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Submission to the Inquiry on Impact of Seismic Testing on Fisheries and the Marine Environment

I am a resident of Lake Macquarie with particular interest in

- Sustaining ecosystems
- Sustaining food resources
- Avoiding animal cruelty
- Avoiding further development of fossil fuel resources

The first, and major, part of this submission deals with observations and scientific studies into damage to marine life by seismic testing and therefore addresses your term of reference:

a. the body of science and research into the use of scientific testing

Information is presented in the following 11-point chronology of scientific studies and related information:

POINT 1 As long ago as 2002 seismic testing was found to cause mortality of whales, as reported by The Centre for Biological Diversity:

*"The Center filed suit and won an injunction shutting down the seismic surveys."*¹

This was a decisive rejection of seismic testing.

POINT 2 On 5 May 2011 National Geographic reported on a study in which cephalopods were exposed to intense sound simulating seismic testing and which found the animals ...

*"... showed signs of damage to their statocyst tissue. Specifically, tiny hairlike structures in statocyst cells—which bend as the cephalopods move through water and help the animals balance—were lost, essentially crippling the creatures."*²

The growing body of research confirms the damage caused by seismic testing.

POINT 3 A 2013 study, A Review of the Impacts of Seismic Airgun Surveys on Marine Life³, reports on the effects on Marine Mammals, including:

"... hearing impairment ... physiological changes such as stress responses, ... behavioral alterations such as avoidance responses, displacement, or a change in vocalizations, or through masking (obliterating sounds of interest). Assuming male fin whale songs have a reproductive function ... it would be difficult to believe that such an effect would not be biologically significant."

"... extended displacement of fin whales by a seismic survey which lasted well beyond the survey length."

"... a reduction in cetacean species diversity with increasing numbers of seismic surveys during 2000 and 2001 off Brazil, despite no significant oceanographic changes ..."

One of the most profoundly disturbing facts reported is:

"Even if impacts are fatal, only 2% of all cetacean carcasses are detected, on average..."

This submission emphasises that the true scale of damage would be obscured and this places paramount importance on avoiding such impacts.

The same document continues:

“A pantropical spotted dolphin suffered rigidity and postural instability progressing to a catatonic-like state and probable drowning within 600m of a 3D seismic survey ...”

Further, the inadequacy of “accepted” methods of preventing noise impacts on whales is described:

“Generally, only the area within 500 m of the seismic vessel is observed, yet high noise levels can occur at much greater distances ... as high at a distance of 12 km from a seismic survey as they are at 2 km (in both cases >160 dB peak-to-peak).”

The same study said of marine turtles that they:

“... show a strong initial avoidance [up to] a distance of about 2 km.”

The study said of fish that:

“Seismic air guns extensively damaged fish ears at distances of 500 m to several kilometres... No recovery was apparent 58 days after exposure (McCauley et al. 2003). Behavioral reactions of fish to anthropogenic noise include dropping to deeper depths, milling in compact schools, “freezing”, or becoming more active (Dalen and Knutsen 1987; Pearson et al. 1992; Skalski et al. 1992; Santulli et al. 1999; McCauley et al. 2000; Slotte et al. 2004). Reduced catch rates of 40%–80% and decreased abundance have been reported near seismic surveys in [a variety of] species... These effects can last up to 5 days after exposure and at distances of more than 30 km from a seismic survey. The impacts of seismic airgun noise on eggs and larvae of marine fish included decreased egg viability, increased embryonic mortality, or decreased larval growth when exposed to sound levels of 120 dB re 1 μ Pa (Kostyuchenko 1973; Booman et al. 1996). Turbot larvae showed damage to brain cells and neuromasts (Booman et al. 1996).”

On invertebrates, the study reports:

*“... A bivalve, *Paphia aurea*, showed acoustic stress as evidenced by hydrocortisone, glucose, and lactate levels when subjected to seismic noise (Moriyasu et al. 2004). Catch rates also declined with seismic noise exposure in *Bolinus brandaris*, a gastropod, the purple dye murex (Moriyasu et al. 2004). In snow crab, bruised ovaries and injuries to the equilibrium receptor system or statocysts were also observed (DFO 2004). Seismic noise-exposed crabs showed sediments in their gills and statocysts, and changes consistent with a stress response compared with control animals. Aguilar de Soto et al. (2013) produced evidence that playbacks of seismic pulses during larval development caused developmental delays and in 46%, body malformations in scallops, potentially affecting recruitment of wild scallop larvae.”*

The document includes in its conclusions:

“At least 37 marine species have been shown to be affected by seismic airgun noise. These impacts range from behavioral changes such as decreased foraging, avoidance of the noise, and changes in vocalizations through displacement from important habitat, stress, decreased egg viability and growth, and decreased catch rates, to hearing impairment, massive injuries, and even death by drowning or strandings.”

This comprehensive report confirms the destructive nature of seismic testing.

It shows a variety of significant impacts on a large range of marine life.

It is a reasonable prediction that seismic testing in Australia would affect current and future fishery and significantly affect animal welfare in the ways described.

POINT 4 In 2014 the United States' Bureau of Ocean Energy Management, in considering 3D seismic testing in the Atlantic Ocean, conceded that there would be "moderate" impacts on marine mammals and turtles. It was estimated that:

*"... about 138,000 marine animals could be injured and 13.6 million could have their migration, feeding, or other behavioural patterns disrupted."*⁴

This submission contends that such impacts are unacceptable.

POINT 5 On 9 June 2015, Live Science reported that

*"... after a seismic survey occurred in Australia in 2010, fishermen saw an 80 percent decline in scallops harvested, resulting in a loss of \$70 million."*⁵

Clearly, further seismic testing would adversely impact current and future fishery.

The same report also states:

*"After seismic testing occurred near Peru, about 900 long-beaked common dolphins and black porpoises washed up dead along a stretch of beach. Upon examination, the dolphins were discovered to have had fractures in their ear bones and signs of bleeding from their middle ears."*⁵

This is a significant animal welfare issue and is not acceptable.

POINT 6 Circa 2017, in response to the Trump administration's intention to overturn an existing ban and approve seismic testing, the Department of the Interior environmental studies estimated that:

*"... seismic proposals now under review would cause more than 31 million instances of harm to marine mammals in the Gulf and 13.5 million harmful interactions with marine mammals in the Atlantic, killing or injuring 138,000 dolphins and whales..."*⁷

This is a significant animal welfare issue and is not acceptable.

POINT 7 In 2018 The Guardian reported:

*"Douglas Nowacek, a Duke University expert on the impact of noise on ocean life, has testified to Congress that the sounds, which can reach 260 decibels, are akin to being at 'the epicenter of a grenade blast and would easily cause the rupture of the human eardrum'. 'Many ocean animals, particularly marine mammals such as whales, rely for their very existence on their ability to use sound,' Nowacek told the Natural Resources committee. 'For these animals, sound is central to their ability to find food, to locate other animals, to avoid predators, to reproduce and thus, to survive.'"*⁸

This is a significant animal welfare issue and is not acceptable.

POINT 8 Early in 2019 the Center for Biological Diversity sought a court order to block seismic blasting, asserting that:

"Dolphins, whales and other animals could endure 5 million blasts as these companies seek offshore oil and gas deposits;

The blasts will happen approximately every 10 seconds for weeks or months at a time;

Seismic airguns create one of the loudest sources of noise in the oceans;

The government failed to consider the combined effects of overlapping and simultaneous surveys, which are greater than the effects of individual seismic-blasting boats;

The government erroneously determined that only a "small number" of whales and dolphins would be harmed;

*Should it go forward, this blasting will irreparably harm marine species, from tiny zooplankton — the foundation of ocean life — to the great whales."*⁹

The scale and intensity of seismic testing is too damaging.

The scale of the damage should be avoided.

POINT 9 On 22 June 2017 the University of Tasmania's Institute for Marine & Antarctic Studies Reported¹⁰ on research into seismic testing's effect on zooplankton. The research found that the air gun signals had significant negative impact on the target species, causing an increase in mortality from 18 per cent to 40-60% Impacts were observed out to the maximum 1.2km range tested and all larval krill in the range were killed.

Lead author, Curtin University and CMST Associate Professor Robert McCauley, said the results raise questions about the impact of seismic testing on zooplankton and the ocean's ecosystems more widely.

"Zooplankton underpin the health and productivity of global marine ecosystems and what this research has shown is that commercial seismic surveys could cause significant disruption to their population levels."

This Australian research points to the disruption of the entire food chain.

POINT 10 In 2019 the advocacy group Oceana released a factsheet¹¹ on seismic testing detailing scientific findings on the damage it causes. For mammals, there are impacts on feeding, predator avoidance, communication, social behaviour, mating and raising of young. For fish, seismic testing causes problems with hearing, communication, finding food, stress, behaviour change, avoiding predators, , mobility and habitat. For fishery, seismic testing causes up to 80% reduction in population and catch rates. For turtles, there is hearing loss, behavioural changes and displacement from habitat. For invertebrates, there is broad scale mortality of zooplankton, affecting the entire food chain and there are abnormalities and mortality in scallops, affecting commercial fishery. There are impacts on lobsters, also affecting commercial fishery and squid suffer habitat dislocation.

The factsheet is a contemporary description of the damage caused by seismic testing and is included as Attachment 1. I specifically request that it and its sources are considered authoritative.

POINT 11 On 25 July 2019 the University of Tasmania's Institute for Marine & Antarctic Studies cited a new study¹² on the effects of seismic surveys on rock lobsters. The study's lead author was quoted:

"After exposing lobsters to the equivalent of a commercial air gun signal at a range of 100-150 metres, our study found that the animals suffered significant and lasting damage to their statocyst and righting reflexes.

... The damage was incurred at the time of exposure and persisted for at least one year - surprisingly, even after the exposed lobsters moulted."

The study's Principal Investigator, Associate Professor Jayson Semmens, was reported as saying:

"... while the ecological impacts of the damage were not evaluated, the impairment would likely affect a lobster's ability to function in the wild."

Clearly, the damage done by seismic testing is well understood by many and; in the absence of any proof of its safety, it should not be allowed in Australia.

The second part of this submission deals with the need for adequate base line data on marine life before seismic testing can be approved and therefore addresses your term of reference:

b. the regulation of seismic testing in both Commonwealth and state waters;

Information is presented in the following 2-point chronology of scientific studies and related information:

POINT 1 On 23 January 2014 National Geographic reported¹³ on a collaboration between whale experts and the oil & gas industry. A significant recommendation from the experts was:

“Before any ships are even sent out, the authors say, companies should attempt to gather baseline ecological data about a region...”

There were also recommendations for real-time acoustic monitoring of the air gun shots to ensure the noise levels match what is predicted by computer models and for evaluating the effectiveness of monitoring programs.

POINT 2 On 1 February 2019 the news service JSTOR¹⁴ cited an academic paper¹⁵ on the need for prudent planning for seismic testing and quoted one of the authors:

“There is currently no obligation to study fish densities prior to seismic blasts, so it will be impossible to tell how severely fish populations are impacted...”

These points show that seismic testing should not be considered in the absence of base line data.

The third part of this submission deals with justification for seismic testing and therefore addresses your term of reference:

d. any other related matters

In 2018 the Trump administration relaxed the US ban on seismic testing.

On 1 December 2018 the Washington Post reported:

“On the Friday after Thanksgiving, the administration published a ... report by 13 federal agencies projecting the severe economic costs of climate change as coastal flooding and wildfires worsen and hurricanes are becoming more severe.”¹⁶

Clearly, this action was diametrically opposed to scientific consensus on climate change and was subject of the response described in the next point. Similarly, it would be against Australia’s best interest to develop offshore gas production and therefore unjustifiable for any purported need for gas to be used as a justification for seismic testing.

On 12 September 2019 the House of Representatives reacted against the President’s actions by passing a Bill which prevents new offshore leases.¹⁷ This was largely driven by states’ objections. In Australia, any decision to allow the destructive activity of seismic testing would similarly face broad rejection by the public.

Matters related to Australia’s energy future have proven to be controversial. Under these conditions, contentious processes such as seismic testing for gas should not proceed.

CONCLUSION

Clearly, the damage done by seismic testing is well understood by many and, in the absence of any proof of its safety, it should not be allowed in Australia. It is intuitive and supported by scientific view that the impacts of seismic testing on marine life cannot be assessed without adequate base line data of the ecosystems where seismic testing is proposed.

This submission makes a strong request for animal welfare and ecosystem health to be prime considerations in evaluating the impacts of seismic testing.

Yours sincerely,

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Citations

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16. <https://www.washingtonpost.com/energy-environment/2018/11/30/trump-administration-approves-seismic-tests-that-could-harm-many-thousands-atlantic-dolphins-whales/>
17. <https://www.delmarvanow.com/story/news/2019/09/12/offshore-drilling-seismic-testing-ban-passed-house/2285224001/>

Appendix 1

https://usa.oceana.org/sites/default/files/17335/new_seismic_long_factsheet_4.22.19.pdf