

**The Norwood Resource Incorporated**

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7 October 2020

**Committee Secretary**

**Senate Standing Committees on Environment and Communications**

**PO Box 6100**

**Parliament House**

**Canberra ACT 2600**

Dear Committee Members,

**Impact of seismic testing on fisheries and the marine environment**  
**Follow up to Public Hearing of 22 September 2020**

Please find following proposed changes to the proof Hansard transcript for 22 September 2020 received on 1 October 2020, along with information pertaining to questions on notice and additional information that may be of interest to the committee.

**A. Suggested proof Hansard changes:**

## B. Questions on Notice

I have highlighted in yellow the areas on the attached proof Hansard where questions on notice were asked of me:

1. **P15: 11<sup>th</sup> paragraph:** *“Senator URQUHART: Mr Hughes, if you have any other information you want to add about Fitzgibbon’s or McCauley’s work, please provide it on notice, if you are able to”*

This was possibly answered by the Chair on P17, last paragraph: ***“CHAIR: That was my next question and I notice that in your submission--and Senator Urquhart asked you to take this on notice—you provide some fairly detailed criticisms of a number of research reports in relation to seismic surveys.”***

As mentioned by the Chair, I did include some fairly detailed criticisms of Fitzgibbon's and McCauley's work (amongst others) in the original submission and include them here for convenience:

“” (following section to the next “” is extracted from TNR’s submission)

4) A brief review and critique of the published research (bearing in mind that research, which fails to find impacts is unlikely to be published)

*(Edited to just include comments on the requested papers:)*

Examples of unrealistic experimental methodology and sound exposure scenario include:

- Fitzgibbon et al, 2017 “*The impact of air gun exposure on the haemolymph physiology and nutritional condition of spiny lobster, Jasus edwardsii*”; and
- McCauley et al, 2017 “*Widely used marine seismic survey airgun operations negatively impact zooplankton*”.

The following section provides further information to support the statements made above relative to some of the key research on which many parties to the current debate base their understanding of the impacts of seismic surveys on marine life.

- i) **Fitzgibbon et al, 2017. “The impact of air gun exposure on the haemolymph physiology and nutritional condition of spiny lobster, *Jasus edwardsii*”** This is a more recent study, which unfortunately still suffers from poor methodology as well as sound exposure levels which are unrepresentative of those involved in typical commercial seismic surveys. Concerns with the Fitzgibbon et al paper include:
- Water depths of 5-10m (see narrative to Fig 1); Source depth of 4.5-5.1m. These are not typical water depths or source to receiver distances for seismic surveys. In fact, if the impact was caused as a result of being 5-10m from the source, this is not a new finding but one that has generally been accepted for decades;
  - Significant doubt regarding sound exposure levels at less than 40m source/receiver distance. Note the sound attenuation curves in Fig 1 in the paper (Fig11 in this submission) are relatively flat at distances below 40m, which demonstrate that the sensors have been over-driven and hence the sound exposure levels the authors quote as leading to physiological impact are lower than actually source levels.

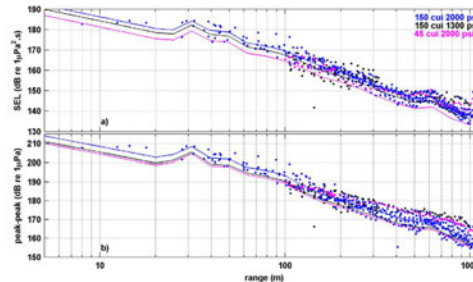


Figure 1. Quantification of sound exposure by range between the air gun vessel and the lobster pots in the 45 in<sup>3</sup>, 150 in<sup>3</sup> low pressure and 150 in<sup>3</sup> high pressure air gun exposure experiments. Sound level is expressed in received sound exposure level (a) and received peak-peak level (b) in the three trials with range expressed logarithmically.

Fig 11: Sound attenuation curves as reported in the Fitzgibbon et al 2017 paper.

Note that, although the interpretation of the sound level curves continue to have a slope after the peculiar reversal between 20 and 30 metres, the actual plotted values (in blue dots) remain roughly horizontal below 40m.

How this figure could have been accepted for publication after a rigorous peer-review process obviously calls into doubt the effectiveness of the peer-review procedure adopted for this paper;

- ii) **McCauley et al, 2017. "Widely used marine seismic survey airgun operations negatively impact zooplankton"** This piece of research clearly contradicts well known facts such as barnacle larvae (zooplankton!) settling and growing on seismic trailing equipment during operations (ie these zooplankton have been exposed to seismic sounds before settling and thrive on the trailing equipment during operations).

Growth of zooplankton on trailing equipment represents one of the biggest problems encountered during seismic operations especially in warmer waters such as the NW Shelf. See following figure, which demonstrates the problems encountered when trailing equipment is retrieved:



Fig 12. Barnacle growth on streamer depth controller.

In addition, considerable concern has been expressed about the experimental methodology as follows:

- Small sample sizes;
- The higher proportion of dead plankton remained constant out to 1200m from the sail-line. This defies any sound exposure impact theory, in which one would expect a decrease in mortality away from the source, given the exposure level at 1200m would be significantly lower than the sound exposure level at, say 100m;
- Large day-to-day variability in both baseline and experimental data; and
- The large number of speculative conclusions that appear inconsistent with the data collected over a two-day period.

However, even if the results of the McCauley et al 2017 study were to be replicated, which is unlikely, an investigation by CSIRO, published as Richardson et al. 2017, demonstrated that, in a typical seismic survey which resulted in the mortality rates reported by McCauley et al, the fast growth rates of zooplankton and the current-driven mixing of plankton from outside the survey area would allow the zooplankton populations to recover in a few days.

It is interesting to note that the Australian Institute of Marine Science (AIMS) is planning to re-investigate the impact of a (commercial) seismic array on zooplankton in a significantly more rigorous fashion.

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2. **P16. 13<sup>th</sup> paragraph:** “CHAIR: “You could take it on notice. I’ve asked every participant” referring to the question in the 11 paragraph “CHAIR: Do you have any idea how much money has been spent researching the impacts of seismic surveys in Australia over the last 30 years?”

Unfortunately, although I am very familiar with the results of the research, monitoring and auditing of seismic surveys, **I do not currently have access to that sort of (financial) information, although I have had access to this information for some years in the past.**

I am very confident that the industry spends more funds monitoring and auditing seismic surveys than are spent on research. These include marine mammal detection by visual, sound or even infra-red means, sound logging to measure the sound field in the vicinity of seismic surveys and aerial surveys to assess the distribution of whales in a particular area.

I am also aware of, and have been involved in the industry’s Joint Industry Program (JIP) which studies the effects of Sound on Marine Life (<https://www.soundandmarinelife.org/>). This has been running since 2005 and consists of industry associations and international oil companies, including BHP, Santos and Woodside, committing approximately A\$50 million to date to Sound and Marine Life research. Note that the BRAHSS (Behavioural Response of Australian Humpbacks to Seismic Surveys) study was part of this global program but conducted here in Australia.

In addition, having been directly involved in the overall management of seismic surveys for Santos, I can confidently say that, for example, during the period 2005-2007, they would have spent 5 times more in routine monitoring and auditing of seismic surveys than they would have contributed to the JIP (and their contribution to JIP was not insignificant). It should be noted that this monitoring and auditing is routinely conducted as part of the environmental plans and conditions of approval for seismic surveys and reports are provided to the regulators. However, even though they provide significant additional information on the effect (or lack of effect) of seismic surveys, they are not published. For example, it is only in the UK (to my knowledge) that Marine Mammal Observer (MMO) data has been collated and analysed in a comprehensive manner to provide valuable insights into the behaviour of marine mammals in the vicinity of seismic surveys (eg . Stone, C J 2003; The effects of seismic activity on marine mammals in UK waters, 1998-2000 JNCC Report No. 323).

If all the monitoring and auditing information gathered during seismic surveys were actually collated and summarised by the regulators, or research institutions contracted by the regulators, I am convinced that this would far outweigh the spurious results from studies that are not representative of the real world highlighted in the public arena and in this Inquiry.

Similarly, if the “catch per unit effort (CPUE)” statistics were collated and analysed to clearly demonstrate whether or not the alleged impact from seismic surveys to fisheries actually occurs, the fishing industry, the petroleum industry, the regulators and the researchers would have a better basis on which to jointly research knowledge gaps.

### C. Additional information

While it would be tempting to add a significant amount of additional information into this section, I will restrict it to a couple of points raised during the public hearings on 21 and 22 September 2020.

1. Firstly, in the process of giving evidence on 22 September 2020, I was asked by the Chair if I agreed with Gary Gray’s quote that there was *“an agenda of spreading fear and confusion and the noise was made by a relatively small number of people”*. I said “Yes” and sought to provide an example of the misrepresentation that obviously surrounded this issue but was prevented by the Chair from doing so. See page 17, end of the 11 paragraph.

I simply wished to highlight that even WAFIC, in their submission and subsequently in the public hearing, had significantly misrepresented the impact of seismic surveys on rock lobster. To quote their submission they stated that that, after the passage of the seismic vessel, the rock lobsters were ***“immobile with their soft underbelly completely exposed”***.

The Day et al 2019 paper did not say this. It said: ***“The righting reflex was assessed by measuring the time taken for lobsters to return to a dorsum-up position after being placed ventrum-up in a bin of seawater.”***

NB. ***“after being placed ventrum-up in a bin of seawater”*** by the researchers (not caused by the seismic survey).

Incidentally, “righting time” for even the exposed rock lobsters, were no more than 28 seconds, with the average more like 10 seconds, for all 3 experiments (Fig 4 of the paper), so it is very inaccurate to describe the exposed rock lobsters as “immobile”.

2. Additionally, the abstract to the Day et al 2019 paper stated the rock lobster exposure was “equivalent to a full-scale commercial survey passing within 100–500 m”. A single small airgun passing within 8 metres of a lobster cannot possibly be described as equivalent to a full-scale survey passing within 100-500m. No acoustician would agree with such an assertion and such a claim is yet another example of “spreading fear and confusion”. Unfortunately, when such statements are made by recognised researchers and then supported without question by other researchers such as AIMS (in the public hearing they appeared in) such an erroneous claim has the unfortunate effect of spreading further fear and confusion. The Day et al 2019 paper is a classic example of the lack of critical peer review that occurs before publication.

Interestingly, although the authors did not include the graph of measured sound levels relative to distance in the 2019 paper, they did include it as Fig 1 in the Fitzgibbon et al 2017 paper. This is shown in the TNR submission and included above in response to a question on notice. Ironically, this graph of measured sound levels contradicts the claim about equivalence made in the Day et al 2019 paper. If one looks carefully at the measured sound levels of the 3 sources at, say, 500m on the lower P-P plot, the received levels for the 40 cu in airgun at 2000psi (magenta) and 150 cu in airgun at 1300psi (black) are higher than the received levels for the 150 cu in airgun at 2000 psi (blue). Although this is contrary to what one would expect and is definitely contrary to the claims about equivalence made in the 2019 paper, this clearly demonstrates that the results have not been critically reviewed before publication by acousticians in other research facilities.



3. Finally, I would like to raise another example of “spreading fear and confusion”. The accusation that seismic surveys cause strandings is a classic example, especially given there are no examples of this happening. This concern was again raised by Senator Hansen-Young on 21 September in a question to Dr McCauley:

**“Senator HANSON-YOUNG:** *I'm from South Australia—we've had a lot of debate on this over the years in SA, particularly in relation to seismic testing in the Great Australian Bight. I wonder if you have done any work looking at the incident in 2014 where a school of sperm whales was found beached in Ardrossan following a seismic testing activity?”*

While Dr McCauley responded saying he was not familiar with the issue he did comment *“There hasn't been any verified beaching of whales that can be directly related to seismic surveys in the world that I'm aware of. There's been a lot of conjecture, that whales have been beached because of seismic, but none of these have been able to be verified.”*

This is despite many inquiries and studies into whether or not there is a correlation between seismic surveys and stranding events, some covered in TNR's submission. In addition, the very clear evidence of observations of whale behaviour, especially sperm whale behaviour, in the vicinity of seismic surveys (eg Stone 2003; numerous monitoring reports sent to the regulator in Australia) demonstrates that it is inconceivable that the seismic survey in the Bight caused the sperm whales to strand **400km away** in Ardrossan, **across two peninsulas**.

Furthermore, an investigation was carried out by NOPSEMA and published in 2015, concluding that ***“no evidence was found to suggest there was a likely correlation between offshore petroleum activities undertaken in the region and the strandings”*** (see Attachment)

## D. Summary and Conclusions

We sincerely hope that committee members will take the time to fully understand the facts, science and research regarding marine seismic surveys before finalising the outcome of this inquiry. Only by fully understanding the facts, science and research will members realise why Gary Gray said what he did in 2013 and BOEM arrived at the conclusion that ***“there has been no documented scientific evidence of noise from air guns in geological and geophysical (G&G) seismic activities adversely affecting marine animal populations or coastal communities”***.

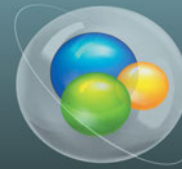
We remain concerned that the facts, science and research are not being fully reviewed at the public hearings held to date and remain convinced that the claims of environmental groups and some fishing organisations misrepresent the situation (and even the research) and therefore lack credibility.

Finally, TNR thank you for the opportunity to place a balanced analysis of the facts, science and research in the public record. Our remaining hope is that it is fairly considered.

Yours sincerely

John Hughes  
Public Officer  
The Norwood Resource

Attachments: 1.NOPSEMA investigation into Great Australian Bight strandings  
2.Separate scanned copy of proof Hansard transcript



## NOPSEMA's investigation into whale stranding events

Cooperation between the Commonwealth Department of the Environment, relevant South Australian government departments and industry has assisted NOPSEMA in completing its investigation into various whales stranding events that occurred in late 2014 and early 2015.

In December 2014, NOPSEMA was informed of a whale stranding event on Parara Beach in South Australia involving eight sperm whales. In February 2015, NOPSEMA was also alerted by the Department of the Environment to another stranding event involving two beaked whales near Donnington South Australia. Further discussions with the South Australian Museum

confirmed that a third beaked whale had stranded on the York Peninsula in late January 2015. In response to these events, NOPSEMA conducted an investigation to determine if there were any cause-effect links between the stranding events and any petroleum activities occurring in adjacent Commonwealth waters.

Information and advice was sought from relevant state and federal government agencies, the South Australian Museum and the petroleum industry. The South Australian Museum provided information regarding the results of necropsies conducted from some of the stranded whales. Furthermore, companies who were conducting seismic surveys around the time of the stranding events provided NOPSEMA with marine fauna observations, along with the dates and locations of seismic acquisitions.

From the information obtained during the investigation, no evidence was found to suggest there was a likely correlation between offshore petroleum activities undertaken in the region and the strandings. The matter will be reconsidered should more information become available. NOPSEMA would like to recognise the collaboration efforts of all parties involved in the investigation process.