an approach is much higher.

Q. Sure.

A. I don't know that I can agree to the word risk in that.

Q. All right.

A. I think of risk in a certain framework.

Q. Understood, understood. At present, are PCFG whales at OSP?

A. So the best reference that I know about that that I discuss in my written testimony was the Punt and Moore attempt to estimate whether they were at PCFG was at OSP and they were unable to do that. And it sounded like, my understanding is that unless more information becomes available that's a really hard task, partly because it's not, for one thing it's not a closed population there's immigration and emigration happening, so it's, I think it's undetermined.

Q. And recognizing those limitations, what in your view, what additional data would be needed to determine if the PCFG population was at OSP or not?

A. Well, as I discuss in my written testimony, general, I suppose you could lump the PCFG into this, but generally speaking it takes decades of abundance

estimates as well as a longtime series of human caused mortality estimates, those things are available for the ENP stock as a whole so it's possible to make an OSP status determination there.

But I think it's also worth keeping in mind that the IWC evaluation doesn't rely on an OSP type of status determination. It really is much less concerned with the current status of the stock or feeding group in this case, with respect to OSP. And much more sets out to answer the question much like PBR if you have a hunt plan, catch limit, would that allow a feeding group in this case to reach or maintain OSP in the future.

Q. Are WNP gray whales at OSP?

A. I don't know, I don't think so. I think that they have, they were subjected to commercial whaling and yeah, I would think not. But I don't know of any formal quantitative evaluation of their status relative to OSP.

Q. And you mentioned a moment ago the IWC and some of the goals and purposes. Can you, in your own words describe whatever similarities or differences exist, that exist with respect to the IWC's procedures and goals and the Marine Mammal Protection Act?

A. Yeah. So hopefully not to repeat myself, but I mentioned the, one of the IWC conservation management objectives mirrors the OSP objective, to allow stocks to

reach or maintain OSP. I might not be understanding the question fully, though.

Q. No, that's fine. I was just curious, you know, how you, having been on the IWC Scientific Committee how you understand the differences between sort of the way that the IWC approaches, you know these types of issues as opposed to how they are addressed under the Marine Mammal Protection Act.

A. Well, one difference that I think is worth noting, and this might not get directly at how they are addressed under the Marine Mammal Protection Act, but how we approach things in the Scientific Committee and the Aboriginal Whaling Management Subcommittee in particular, is that if there's evidence presented, for example evidence was presented during the last implementation review, genetic information was presented that suggested the possibility of some structuring with the PCFG.

And essentially what the Scientific Committee did, we didn't hang around and wait years and years to debate whether or not the PCFG was a stock or not. We just said well let's just evaluate this in what is a challenging way from the perspective of a catch limit, and that's to assume that this is a separate unit. So we just went ahead at that point and did the evaluations assuming that the PCFG was separate, basically.

Q. Thank you. And I know you are not a lawyer, you you're aware that the MMPA adopts a precautionary principle that's aimed as conservation of marine mammals?

A. Sure. At least, that's how it's been interpreted, I believe, yeah.

Q. And so I want to transition that into a few questions about the UME, which you've provided testimony on.

A. Uh-huh.

Q. So you pointed to the UME from 1999 to 2000, which we've heard a lot about in these two days of the hearing. Since we only have the one recorded event that's officially labeled as a UME, it's fair to characterize that as a, a UME for gray whales is a relatively rare event, correct?

A. I think that's fair, noting Shannon Betteridge's testimony that, you know, the UME, quote/unquote has only been applied, I can't remember when, the early '90's or whenever it was. So there might have been events before that.

We do have, so I think that's relatively rare. I think also, like I mentioned as far as UME's go, you know, these -- you expect that kind of volatility when population are at or near carrying capacity. This ENP stock has, you know, got pretty well decimated by

commercial whaling, so we don't have a long time series -
-

Well, I mean, let me backtrack a little bit here. We have information on how this, how the ENP stock has responded to mortality events, including commercial whaling and including the last UME. So I think it's fair to say that UME's are rare. But it's, but I think I would throw the caveat in there that this population has shown resiliency to mortality events in the past.

Q. Okay. And you've, in your declaration you relied primarily on the high calf production after the last UME to conclude that the current UME should not postpone issuance of a waiver; is that correct?

A. Yeah, and I would add to that that high calf production before this UME as well. So between, yeah.

Q. But you have no specific evidence that the gray whale population will respond to this UME in the same manner that it did to the last UME, correct?

A. I don't have a crystal ball, I don't know.

Q. All right. And aside from the single UME we have really no other evidence to point to, correct?

A. Other than the resiliency that I just mentioned and how -- and the recovery from commercial whaling, yeah. So I don't think we have any evidence that it won't recover from this UME.

Q. So it's essentially equally likely that the population could respond the same as it did or in a completely different fashion, correct?

Or, if you would like me to restate that. I know in the scientific would, you all like statistically significant, or you know, high confidence values. We have no high confidence that the population will respond in the same that it did to the last UME, correct.

A. Well we -- the data that we have, demonstrates that in the past this population has recovered from high levels of mortality. The evaluations that have been done by the IWC in the Rangewide Review model future UME events and the results of those evaluations suggest that the Proposed Hunt Plan meets the conservation management objectives under, for the OSP, at least for the MMPA.

Q. Thank you. I hear you on that. I guess, let me try to rephrase it a bit differently. Would you agree that in terms of formal UME's for gray whales, we have a sample size of one?

A. Yes.

Q. And generally speaking in the scientific community a sample size of one provides little confidence as to what might happen in another scenario, correct?

A. I think that's fair to say. I think it's a little more complicated than that, but I won't belabor

the point now.

Q. And you do acknowledge that it's too early to know what the final magnitude of this UME will be, correct?

A. That is correct.

Q. And so it could be, it could last longer than the prior UME, correct?

A. Or shorter.

Q. And it could have a much more dramatic effect on the PCFG and the greater ENP population, correct?

A. I don't know that there's any indication that I've seen or heard of so far that it would have a greater impact on the PCFG. It could have greater impact on the ENP, yeah.

Q. But if, for example it lasted for four years instead of two years then it could have a more dramatic effect on the PCFG, correct?

A. At current levels, yes.

Q. I think I'll leave it there.

MR. EUBANKS: I have no further questions.

THE COURT: All right.

MR. SOMMERMEYER: No questions?

THE COURT: Okay, MMC?

MR. GOSLINER: No Questions.

THE COURT: No questions, okay. Any re-cross?

MR. EUBANKS: No.

THE COURT: Very good, all right. You may step down.

(Witness steps down from witness stand.)

THE COURT: Okay.

MR. GRUBER: Your Honor we would like to suggest given the hour and the fact that it is end of the week that we take up on Monday morning with the Tribes witnesses?

THE COURT: I think that might be wise. Give us a break and we will be back and you'll have, we'll start with your witnesses on Monday morning. You have five more?

MR. GRUBER: Well, Your Honor, the Tribe plans to call its three remaining tribal member witnesses. And historian Joshua Reed, and then we would move on to Jonathon Scordino the Tribe's marine mammal biologist.

THE COURT: Okay. That will be on Monday. All right, thank you very much in recess for the weekend have a good day. We will start Monday at nine a.m.

(At 4:14 PT/7:15 ET the proceeding concluded for the day to resume on Monday, November 19, 2019.)

CERTIFICATION

This certificate is valid only for a transcript accompanied by my original signature required on this page.

I hereby certify that the proceedings in the matter of National Oceanographic and Atmospheric Administration, Docket number 19-NMFS-0001, hearing heard on Friday, November 15, 2019, before the Honorable George J. Jordan, were recorded by means of audiotape.

I further certify that, to the best of my knowledge and belief, page numbers one to two hundred thirty-one constitute a complete and accurate transcript of the proceedings as transcribed by me.

I further certify that I am neither a relative to nor an employee of any attorney or party herein, and that I have no interest in the outcome of this case.

In witness whereof, I have affixed my signature this 10th day of December, 2019 and corrections January 21, 2020.

Sally S. Gessner

Sally S. Gessner, CER
Certified Electronic Court Reporter

(ATTACHMENT)

Translation of opening statements in Makah, Maria Parker Pascua

Hearing, 11-15-19 (Day 2, page 34, lines 10-11)

Makah	English
ʔuʔułt, ʔuxawa·łbeyaqƛs qʷapałdis	First of all, I want to use our custom
łaxʔukʷi·y ġatiqšiƛ ʔukti·p	today to express thanks to the
Du·wa·bišatx̌ ʔiyayaxdu·	Duwamish
kʷiči·yaʔu·ċałˀ ċawidukšiƛqeyd ti·kaʔa·	that we are here in their territory as
łax̌.	we gather together right here now.
ʔiš hit·ʔaƛid ya·ło·wisiqa·d ʔuda·kqa·	And we remember this place that has
hitakłabʔiq Si·ʔałˀ ʔiyaxˀċiƛ ča·baɬʔiq	the name *Seattle* coming from the
ʔukti·p Du·wa·bišatx̌.	chief
ʔuquqłas Hita·ʔa·ʔoƛ	of the Duwamish tribe.
Qʷidiččaqʔa·qsups. hi·dubałits	My name is Maria Parker Pascua
sixʷa·wix̌pałqey,	I am Makah. I was born
ʔiyax̌a·tx̌s Di·ya.	during gray whale season ‘*December’,*
ʔiyaxˀċiƛs Pa·ka· ʔa·duqʷapł	I live in Neah Bay.
ʔucta·łid ʔuʔu·taxbadax̌.	I come from the Parker family
ʔiyaxˀċƛtid quqʔaċatxiq ʔUse·ʔiɬ.	we descend from whalers.
ʔuxu·s hu·x̌taksa·qtiʔi·ʔiq,	I come from the village of Ozette.
hu·x̌taksa·ps Qʷi·qʷi·diččaq	I am a teacher,
ċakwa·sub ʔukti·p ƛax̌ʷ ʔiš ʔaƛ iyax̌	I team Makah language 9th-
hu·x̌takšiƛo·wisiq.	12th at
yu·qʷa·, ʔuxu·s ġaċiwiq ʔukti·p	the school.
Qʷi·qʷi·diččaq ʔiš ƛaʔu·	Also, I am the Language Specialist
ƛ̓i·ƛ̓i·cuxʷatq.	pertaining to Makah and other Native
	language.