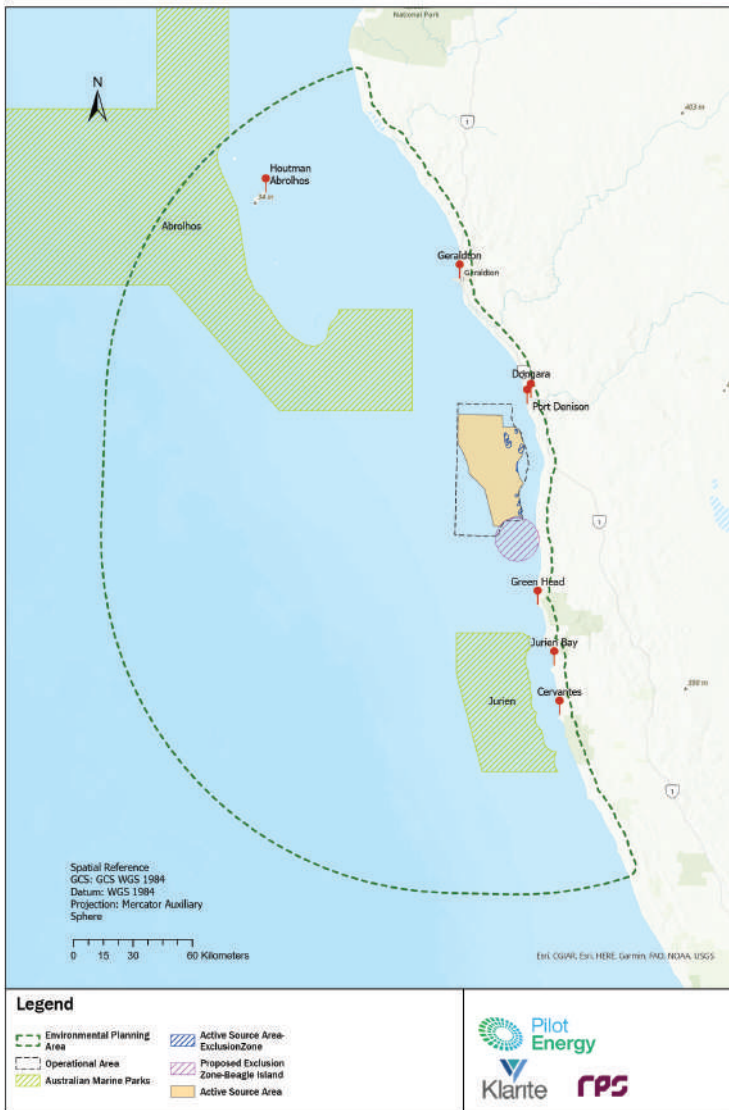


1. Where will the proposed activities be located?

The Eureka Survey will be located approximately 7km offshore the west coast from Dongara, covering an Operational Area of approximately 950 sqkm.

Eureka 3D MSS - Base Map



2. When are the proposed activities occurring? How long will they take?

The survey is planned to take a maximum of 30 days acquiring data in a 40-day window. It is currently (and most likely) proposed for a February- March window in either 2025 or 2026.

3. Are there any exclusion zones associated with the activities?

Within the Operational Area polygon during period of acquisition, sections of the area will be closed off for a few days at a time. Operations will initially start with a day of laying the ocean bottom nodes on the seabed – which will remain there until the end of project operations, then the seismic vessel will commence seismic acquisition on the western flank of the Active Source Area, slowly moving eastwards.

Fishing activities can occur within the Operational Area during the survey period, noting there will be a ~6km area radius around the vessel and the towed streamers in which access will be temporarily restricted. Look ahead notifications of planned vessel movements are available on request (24/48/72-hour notices) and typical on-water communication protocols will manage access to areas within the Operational Area available for marine use.

The shallower waters to the east of the reef areas have a smaller ~3km radius restricted area around the vessel. This is because the vessel is only towing the sound source and no streamers are required. These ocean bottom nodes previously deployed will receive the sound signals and then be recovered at the end of the survey.

Pilot has voluntarily excluded areas shallower than the 12m depth contour, plus a 300m buffer, from the reef structures within the survey area. This is a mitigation measure put in place to lessen any impact on fish and lobster aggregations in the reef habitats.

December 2023

Activity carried out by  **Pilot Energy**

EP prepared by 

Contact us

Email: contact@eureka3dmss.com.au

Phone: +61 497 832 046

Web: www.eureka3dmss.com.au



3a. Will there be any impact to recreational fishing access?

Launching areas and ports will still be open during project operations. There will be notifications put up at all major ports and boat ramps to raise awareness around the ongoing activities. Specific areas of closure will be communicated via email and text. If other forms of communication are more appropriate for recreational fishers, it would be great feedback to accommodate the changes that will be occurring in the area.

4. What are the impacts of seismic surveys on fish behaviour and health, including spawning activities?

Our assessments and modelling are generally undertaken on two parts of the fish lifecycle, adult and fish spawn.

For zooplankton the underwater noise modelling study and subsequent impact assessment determined that there may be mortal injury up to 270m from the sound source for fish eggs and larvae. However, any potential mortal impacts to zooplankton communities must be assessed in the context of natural mortality in these populations and effects to zooplankton (including fish eggs and larvae) resulting from seismic noise emissions are likely to be inconsequential compared to natural mortality rates, which are very high - over 50% per day in some species and commonly exceeding 10% per day. One study (Sætre and Ona, 1996) calculated the 'worst-case' scenario, was 0.45% of the total population, and they concluded that mortality rates caused by exposure to airgun sounds are so low compared to natural mortality that the impact from seismic surveys must be regarded as insignificant.

For fish we categorise effects based on their auditory biology:

- Fish without a swim bladder
- Fish with a swim bladder but not used for hearing.
- Fisher with swim bladder used for hearing.

Our impact assessments use widely accepted (by scientific and regulatory communities) papers of the most recent and relevant information. There are not always papers that can provide direct comparison with a species of fish, however comparison with fish of similar auditory biology is accepted by scientists.

Every species of fish studied to date is able to hear. The critical issue for understanding whether sound will affect the hearing of a fish is whether it is within the hearing frequency range of the fish and loud enough to be detectable above background ambient noise.

In some fish species we recognise that temporary hearing impairment (a temporary threshold shift TTS) can occur due to fatigue and temporary changes to the hair cells of the inner ear and/or damage to the auditory nerves when exposed to sound pressures for prolonged periods of time (Smith et al., 2006; Popper et al., 2014; Liberman, 2015).

However, the types of fish that are likely to occur in the Operational Area do not possess a direct connection between the swim bladder and the inner ear; they are therefore sensitive primarily to particle motion rather than sound pressure.

Many of the studies available on temporary threshold shifts (short term changes such as temporary hearing impairment) are based on captive fish, whereas free-swimming fish in the wild are likely to make some effort to avoid increases in sound pressures that contribute to temporary threshold shifts.



4a. If there are impacts, how long will it take for fish to recover?

Temporary threshold shift affects that may result from seismic activity are temporary and recoverable. With effects lasting up to 24 hours but in many cases due to avoidance behaviour (swimming away) likely to be much less. No study to date has demonstrated direct mortality of free-swimming adult fish in response to seismic activity (even when at proximity 1-7m).

4b. Have any studies been undertaken in WA?

The Scott Reef Study associated with the Woodside Maxima 3D survey reported in McCauley et al. (2008) and Miller and Cripps (2013) is a study undertaken in the North West of WA which included a component that examined how the behaviour of caged fish exposed to seismic signals changed. This study examined the effects to fish species including the Bluestripe Snapper, a demersal species similar to the demersal species that are most likely to occur in the Eureka 3DMSS Operational Area.

The captive fish in the study showed alarm responses such as startle and avoidance behaviour when less than 200m passing by. Less significant agitation levels (defined by changing swim direction) increased with increasing received sound levels for some fish species, however, did not seem to increase with increasing received sound levels for the less sensitive Bluestripe Snapper (McCauley et al., 2008). Fish began to feed and behave normally again within 20-minutes after the passage of the seismic source (McCauley et al., 2008; Miller and Cripps, 2013).

YouTube video on this study can be located here [Maxima 3D MSS - Seismic Survey in a Coral Reef Environment](#)

5. Where can I find more information on seismic surveys?

We have a link to an information summary on our webpage regarding what a seismic survey is:

[Eureka 3D MSS: What is a Seismic Survey?](#)

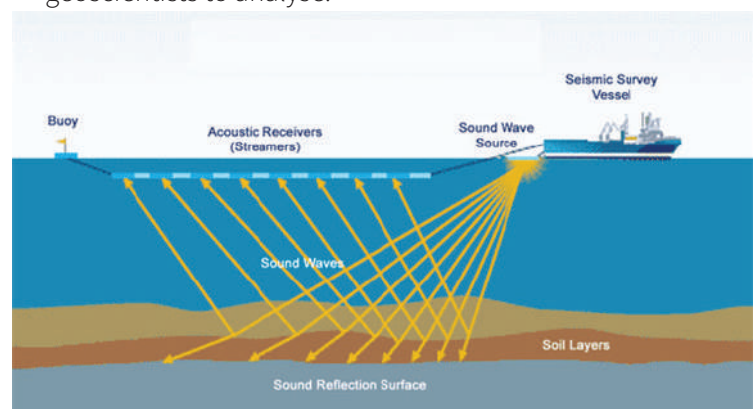
There are also a couple of videos on YouTube that explains a seismic survey and the environment.

[Marine Seismic Surveys and the Environment](#)

[Marine Seismic Surveys: Exploring Our World - Australia](#)

Seismic surveying is a method used in petroleum exploration to image the subsurface of the earth, the technology resembles medical ultrasounds used to image an unborn baby. In the oil and gas industry the data collected assists in identifying geological rock layers that may host the potential for carrying/entrapping hydrocarbons.

The source towed behind the vessel releases short bursts of compressed air that travel through the water column and kilometres beneath the seabed as sound waves. The time taken for sound waves to travel to a rock layer and back to the receivers (being towers on the streamers or in the ocean bottom nodes) is then measured and later processed to build a 3D image of the subsurface for geoscientists to analyse.



Demonstration of seismic survey activities



6. How can I receive regular updates on this project?

You can sign up for our newsletters and webinars from our website at www.eureka3dmss.com.au. We are releasing newsletters as and when project updates occur, whether it be new scientific research, general updates to project status including timing, location, or updates to available information in our document library, or the status of Environmental Plan submission.

7. Who can I contact for more information?

If you have any questions regarding the Eureka 3D Marine Seismic Survey, alternatively if you would like to enter consultation with us as a relevant person, please contact us at contact@eureka3dmss.com.au.

References

McCauley, R.D., Salgado Kent, C. and Archer, M. 2008. Impacts of seismic survey pass-bys on fish hearing and caged fish behaviour, Scott Reef Lagoon, Western Australia. Prepared for ERM and Woodside Energy, CMST Report No. 2008-52, Curtin University, Perth, Australia.

Meekan, M.G., Speed, C.W., McCauley, R.D., Fisher, R., Birt, M.J., Currey-Randall, L.M., Semmens, J.M., Newman, S.J., Cure, K., Stowar, M., Vaughan, B., Parsons, M.J.G., 2021. A large-scale experiment finds no evidence that a seismic survey impacts a demersal fish fauna. Proceedings of the National Academy of Sciences of the United States of America 118(30): e2100869118.

Demonstration of seismic survey activities Image -
<https://fishsafe.org/en/offshore-structures/seismic-surveys/>

December 2023

Activity carried out by  Pilot Energy

EP prepared by 

Contact us

Email: contact@eureka3dmss.com.au

Phone: +61 497 832 046

Web: www.eureka3dmss.com.au

