

**Enbridge Northern Gateway Panel 2 - Prince Rupert  
Examination by Ms. Campbell**

5706.           **THE CHAIRPERSON:** Thank you.

--- (A short pause/Courte pause)

5707.           **MS. CAMPBELL:** Okay.

5708.           Good afternoon, Madam Chair and Panel members, and good afternoon to you, the expert Panel, this afternoon. My name is Karen Campbell. I am a lawyer with Ecojustice and I'm here this afternoon representing the Coalition, which consists of ForestEthics, Living Oceans Society and Raincoast Conservation Foundation and here with me as well, I have my colleague Brian Falconer who is with Raincoast Conservation Foundation.

5709.           So one of the first issues that I'd like to talk about is a little bit related to the Exxon Valdez oil spill. And it's our understanding that the long-term impacts of the Exxon Valdez have been well studied and many studies have been done.

5710.           And in your application you have directly referenced and addressed the EVOS. And in your ecological risk assessment and in your application you do rely on a number of studies that look at the experience with EVOS; is that correct?

5711.           **MR. JEFFREY GREEN:** The Exxon Valdez, because of its proximity to this area and similar types of habitat, is a very good surrogate area to our study area and so it's been relied on for many of the valued environmental components as a good source of information.

5712.           It's also likely the best studied oil spill in the world. That doesn't mean we did not refer to other literature, but it is one of the -- you'll see a predominance of references from EVOS.

5713.           **MS. CAMPBELL:** I understand. And in your application you've also directly referenced the work of the EVOS Trustee Council website as a source of information for the long-term effects of EVOS?

5714.           **MR. JEFFREY GREEN:** Yes, we have.

5715.           **MS. CAMPBELL:** Great. And you have relied on information from that website as one source of information on the long-term effects of that spill; is

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- that correct?
5716.           **MR. JEFFREY GREEN:** It's one of many sources. We also referred to the specific scientific studies relating to different species that we're looking at.
5717.           **MS. CAMPBELL:** And I'd like to pull up Living Oceans Society Exhibit D122-7-15, which is the EVOS Trustee's 2009 report. And do you know whether that's specifically one of the documents you've referenced or was it a 2010 website study that you relied upon?
5718.           **MR. JEFFREY GREEN:** I think it depends on which document you're looking at.
5719.           **MS. CAMPBELL:** Okay.
5720.           **MR. JEFFREY GREEN:** So in the environmental assessment, which was filed in May 2010, in all likelihood, we would have been referring to the 2009 report. But in some of our response to information requests we cite as late as 2011.
5721.           **MS. CAMPBELL:** Thank you.
5722.           And you're aware that the EVOS Trustee Council is an independent body, it allocates settlement funds for restoration activities, for long-term monitoring, and for research related to EVOS? Would you agree with that?
5723.           **MR. JEFFREY GREEN:** Yes, we would.
5724.           **MS. CAMPBELL:** And that it consists of a representative group of stakeholders who have an interest in documenting, tracking, and researching the effects of the spill?
5725.           **DR. ALAN MAKI:** The Trustee Council consists of three state agency and three federal representatives, three federal agency representatives; total of six.
5726.           **MS. CAMPBELL:** Thank you.
5727.           And I'd like to go to the chart that's on page -- Adobe page 18 of that

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exhibit that we've just got up on the screen. And I don't think we need to linger on it too, too much.

5728. But I do -- and I can ask you if you would confirm what you see on the chart, which is generally that according to the Trustee Council, only 10 of the 27 environmental resources that were injured by the EVOS have recovered. Three have likely recovered. Would you agree that that's what's there on the screen?

5729. **MR. JEFFREY GREEN:** That's what it says on the screen. I think if -- to have a discussion about these results it's important not to look at a summary like this, but to focus on specific species because I think you'll see, as we've discussed in our recovery report, for species that are recovered there's no debate.

5730. For species that are recovering and for species that are not recovered there's often different reasons for why they're at that state. And it's not necessarily just because -- well, Dr. Pearson gave a very good example for Pacific herring earlier as to why that species has been documented as not recovered.

5731. It may not necessarily relate to the spill itself. And I'll ask Dr. Maki and Dr. Pearson to add to that, if they like.

5732. **DR. ALAN MAKI:** It's matter of record for this panel that we've discussed this very table in its subsequent generations, particularly the 2010 version of the same table, and we have an extensive record of why this is not an accurate representation of the stated sound.

5733. In quick summary, there are thousands of species in Prince William Sound that aren't studied, that are fine, have been recovered or were never affected in the first place. They're not reflected in this table. And to unduly focus on the 26-odd species that are listed here brings an inappropriate focus to the entire ecosystem recovery scenario.

5734. **MS. CAMPBELL:** So maybe we can just move along and maybe could I ask you if you would agree that there remain lingering effects of EVOS that are significant or otherwise? Are there minor effects that are still being felt in the environment to this day as a result of EVOS?

5735. **DR. ALAN MAKI:** There are minor effects on some of those species that are still measurable today.

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5736. **MS. CAMPBELL:** Thank you.

5737. And in the -- in your application, one of the -- so you've done five studies. You did five modellings -- models. You did the 36,000 cubic metre spill in Wright Sound as well as the 10,000 cubic metre spills.

5738. And in doing the mass balance model for Wright Sound, can you confirm that you conducted an ecological risk assessment and a human health risk assessment for that 36,000 cubic metre spill model?

5739. **MR. JEFFREY GREEN:** Yes, I can. And there's two other spills that are in the marine environment which is at the terminal. And we also did the human and ecological risk assessment for those two scenarios.

5740. **MS. CAMPBELL:** So you did the ecological risk assessment for the terminal as well?

5741. **MR. JEFFREY GREEN:** That's correct. And Mr. Stephenson is here to speak to that.

5742. **MS. CAMPBELL:** Okay. I don't have any questions on that at the moment so.

5743. And when you did the ERA of the Wright Sound model, did you rely on studies of EVOS impacts to assess the impacts of hydrocarbons in the marine environment from that spill?

5744. **DR. MALCOLM STEPHENSON:** Yes, we did. As Dr. -- sorry, as Mr. Green said earlier, we used them as a surrogate.

5745. **MS. CAMPBELL:** And in some cases have you used the work of the EVOS Trustee's Council and in other cases, you've relied on other studies?

5746. **DR. MALCOLM STEPHENSON:** That's correct. We looked at the conclusions of the EVOS Trustee's Council, but we also looked at other studies and drew what we thought was a balanced conclusion based on a comparison.

5747. **MS. CAMPBELL:** So it's fair to say you did use a range of perspectives in coming to your conclusions around the role of EVOS and how that

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would impact the right spill model?

5748.           **DR. MALCOLM STEPHENSON:** We considered a range of information before coming to our conclusions, yes.
5749.           **MS. CAMPBELL:** And so if there was a spill in Wright Sound, as you modelled, is it possible that its impacts would be felt longer than 20 years? Significant or otherwise.
5750.           **DR. MALCOLM STEPHENSON:** In my opinion, that's unlikely. We put our opinion as to the length of time that it would take for recovery to occur as part of the ecological and human health risk assessment. So those timeframes are there, they're on the record.
5751.           **MR. JEFFREY GREEN:** If I can just add to that, is -- the Exxon Valdez I think serves as an example of a large oil spill with some very substantial effects. It also reflected a time period of 20 years ago and the world has changed a great deal since that time.
5752.           And there's been a number of papers published on what's different between 1989 and now. Dr. Maki, I believe on Monday, spoke about some of the changes to the U.S. legislation in terms of oil spill response, tanker specifications, escort tugs and the like.
5753.           But I think one of the big differences between Exxon Valdez and now is what we're talking about here is a very different type of spill response, a very different type of prevention approach. And so while we can compare to Exxon Valdez in terms of the types of effects, I think we have to be cautious about saying that similar spills are -- are likely because I think things are very different.
5754.           **MS. CAMPBELL:** And -- okay. Thank you.
5755.           I'd like to talk a little bit about the risk assessment for the hypothetical spill examples at the Kitimat terminal and in Wright Sound.
5756.           And that would be B16-33. And -- I'll just wait for that to come up on the screen.
5757.           In that study, on page -- Adobe page 30 which is page 212 of the study -- and I think -- can you go down a little bit further? There we go, the

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identification of receptors.

5758. In developing the criteria for that study, you recommended specific receptors to be used that were based on four factors. And the four factors that are identified in the bullets there are: that the species would be indigenous to the area; that they would likely be exposed to chemicals of potential concern; that they be representative of trophic levels in feeding guilds; and that they would be of cultural, economic or social importance.
5759. Correct?
5760. And then, on the next page, page -- Adobe page 31, you identified four mammals that you would look at and those are: the harbour porpoise, the mink, the sea otter and the Steller Sea Lion.
5761. And these mammals are primarily fish and invertebrate eaters; is that correct?
5762. **DR. MALCOM STEPHENSON:** That's correct.
5763. **MS. CAMPBELL:** And would you agree that killer whales, and particularly killer whales which frequent the CCAA, represent another trophic level that cannot be represented by the fish eaters?
5764. **DR. MALCOLM STEPHENSON:** You could make that suggestion but the primary contaminants of concern we're dealing here with hydrocarbons. And they do not bi-magnify or transfer up the food chain in appreciable quantities.
5765. So we were focussing on -- on those components of the food chain that would have the greatest -- greatest exposure to hydrocarbons such as PAHs. There's a strong difference to be drawn between PAHs and other organic contaminants such as PCBs which do bi-magnify and for which a higher level of concern on -- on killer whales perhaps that might be eating mammals would be warranted.
5766. In this case, it's not warranted, in our opinion.
5767. So there's a trophic level that is not represented. Even though -- even though you said that you were going to have representative trophic levels, there is

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a trophic level, the higher one ---

5768.           **DR. MALCOLM STEPHENSON:** I think if you could scroll back up to the previous page?
5769.           There's -- there's also a focus on exposure there. And again, as I said before, my contention is that the species that we focussed on are those that would be exposed to a higher degree than organisms that would be feeding on marine mammals, like seals.
5770.           **MR. LANGEN:** Madam Chair, if I may.
5771.           Ms. Campbell, I know that you're reading. And if you could slow it down a bit it would be helpful for me trying to follow your questioning. Some of them are a bit fast. I'm sure the court reporter would be appreciative as well.
5772.           **MS. CAMPBELL:** My apologies, Mr. Langen. I'll do that.
5773.           **MR. LANGEN:** Thank you.
5774.           **MS. CAMPBELL:** I've always been a little bit of a fast talker. So I'll see what I can do.
5775.           So I -- I'm just trying to clearly understand that you opted not -- even though killer whales frequent the CCAA and are one of the trophic levels in this area, you opted not to include those in the ecological risk assessment.
5776.           Correct?
5777.           **DR. MALCOLM STEPHENSON:** We selected harbour porpoise as -- as a small whale which feeds on fish, which frequents the study area and which would also serve to represent fish-eating killer whales.
5778.           **MS. CAMPBELL:** And are you aware that the EVOS Trustee Council identifies that transient killer whales are not recovering as a result of the EVOS and that their extinction is anticipated?
5779.           So in that light, given that the experience of one group of killer whales with EVOS has -- has not been -- there's been no recovery, essentially, would it not have been wise or helpful or precautionary to consider to include killer whales

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in the ERA?

5780.           **MR. LANGEN:** So, Madam Chair, my friend has a fairly nested question there. There was at least two questions. One was: Are you aware that the EVOS Trust Council has offered an opinion? I won't repeat here with respect to killer whales. She then nested something about extinction. And then she asked the question.

5781.           So I'd ask her to break it down for the witnesses, please.

5782.           **MS. CAMPBELL:** Thank you.

5783.           Are you aware that the EVOS Trustee Council has determined that transient killer whales are not recovering?

5784.           **DR. ALAN MAKI:** We were aware that the AT1 pod which is the transient killer whale pod of concern in Prince William Sound is listed as unrecovered.

5785.           However, the data underlying that are ambiguous at best. They cannot make a linkage to an original effect of the oil spill. It appears to be a combination of many effects.

5786.           As you correctly identified, the transient killer whales are primarily mammal feeders and, as such, this group has -- has the highest levels of the polychlorinated organics, PCBs, pesticides and many other biopersistent, bioaccumulative compounds that we've measured in marine mammals.

5787.           The levels are high enough in those organisms, in those particular members of AT1 pod to be of concern for reproductive impairment.

5788.           That group of killer whales has not reproduced a calf since 1984. Five years before the spill. The additional fact that their senescence has come into -- into call, they are -- a combination of -- with the high levels of contaminants, we've many other variables impacting that group of killer whales.

5789.           And even the Trustee Council's own statements indicate that the link to any Valdez exposure is uncertain.

5790.           **MS. CAMPBELL:** Would you agree that killer whales are listed as



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threatened under both the federal *Species at Risk Act* and COSEWIC?

5791.           **MR. JEFFREY GREEN:** Yes.

5792.           **MS. CAMPBELL:** Would you agree that killer whales are small and isolated populations and that they're slow-reproducing?

5793.           **DR. ALAN MAKI:** I guess we should -- I guess we should talk about the killer whales in general here.

5794.           This is a very -- a very interesting story. You need to understand killer whale biology to get to the proper answers of your question.

5795.           And, first, turn the clock back to 1989 when the killer whale group was a fairly loose knit group relying on observations and pictures taken by incidental observers.

5796.           Today's computer and email connections have vastly improved their ability to -- to identify the killer whale population. We have a much better fix.

5797.           Each killer whale is identified and catalogued through photos of their dorsal fins and their colouration. Each individual whale has got a distinct colouration and is assigned as distinct and specific alpha-numeric identifier. And this is true of the entire north Pacific population.

5798.           **MS. CAMPBELL:** And so you make a good point ---

5799.           **DR. ALAN MAKI:** And the catalogue of those -- of those animals is -- is kept by Graeme Ellis and John Ford at the DFO Nanaimo lab.

5800.           Now, those are the identifiers for the population we're talking about. And you've got to understand, in Prince William Sound, there are two types of pods: The resident pods which focus on eating fish and the transient pods, or Biggs pods sometimes referred to here in Canada, which are primarily marine mammal consumers.

5801.           They are very different in their feeding ecology and their behaviours.

5802.           Now, in Prince William Sound, in 1989, there were six known pods of killer whales, totalling about a 117 individuals. Of those pods, only two exhibited

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significant losses of individuals about the time of the EVOS. It leaves the question open what about the other ones?

5803.           The AB and AT pod were the two that we're talking about.
5804.           **MS. CAMPBELL:** But I -- right now I'm asking questions on the ERA, I'm not asking about the status of ---
5805.           **DR. ALAN MAKI:** Well, in order -- in order ---
5806.           **MS. CAMPBELL:** But I think I might want to get to that ---
5807.           **DR. ALAN MAKI:** Okay, all right.
5808.           **THE CHAIRPERSON:** If we could -- excuse me, both of you, if we could have one person speak at a time. It's -- we talk about speaking quickly being a problem for the court reporter. When people speak together it's a much worse problem.
5809.           **DR. ALAN MAKI:** Good point.
5810.           **THE CHAIRPERSON:** So let's have -- let's have the witness complete their answer and then back to you, Ms. Campbell.
5811.           **MS. CAMPBELL:** Thank you, Madam Chair.
5812.           **DR. ALAN MAKI:** The -- the story is -- is primarily focused on those two pods, the AB pod and the AT1 pod. They both experienced losses of individuals in the late eighties, early nineties. The AB pod consisted of 35 members in 84 and lost 21 from the period 1985 to '90 and the AT pod lost 9 members.
5813.           Now, this was particularly troubling to a number of us who were studying the post-spill ecology and recovery status which I think is what you're getting at.
5814.           Since killer whales are extremely intelligent and it's a highly mobile species, how could it really run into oil at toxic levels, given the fact that vast stretches of the Sound were totally oil-free during the heights of the spill in '89 even. It seemed implausible that the killer whales could not avoid the spill with

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very little effort.

5815. So you have to look at the whole background situation of the -- of the environment that was occurring in the -- in the 1980s.

--- (A short pause/Courte pause)

5816. **DR. ALAN MAKI:** To facilitate discussion here, maybe -- maybe you can refocus your question and I'll make sure that I'm -- I'm properly addressing where you want to go.

5817. **MS. CAMPBELL:** Thank you.

5818. My question actually did not have to do with the status of the AB or the AT1 pod in Prince William Sound. It had to do with the ecological risk assessment that was done for Wright Sound.

5819. And my question, I think, is building on the previous answer that is it, I believe that Mr. Jones had the same issue with the Dr. or the Mr. status, so with Mr. Stephenson -- Dr. Stephenson. I'm sorry, Dr. Stephenson.

5820. And -- and it has to do with, the ecological risk assessment is designed to be precautionary. If it's designed to be representative of potential impacts on species that represent different trophic levels, and that we know that killer whales are threatened and, as we've learned from you, Dr. Maki, we know that they're very well studied, why didn't you include killer whales in that ecological risk assessment?

5821. **DR. MALCOLM STEPHENSON:** It's -- sorry, it's entirely normal in an ecological risk assessment for an identified receptor or key indicator to represent other key indicators that would have generally similar characteristics.

5822. And I return to the four bullets that are indigenous to the area, are likely to be highly exposed to COPC emissions due to their habitat and home range, a representative of various trophic guilds -- sorry trophic levels and feeding guilds in the marine ecosystem and are of cultural, economic or social importance. And the harbour porpoise was selected for this ecological risk assessment for a combination of those factors particularly as I indicated, the fact that they are fish-eaters, so they're feeding at a trophic level where accumulation of PAHs is plausible.

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5823. They have a limited or more limited home range and habitat that brings them into close proximity to human activities such as -- such as a wharf where -- where vessels would be loading, in the case of the marine terminal. And -- and the -- a mammal-eating killer whale simply would not -- would not fit that -- that set of criteria. Its exposure would be less and -- and the risk to that organism or that type of organism would likewise be less, so we were focusing on -- on, in this case, selecting the harbour porpoise as -- as a model organism.

5824. **MS. CAMPBELL:** I'd like to turn to Volume 8C, which is Exhibit B3-40, at Adobe pages 120 and 121 and -- and just at the bottom of the page of 120 and near the top of 121 ---

5825. **THE CHAIRPERSON:** We don't seem to have the correct exhibit pulled up because there aren't that many pages in the document that's up.

5826. **MS. CAMPBELL:** Oh dear -- oh dear, okay ---

5827. **MR. JEFFREY GREEN:** The -- the ecological risk assessment, I believe is in B3-42.

5828. **MS. CAMPBELL:** It must be 3-42. That would be my mistake.

5829. So it's B3-42 -- well, it's the application and it's page 8-56 which I have as Adobe 120 and 121 of what I thought was B3-40, so bear with me.

5830. **MR. JEFFREY GREEN:** It's page 8.56, did you say?

5831. **MS. CAMPBELL:** Yes, it's 8.56.

5832. **MR. JEFFREY GREEN:** Okay, so that's B3-39.

5833. **THE CHAIRPERSON:** Ms. Campbell, welcome to our world of bingo. We all work together to help each other.

--- (Laughter/Rires)

5834. **MS. CAMPBELL:** Thank you very much. I'm sorry about that. Well, it's funny because I know what it is and I know where it is as I'm sure you all know very well.

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5835. So thank you for that and what I wanted to point to was a section here and it's in what I have as page 8.56 of Volume 8C and it's the section on marine mammal vulnerability and key life stages and there is a brief description of killer whales. And perhaps I could just read it to you.

5836. **THE CHAIRPERSON:** If it's a brief description, why don't we go that approach?

5837. **MS. CAMPBELL:** Yeah. In 8.9.1.2, Ms. Gilbert.

5838. **MR. JEFFREY GREEN:** It's -- I'm sorry, so we'll have to go to B3-40, and it's Adobe page 7.

5839. **MS. CAMPBELL:** Thank you, Dr. Green.

5840. And I wanted to take us back to the application just because that is the primary document, so anybody who is looking to understand the nature of the Northern Gateway proposal is always going to start here, and at the bottom of page 8-56 and the top of page 8-57, you're right there, Ms. Gilbert, it says:

*"The northern resident [...] whale is relatively well studied, [...] known to frequent the CCAA. [And] as top predators, [Northern Resident] [...] killer whales rely on lower trophic levels and can be considered indicators of ecosystem health."*

5841. And then on the next page, if you page over, it says:

*"Their communication methods, hearing and physiology are generally similar to those of other toothed whales, although transient whales do show some marked differences."*

5842. And I'm wondering, Dr. Stephenson, if you can describe what the marked differences are here of the transient whales that are discussed or Dr. Green.

5843. **MR. JEFFREY GREEN:** So the, yeah, so we're referring here, just to be clear, this is the effects assessment, the general effects assessment in the Volume 8C and it's not the ecological and human health risk assessment.

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5844. And what we're referring to here, it says their communication methods, hearing and physiology are -- so communication, for example, in Biggs or transient killer whales versus residents would be different, as an example, their -- their calls are different. They -- like, so their vocalizations are different than residents, for example.

5845. **MS. CAMPBELL:** Okay, thank you.

--- (A short pause/Courte pause)

5846. **MS. CAMPBELL:** I'd like to go to the aid to questioning that we filed earlier this week and it is Aid to Questioning A which is -- it's a paper by Craig Matkin on ongoing population level impacts on killer whales following the Exxon Valdez oil spill.

5847. And this paper is in the references to your Application; is that correct?

5848. **MR. JEFFREY GREEN:** Yes, we did reference this paper in our Application.

5849. **MS. CAMPBELL:** And you're aware that it was prepared with funding from the EVOS Trustee Council?

5850. **MR. JEFFREY GREEN:** Yes.

5851. **MS. CAMPBELL:** The Matkin paper addresses the impacts of oil on orcas in Prince William Sound and it examines the impacts of the two pods in particular, the AB Pod and the AT1 Transient Pod.

5852. And that's -- that is one of the -- that's the subject of the paper; is that generally correct?

5853. **MR. JEFFREY GREEN:** Ah, yes, both groups are discussed there and Dr. Maki has described why they're quite different.

5854. I'll just point out, in Volume B3-40, starting on page 15, there is a discussion that includes the Matkin papers and some of the outcomes of the Matkin papers.

5855. **MS. CAMPBELL:** That's right and I actually had that exact

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reference here and I had it correct in that case but ...

5856. And actually, at that point in your Application -- and I don't think there's a need to go to it but you've actually brought it up, Dr. Green, you do say that -- the Application states that:

*"Studies examining a whale's ability to detect and avoid hydrocarbons are inconclusive."*

5857. And you reference some studies from 1990, 1992 and 1995.

5858. **MR. JEFFREY GREEN:** That's correct.

5859. And just for your information I'm a mister not a doctor. It'd be nice if I was but I'm not so ...

5860. **MS. CAMPBELL:** Thank you. I'll do my best, Mr. Green.

5861. And the Matkin paper which is also referenced on the same page deals with directly that issue and, at this point, I'd like to take us to Adobe page 11 of the Aid to Cross that's on the screen.

5862. And I'd like to take us to the highlighted text that we have there which says -- I mean I'll go the sentence before which says:

*"The results of this study..."*

5863. So this is the conclusions of the Matkin study:

*"... underscore 3 key aspects of killer whale behavior and ecology that leave them highly vulnerable to natural or anthropogenic disasters such as oil spills."*

5864. And here's the highlighted part:

*"First, free ranging killer whales do not or cannot detect or avoid crude oil sheens at the water's surface and are susceptible to inhalation of vapors and/or oil, skin contact, and, especially in the case of mammal-eating transients, to ingestion"*

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5865. Which would be transient killer whales.

*“Second it is clear that resident killer whale pods, even under optimal conditions, may take decades to recover from the impacts of [an oil] spill. Particularly where there’s reproductive females [involved]”*

5866. And:

*“Third, in [a] small, isolated and threatened population like ATI [transient pod], a major environmental perturbation can greatly hasten[the] decline toward extinction.”*

5867. So it’s the opinion of this scientist that killer whales are vulnerable to crude oil spills.

5868. Is that generally an accurate description of this scientist’s opinion?

5869. **MR. JEFFREY GREEN:** I think that’s a fair description of Mr. Matkin’s description.

5870. I think, as we state in the Application, there’s some controversy around the killer whale issue.

5871. Northern Gateway is of the opinion that this is a very important iconic species in British Columbia. It’s culturally important to Aboriginal people. It’s very important to British Columbians.

5872. And I guess our -- what one can say is that you can’t say there are no effects from an oil spill on killer whales. The evidence just isn’t there to say that there is not.

5873. I think the debate is what are the effects and how do those effects interact with a range of different factors and Dr. Maki was beginning a discussion about some of the complications of the interpretation of the information.

5874. And I think it’s important, if we are going to talk about the interpretation, that we speak about resident killer whales and the Biggs or transient killer whales because the issues are quite different.



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5875. I think, before we start there, what I'm able to say is that what becomes really important for killer whales is that they are a special status species. Northern Gateway has already identified that and in -- we've talked about some of the measures in terms of reduced speeds and reduced noise; that we're paying attention to that special status.

5876. In the case of an oil spill, the best solution for a killer whale is prevention. There's not a great range of mitigation techniques for killer whales and so prevention is an important one and understanding their population and knowing where they are is important.

5877. So maybe I'll just leave it there and we can get into questioning but it is a very difficult area in terms of understanding the specific effects.

5878. **MS. CAMPBELL:** Thank you.

5879. And that -- I spent a bit of time trying to understand -- and thank you for the overview of the approach of Northern Gateway because I did spend a bit of time trying to understand the evidence that you've presented on killer whales.

5880. So what I did was I also looked at the reply evidence that was filled in July, 2012 on the recovery of biophysical and human environments from oil spills which is Exhibit B83-17.

5881. And if I look there, at Adobe page 75. Oh, we're there. Sorry, I've lost my confidence about my tabbing.

5882. There's a part where you say:

*"The Exxon Valdez oil spill is to date the best study of major tanker accident and the findings of studies related to killer whales suggested there had been adverse effects."*

5883. And then, what I'd like to do is just not take us through this because that isn't going to necessarily going to help but my understanding, based upon the subsequent six pages there, you actually challenge this conclusion in a number of ways and you describe other studies that would diminish the idea that there have been direct effects on the whales from the Exxon Valdez.

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5884. And one of the studies that you rely on largely is the work of Fraker?
5885. **MR. LANGEN:** Sorry, Madam Chair.
5886. I understand that -- if you can -- you're going on and on and if there's a question, if you can ask the question and then go to your next question, I think that would be helpful.
5887. So you said -- you summarized what, in your view, the evidence says over six pages and maybe perhaps you can ask the witnesses whether that is a fair summary and then go to your question. I think that would be helpful.
5888. **MS. CAMPBELL:** Is it fair to say -- thank you, Mr. Langen.
5889. Is it fair to say that, in the next six pages of your reply evidence, you challenge the conclusion that the orca whales suffered adverse effects from the spill?
5890. **DR. ALAN MAKI:** It's fair to say that there's a considerable body of additional literature that needs to be considered before one draws any conclusions about the ultimate effects of the Valdez spill on either of these pods.
5891. **MS. CAMPBELL:** And one of the studies you relied upon is that of Mr. Fraker, which is also an aid to cross -- which is our Aid to Cross D, which is entitled "Killer Whale Deaths in Prince William Sound 1985 to 1990".
5892. One of the ideas posited by Fraker is that there was a depredation of killer whales by fishermen in the years preceding the spill and that bullet wounds could have been a factor in the death of the whales after EVOS. Is that correct?
5893. **DR. ALAN MAKI:** It's not only the position of Fraker, but he cites published literature and reports that were presented before the International Whaling Commission that confirms that. And additionally, there were quite a number of whales that were discovered in the late 1980s that were clearly -- had clearly died from bullet wounds.
5894. Now, we should probably work the context of this because everybody's wondering why are people shooting killer whales. In order to get the background understood there, you have to turn the clock back to the 1980s where, in Prince William Sound, the longline fisheries were taking off for both halibut

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and sablefish or the black cod, as we call it.

5895. The longline fishery involved putting a long string of bait down and then coming back with a hydraulic pulley and pulling that up with the fish that had been caught. It didn't take long for the killer whale pods to associate the noise of the hydraulic pulley with essentially the dinner bell ringing. And they got quite acclimated to that fishery so that once you pulled your line in, you literally pulled in nothing more than the head of the halibut or the head of the black cod. The rest of it had been very neatly clipped off by the killer whales as it was being retrieved through the water.

5896. This, obviously, was a conflicting use of resources, we'll say. The fishermen were highly concerned about this and took to their basic defence and started using high-powered rifles to solve their dilemma. During the late 1980s, many whales were reported and washed up and had clearly been killed by bullet wounds.

5897. John Hall's field research in Prince William Sound recorded a number of additional whales that had clear evidence of bullet wounds in their dorsal areas and had clear large abscesses from previous bullet wounds, so that's an established and well-known fact that there was a contributing effect there.

5898. Now, you cite the Matkin 2008 paper and, as with everything in this world, it is always about context. And it's important to understand that, in 1994, Matkin, in association with Marilyn Dalheim, another researcher working on killer whales, published an extensive review of the killer whale scenario at that time. I think this was 1994.

5899. They summarized all the available information and reached the conclusion that simply evidence does not support the Exxon Valdez spill as a clear cause of the killer whale mortalities, and that's essentially a quote from their paper. That's in 1994.

5900. This led Bob Spees, who was the -- Dr. Spees, who was the chief scientist for the Exxon Valdez Trustee Council, to state, and this is a quote:

*"We don't know what's involved yet."* (As read)

5901. And the Kodiak paper, then, subsequently in 1996, quoted Craig Matkin by stating, and I give another quote:

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*“Scientists suspect that oil toxicity is not to blame. Instead, they think the problem is related to a breakdown in the pod’s social structure caused by the [...] [‘89] spill, said Matkin...”*

5902. So the toxicity angle is highly questionable prior to that and then, 10 years later, we see Matkin comes out with no real new additional information, additional census information, but no new exposure information and reaches the -- an opposite conclusion that it may very well have been -- and his quote here is “was likely caused”. Loss of whales was likely caused by the Exxon Valdez spill.

5903. So we see a reversal of position leading up to that paper. So we then look at what could have caused that. How could we possibly reach a conclusion that the Valdez spill brought about the toxicity?

5904. And you analyze the three routes as Fraker did in his paper. You have three potential ways that an animal can be exposed. You can either inhale it, you can either contact internally or you can ingest it.

5905. Fortunately, we have some information -- a fair amount of information from Canadian researchers Geraci and St. Aubin who, in the 1980s, did a lot of marine mammal work and actually oiled animals in a laboratory context to check their susceptibility and to check the toxicity.

5906. They found, using dolphins, that the threshold for petroleum hydrocarbons was in the vicinity of 300 parts per million of volatile organic carbons in an exposure period of about three hours. That was what they determined from their laboratory exposures.

5907. Now, our best estimates ---

5908. **THE CHAIRPERSON:** Dr. Maki, can you remind me what the question was?

5909. **DR. ALAN MAKI:** She’s asking about the Matkin paper and the conclusions challenged by Fraker, so I wanted to ---

5910. **MS. CAMPBELL:** Actually, I believe I had already received an answer to that. I ---

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5911.           **DR. ALAN MAKI:** Yeah. Well, I wanted to also say that the contact and ingestion routes were similarly analyzed and proven that there's just no way you could have reached that problem. You could not have reached an exposure that would have caused those killer -- so we're left, then, with the shootings that occurred, the ---
5912.           **MS. CAMPBELL:** Exactly. May we stop at the shootings because that was the point I was ---
5913.           **DR. ALAN MAKI:** The bottom line is -- the bottom line, I want to say -- just one more sentence.
5914.           The final conclusion after we analyze all this work, and this is our position -- whether the EVOS somehow contributed to the killer whale deaths is simply unknowable. We can't tell one way or the other. The data are just not clear.
5915.           **MS. CAMPBELL:** So what I'd like to actually do is go back to the idea about the depredation of the killer whales and the shootings.
5916.           And I know that we've now had an explanation of the context and the background for that, but my specific question in relation to those shootings is -- and it goes back to the reply evidence that was filed in B83-17. And that is, my understanding is that Northern Gateway now adopts one of Fraker's conclusion, essentially, that some of the killer whale mortalities post EVOS may have been caused by bullet wounds and not by EVOS. Is that correct?
5917.           **MR. JEFFREY GREEN:** What we've done in the recovery report is try to provide a summary of the available information. And I think we could debate the Matkin and Fraker papers at some length, and that's not Northern Gateway's intent in the recovery review. It was -- I'd actually like if we could maybe go in your aid to cross on page 45.
5918.           Mr. Fraker -- Dr. Fraker talks about his conclusions. And to me, it really -- to sum up what Dr. Maki just said which is -- and I'll just read it. He says:

*"This is not to say that oil cannot harm cetaceans nor that EVOS did not somehow contribute to the death of Prince William Sound killer whales recorded in 1989/1990; however,*

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*a critical examination of the facts and suggested explanations  
does not reveal a clear and plausible causal connection.” (As  
read)*

5919.           And there are some mysteries. I think it's very fair to say that there are some whales that people can't explain why they went missing. There's a lot of debate about why certain transient whales disappeared and why certain residence ones did.
5920.           I think what is important from Northern Gateway's perspective is we can't rule out that oil does not have an effect on killer whales and other marine mammals.
5921.           DFO has identified oil as a threat in the recovery strategy for both northern and southern resident killer whales, and we're aware of that. So I think one of the approaches that we see from the point of view of the scientists supporting Northern Gateway on this project is an oil spill is an accidental event that's unlikely to occur.
5922.           There are other threats to the population that are occurring every single day and are very certain and are occurring right now. So things like competition for food, disturbance by vessels are things that are happening today and are -- and can be managed.
5923.           It's difficult to manage an oil spill and so I think our emphasis is -- and we said this in the last panel, is how do we reduce the routine effects of our operation on this species and other species? And so I won't repeat because that was the last panel, but a lot of effort has gone into speed control and the associated noise effects and what that might do to killer whales.
5924.           And so I think the quick answer is, the approach from the point of view of this project is let's minimize the routine effects, work with other people in terms of data collection. So there's a commitment to three years pre-operational data and three years post-operational data, large regional surveys for marine mammals which would include killer whales, continuing to support DFO in their work and understand this population and what the threats are to it and then working on the threats that are manageable.
5925.           **MS. CAMPBELL:** And I think -- in that context, I think the question I'd like to ask is, given that there are already existing threats to the population, be

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- it shootings, be it noise disturbances, be it existing harm in the environment and we know that these are threatened species already, isn't it possible that if, in the future, an oil spill was to occur, that exposure to the oil spill could be catastrophic because these killer whales are already compromised and might well be unable to contend with additional disturbance?
5926.           **MR. LANGEN:** So there's a lot in that question. And again, it started with a preamble that involved shootings.
5927.           I know we talked about shootings up in Prince William Sound. I don't know whether it's fair to say they're -- I'm no expert. but I don't know whether it's fair to say that killer whales are being shot today so I'd ---
5928.           **MS. CAMPBELL:** I think the shooting -- I think -- I'm using shootings as an example of an already stressed species.
5929.           **MR. LANGEN:** Okay. And I think to be ---
5930.           **MS. CAMPBELL:** So I do not -- there's no specific question with respect to shootings.
5931.           **MR. LANGEN:** Okay. But you built a premise into the question and I think you should -- to be fair, you put the premise to the witnesses and ask if they agree with it and then lead with your ultimate question.
5932.           **THE CHAIRPERSON:** Ms. Campbell, another approach is just to ask your question directly to the panel with a limited preamble.
5933.           **MS. CAMPBELL:** Would you agree that an oil spill would further compromise an already threatened species, that is, the killer whale?
5934.           **MR. JEFFREY GREEN:** I would say that that is not outside the realm of possibility. It again goes back to what actually occurs during an oil spill. And I think one thing we can take away from the work that Dr. Maki was speaking to by a number of researchers was that, if there are mechanisms, that they are likely during the very early part of the spill in particular. Like inhalation seems to be one that people are quite concerned about.
5935.           And I go back to something that Mr. McHugh spoke to earlier. If one thinks of the probability of, first of all, a spill occurring, that killer whales have to

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be in the exact location of that spill within a very short time period of that spill occurring and they have to be inhaling at -- you know, so those things all have to add up together.

5936. The multiple probabilities means this is a highly unlikely event. So it's not to say it couldn't happen. We think it's an unlikely event.
5937. And the second thing is that one can plan for -- it's very difficult to plan for unlikely events, but when we know there are risks to the population that exist today, then it's better to spend, we think, effort on looking at that.
5938. Now, that's a DFO responsibility and, within Northern Gateway's project, they've thought about ways of addressing the noise issue, for example. I don't think it's within the control of any project to address, for example, the food issue that we -- is also an identified threat to the population. Contaminants are another issue, in particular in the southern population. You know, so the amount of contaminants building up in food supply and then whales ingesting that.
5939. So there's a number of issues with the species and so yes, I think it's fair to say that an oil spill might exacerbate it, but it would really -- it's an unlikely event. And I guess one would have to really think of a catastrophic example to result in the sort of thing you're speaking to.
5940. **MS. CAMPBELL:** Thank you. And I ---
5941. **DR. MALCOLM STEPHENSON:** I'd like to add to my colleague's comments as well regarding the contaminants.
5942. If we could actually have this questioner's previous aid to cross back. Again, I think it was Adobe page 11 on that aid to cross. Thank you.
5943. And in the middle of the page we're speaking to contaminants here. In the middle of the page the claim is made -- no, no. Sorry, in the middle of the highlighted section. The claim is made that:
- "The whales are thus susceptible to inhalation of vapours and/or oil skin contact and especially in the case of mammal eating transients to ingestion. (As read)*
5944. Now, I'd like you to move over to the other half of this page and down



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and across. Yes.

5945. Their reference to this -- the only reference, actually, to contaminants in this paper that I'm aware of is this paragraph that starts:

*"Several factors possibly acting in concert have been suggested for the lack of recruitment in the AT1 group, including high contaminant levels [ and I apologize to the author] (Yilato et al, 2001) and the sharp decline of harbour seals in recent decades." (As read)*

5946. Now, if you go to the references section a page or two down, and let's look at that Yilato reference. There it is.

5947. This Yilato reference is "Influence of Life History Parameters on Organochlorine Concentrations in Free-Ranging in Killer Whales".

5948. And I return on this point back to my contention earlier that the concern about mammal eating killer whales is specifically in the context of organochlorines and not PAHs, which do not magnify. Organochlorines are those classes of contaminants that would include PCBs and DDT, for example, which are simply not relevant to this Application.

5949. **MS. CAMPBELL:** Madam Chair, I'm cognisant of the time. I have two very quick questions.

5950. And I just -- just to close off this area. And that is, can you confirm for me that the Fraker study is a review article and that it is not based on original research? That's question one and there will be one after that, and then I'll be done.

5951. **DR. ALAN MAKI:** Yeah. It's -- the article is published in health and environmental reviews and it is per se a review article.

5952. **MS. CAMPBELL:** And are you aware that the Fraker study was funded by Exxon Mobil?

5953. **DR. ALAN MAKI:** I'm aware of that, but I'm not sure that that implies anything as far as the credibility. Fraker was an independent researcher who was funded to do and write his own conclusions and was not challenged on

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the direction of what he said.

5954.           **MS. CAMPBELL:** Then I'll ask one final question, which is, do you happen to know whether Dr. Fraker has ever conducted any original research in Prince William Sound?

5955.           **DR. ALAN MAKI:** He's done observational work. I know I've had him out on research crews -- cruises with me in Prince William Sound. Observational.

5956.           **MS. CAMPBELL:** Thank you. Those are my questions this afternoon.

5957.           **MR. JEFFREY GREEN:** Could I just add -- I'm sorry.

5958.           **THE CHAIRPERSON:** If you have something to add to the question that was posed, please go ahead.

5959.           **MR. JEFFREY GREEN:** I just wanted to add that I think it's correct to say that -- I think it's Mr. Fraker is -- it's a review. He did review information and analyze it.

5960.           I think it's also fair to say in the Matkin article that there's an -- he conducted some original research, but there's also analysis similar to what Fraker has done to look at some of the same issues.

5961.           So it's a very complex situation in which, because of the difficulty in studying killer whales -- you can't see them very often and so people have to make assumptions.

5962.           You know, a very good example is that whales may only be seen once or twice a year and so, when a whale disappears, it's very hard sometimes to figure out where that whale has gone and what's happened.

5963.           And so both papers, I think, discuss -- and I think both fairly discuss some of the controversies. And I think what it flags, to me, and I think we said this yesterday when we were just talking about the recovery review, is for a number of the species that haven't recovered, there's often similar types of debate about why species have or have not recovered. And I'll stop there.

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5964. **MS. CAMPBELL:** Thank you.

5965. **THE CHAIRPERSON:** Thank you.

5966. Ms. Gilbert, could we get an AQ number, please, for the Coalition?

5967. **THE REGULATORY OFFICER:** AQ62.

--- **AID TO CROSS-EXAMINATION NO. AQ62/AIDE AU CONTRE-  
INTERROGATOIRE No. AQ62:**

*The Coalition - Aids to Cross-examination*

5968. **THE CHAIRPERSON:** And just in closing tonight, the Panel would just remind parties if they could be direct in posing their questions and then also the witnesses, if you could focus on providing responses that directly relate to the questions that have been posed, it would help us all move along.

5969. So with that, thank you very much, everyone. We'll sit again at 8:30 tomorrow morning.

5970. Good evening.

--- Upon adjourning at 4:02 p.m./L'audience est ajournée à 16h02