

# The importance of sound science for evidence-based decision making

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Effects of Noise on Aquatic Life, July 2019

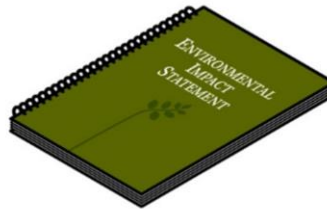
- Background – Australian regulatory approach
- Problem areas in the approvals process for seismic surveys
- Scientific response to uncertainties in EIA
- Enhancing the scientific response

# Background

## Australian offshore regulatory regime



Research agencies,  
Universities



Activity  
proponents



Activity  
proponents



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In a number of other countries marine research and environmental impact assessment are undertaken or coordinated by the same agency that regulates noise generating activities and makes environmental management decisions. In Australia, the regulator does neither of those things.

### Science/research

People that produce the science/undertake research – Gov't research agencies, universities and specialist service providers.

### Environmental Impact Assessment

Industry activity proponents – must evaluate how their activity will interact with the environment and apply the best available science to predict environmental impacts and demonstrate that they will be managed to ensure the environment is protected. In Australia, the EIA and activity implementation plan is contained in an Environment Plan.

### Regulation

NOPSEMA critically evaluate the approach to predicting and managing impacts –

Asking questions like - has science been appropriately interpreted and applied to make predictions? Are controls sufficiently protective for marine fauna and will they be effective?

### Regulatory approach

Until NOPSEMA is satisfied that environmental impacts will be managed appropriately – an activity cannot go ahead.

Once an activity environment plan is accepted, it is the proponents responsibility to ensure the activity is carried out in accordance with environmental management commitments.

NOPSEMA has a role to play in monitoring activity compliance with these environmental management commitments during implementation through our inspection program.

Both activity proponents and NOPSEMA as the regulator are science users – applied to EIA and decision making on environmental management.

The regulatory approach is not one where the regulator dictates the way activities should be managed, rather there is reliance on a robust environmental impact assessment and application of relevant science to understand how the environment may be impacted and inform decisions on the management measures required. In this way, the environmental management is fit for purpose for the individual activity circumstances.

The regulations also require activity proponents to consult with stakeholders that may be affected – opportunity for them to raise any concerns. Commercial fishers are often the noisiest stakeholders for noise generating activities.

There is a heavy reliance on science and new science is able to be taken up and applied without the need to update policy or regulations.

## Problem areas - approvals process for seismic surveys

### Cause

Impact predictions

Effectiveness of controls

Consultation

### Symptoms



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- Scientific uncertainty is resulting in problems with the prediction and management of noise impacts.
- The main causes relate to limitations in the evidence base that supports three key components of environment plans:
  - 1) predictions of environmental impact
  - 2) demonstrating that control measures will be effective; and
  - 3) responding to stakeholders to allay their concerns.
- The symptoms of these problems are delays in the approvals process, dissatisfied stakeholders and compromises in the way seismic surveys are undertaken, e.g. smaller acoustic sources, reduced survey areas or narrowed activity windows – avoid environmental sensitivities.

A common theme across all of these areas is scientific uncertainty.

# Scientific uncertainty

## Problem areas – specific examples

Impact predictions

Effectiveness of controls

Consultation



1) Predictions of impact – commercially targeted invertebrates, e.g. bivalve molluscs and crustaceans. Effects from noise on these groups have been demonstrated through recent research but there are no established noise effect thresholds for these species with which to inform environmental management decisions. Widely varying interpretations of what sub-lethal effects may mean for long term health and survival.

2) Effectiveness of controls – mitigating impacts to biologically important life stages of whales – foraging, calving, resting. This is a particular issue for threatened species with statutory recovery plans that require specific levels of protection, e.g. no displacement from a foraging area. Limitations both in understanding of where and when these behaviours occur as well as how they are affected by noise.

3) Consultation – related to issues with prediction of impact – fisheries stakeholders raising concerns about effects on their fished stock – still able to catch at same rate? Concerns about effects on eggs and larvae and implications for recruitment. Science often doesn't provide sufficient evidence to counter concerns - results of studies to date variable, e.g. m's to km's effect range for zooplankton.

Five years ago – the most common industry response to these issues was to take precautionary decisions to exclude sensitive areas or times in order to expedite activity approval, rather than applying science during activity implementation to prove that controls are effective and the environment is sufficiently protected – the implication was no advancement in scientific understanding and the problem

persisted.

More recently we have seen a trend towards a more scientific response to uncertainty.



## Scientific response to EIA problems

Impact  
predictions

Effects  
studies

Effectiveness  
of controls

Detection  
measures

Consultation

Fish  
movement  
studies



A positive development - individual activity proponents are commissioning science to validate predictions of impact – are they within acceptable limits? And ensure control measures are effective – providing required level of protection to key fauna groups.

This work is advancing scientific understanding through time and alleviates stakeholder concerns – helps build social licence or community support.

Examples:

- i. Scallops – multiple studies undertaken before, during and after seismic activities over important scallop beds to test impact predictions for scallops, e.g. was there detectable mortality of scallops as a result of the survey?
- ii. Whales – field trials to test effectiveness of new PAM technologies to detect and determine position of baleen whales relative to a sound source, e.g. can we effectively detect and localise whale position to inform management?
- iii. Consultation – fish movement studies – before, during and after seismic surveys, e.g. how far away are fish moving and for how long?

However, these scientific studies are reactive to uncertainty in EIA predictions and

stakeholder and regulator feedback. Although they add value to the environmental management of individual activities and assist with building a social licence/community confidence, these studies;

- Are poorly funded and not widely shared to inform management of future activities and therefore not as broadly applicable or beneficial as more strategic science endeavours.
- The science is answering the right questions to inform management of an individual activity but not the questions that will benefit the entire industry.
- For example, they are not furthering knowledge in terms of quantitative relationships between the level of noise or rate of particle motion and the responses of biota. The type of information that would assist with development of effect thresholds to inform management of all future activities.

## Enhancing the scientific response



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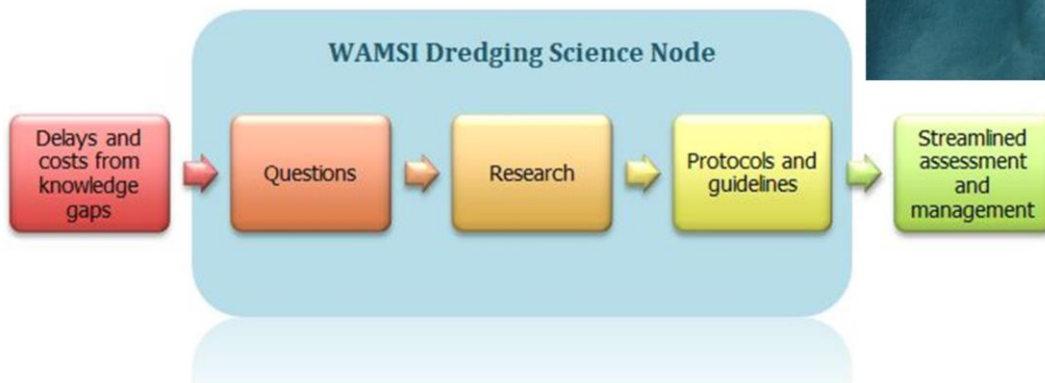
The science on effects of noise on aquatic life is currently being applied to EIA – often feels like a square peg is being rammed into a circular hole, often leaving unanswered questions.

Regulators and the offshore petroleum industry have a unique perspective on science needs on the effects of noise on aquatic life.

- Regulators and industry don't always have a harmonious relationship, but we do have a common need for science to support our work in EIA and decision making.
- Science that is targeted at EIA needs and questions has an ability to enhance accuracy of environmental impact predictions and the confidence that controls will be effective.
- Need to carefully define the size and shape of scientific needs for EIA and ensure science is planned to meet this need – to neatly fit into holes in the evidence base, ensuring that science is routinely answering the questions of importance to environmental management.

## A proven case example - Dredging

Better science = better decisions

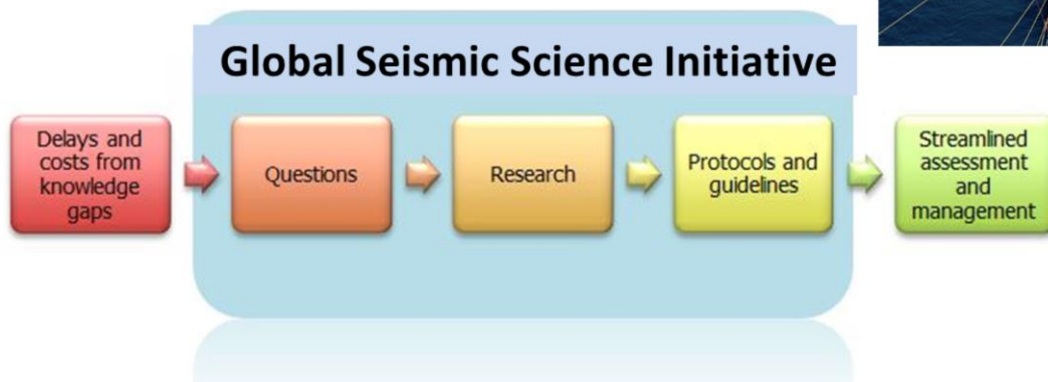


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The problems associated with scientific uncertainty in the prediction and management of environmental impacts have also been experienced in the dredging industry.

- 10 years ago, dredging activities in Australia were in the same predicament as seismic is now. Dredging companies were required to implement rigorous monitoring and management programs to address uncertainty.
- Millions \$\$ spent by individual companies – data generated not suitable for developing effect thresholds and informing the environmental management of future activities so the cycle of predictive uncertainty and rigorous monitoring to test and prove predictive accuracy continued.
- In response - a strategic, collaborative approach was adopted to enhance capability to predict and manage environmental impacts – a dredging science node. Resulted in unprecedented sharing of confidential data and targeted science with a goal of better science for better decisions.
- Some of the key questions that were being answered in the dredging space were around dose-response relationships for turbidity and benthic flora and fauna.
- Very similar questions needing to be answered in noise space, for the relationships between doses of noise and response of different species/fauna groups.

Better science = better decisions



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The time is right to develop similar initiatives for seismic survey and other noise generating activities. Initiatives that allow collective agreement by all parties on the priority science questions and the scientific outputs that will benefit EIA and establishment of a clear pathway to have them addressed.

Similar models have been successful for other activities, industry is already collaborating on sound and marine life research, and industry and regulators are aligned on the science needs.

Targeted science can improve confidence in the prediction and environmental management of noise impacts, delivering high levels of environmental protection more efficiently.

Benefits will only be realised if the science is specifically planned and designed to produce outputs that meets the needs of environmental impact assessment and management.