Otway Deep Marine Seismic Survey

1. Purpose of this report

NOPSEMA has accepted the Otway Deep Marine Seismic Survey (the EP) submitted by Spectrum Geo Australia Pty Ltd (the titleholder, also referred to below as Spectrum) for a seismic survey activity in the Otway Basin within the period 01 October to end February 2022.

The titleholder submitted the EP for assessment by NOPSEMA on 08 May 2018. NOPSEMA has since completed its assessment of the EP and has determined that it is satisfied that the EP meets the criteria for acceptance[1] on 13 June 2019.

This report explains how NOPSEMA took into account key matters in making its decision. The key matters capture key issues or concerns raised by stakeholders and reflect the environmental values and sensitivities of the region that will be of most interest to the public.

This report accompanies the Otway Deep Marine Seismic Survey Summary Environment Plan (Revision 1) submitted by Spectrum Geo Australia Pty Ltd, which is available on the NOPSEMA website and should be referred to for further information.

1.1. Information relevant to NOPSEMA's decision:

In making the decision to accept this EP, NOPSEMA took into account:

- the Environment Regulations;
- NOPSEMA Assessment Policy (PL0050), Environment Plan Assessment Policy (PL1347) and Environment Plan Decision Making Guidelines (GL1721);
- The Otway Deep MSS Environment Plan;
- the information raised by relevant persons, government departments and agencies that is relevant to making a decision;
- relevant published, peer reviewed scientific literature;
- relevant plans of management and threatened species recovery plans developed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and relevant guidance published by the Department of the Environment and Energy.

2. Next steps

Responsibility for the ongoing environmental performance of the Otway Deep Marine Seismic Survey activity remains, at all times, with Spectrum Geo Australia Pty Ltd.

NOPSEMA has legislated responsibilities to inspect and investigate offshore petroleum and greenhouse gas storage activities, and to enforce compliance with environmental law. These functions will be applied to this activity in accordance with NOPSEMA's policies.

[1] Environment Regulations, Regulation 10A Criteria for acceptance of environment plan

3. Sensitive Information

Sensitive information received during consultation, such as the names and contact details of individuals, is not published in this report, although this information has been considered by NOPSEMA during its assessment process.

4. Further information

If you would like further information about the activity, please contact the titleholder's nominated liaison person specified in the EP summary and on NOPSEMA's webpage for the Otway Deep MSS.

This report does not provide an exhaustive record of all matters relevant to environment management and decision-making for this EP. Readers should also refer to the relevant sections of the EP particularly where these references are provided.

If you would like to be notified of regulatory information on the activity, such as start and end dates and enforcement actions (if any), please subscribe to updates via NOPSEMA's website.

How NOPSEMA has taken into account key matters raised during the assessment and decision making process for Otway Deep MSS

#	Matter :	What Spectrum are doing:	What NOPSEMA decided:
Displacement of commercial fishers			
1	***There would be unacceptable impacts on fishing operations in particular Southern Rock Lobster Giant Crab and trawl fishing*** Claims were raised that there would be displacement of and interference to commercial fishers as a result of the activity which could reduce catch resulting in loss of income to fishing and related businesses.	Spectrum completed an evaluation of publicly available information, commissioned a report by South East Trawl Fishery Association (SETFIA), and undertook extensive consultation with relevant government departments and other relevant persons for commercial fishing. The survey area overlaps areas that may be fished by numerous fisheries including the Southern Rock Lobster (SRL), Giant Crab (GC), Southern Squid Jig, and Southern and Eastern Scalefish and Shark - Commonwealth Trawl Sector (CTS) fishers operating within the Victorian, Tasmanian and Commonwealth managed fisheries. The operational area overlaps 4.9% of Victorian Southern Rock Lobster fishery. However, the survey will only be acquiring in these depths (< 200 m) for a maximum of 4 days. Given this, the impact of displacement to Victorian Southern Rock Lobster fishers is low given the spatial and temporal extent of the fishery and the controls in place. As water depths up to 800m have been excluded in Tasmanian waters, the survey does not overlap with Southern Rock Lobster fisheries habitat in the Tasmanian fishery. In response to consultation, Spectrum have changed the south-eastern operational area boundary of their survey	NOPSEMA recognises the matters raised and agrees that there is the potential for the activity to cause displacement of commercial fishers, which if not appropriately managed could have adverse impacts on fishing. In making a decision regarding this matter, NOPSEMA took into account the content of Spectrum's EP, publically available data on fishing activities, views expressed by relevant persons including fisheries management authorities, commercial fishers, fishery representative organisations including but not limited to Seafood Industry Victoria, South East Trawl Fishery Industry Association, Tasmanian Seafood Industry Council, and NOPSEMA's decision making guidelines (GL1721). NOPSEMA required Spectrum to provide a detailed evaluation of their spatial and temporal overlap with the Southern Rock Lobster and Giant Crab fisheries, as well as describe the likely presence of these species within the survey area based on habitats and bathymetry present. A focus of the assessment included ensuring that sufficient effort had been given to exploring control measures to address relevant person's claims. This included designing the

to avoid overlap with habitat fished by Tasmanian Giant Crab fishers.

Through the consultation process, Spectrum sought information from Victorian Giant Crab fishers and identified that the survey overlaps 7.5% of the area actively fished for Giant Crab in the Victorian fishery area. Spectrum will avoid interactions with the Victorian Giant Crab fisher by acquiring in this actively fished area prior to the start of the Giant Crab fishing season.

The ocean bottom node (OBN) placement area overlaps the Commonwealth Trawl Sector fishery area and concerns were raised by relevant persons during consultation. During consultation, Spectrum established the potential water depths and OBN locations that may affect individual trawl fishers and have set up a communication protocol with them to avoid locating OBNs in an actively trawled area.

The key control measures in place to ensure that there would be no unacceptable impacts from physical displacement on fishing operations include:

- No seismic survey (including infill lines) within the Victorian Giant Crab actively fished area after 15 November.
- Payment of compensation to the rightful owner for any fishing equipment that has been damaged beyond repair by the survey or lost as a result of the survey activities and cannot be re-used.
- Payment of compensation for lost income to fishers arising from delays in returning the fishers' equipment to full working order (either through repair or replacement)

survey location and timing to avoid potential impacts to fishers.

NOPSEMA also recognises that Spectrum's operational area is located in water depths of greater than 170m, which are not traditionally fished by Southern Rock Lobster fishers. Further, in response to a request by NOPSEMA, Spectrum committed to implementing a control that prevents acquisition in the area actively fished by the Victorian Giant Crab fisher during the giant crab fishing season (commencing 16 November). This means that there will be no physical displacement of Victorian giant crab fishers caused by the seismic survey.

NOPSEMA required Spectrum to communicate the locations of the OBNs during consultation and is now satisfied that Spectrum has adequate controls in place, including understanding the locations of actively trawled areas and moving OBN locations, to ensure that there will be no adverse impacts from OBN placement on trawl fishers.

NOPSEMA is reasonably satisfied that Spectrum have provided a detailed evaluation of potential displacement of commercial fishers and demonstrated that with the adoption of control measures, impacts of the survey will be reduced to as low as reasonably practicable (ALARP) and an acceptable level.

- Notification to fishers 4 weeks prior to commencement of survey.
- Fishers actively operating in the survey area will be issued a 7 to 10 day forecast prior to activities commencing in the survey area, and will be kept informed of daily survey activities through Spectrum's 24-hour look-ahead communication process.
- Avoiding or minimising conflicts on the water by considering additional controls such as moving to another sail line or deviating around fishing activity.
- there will only be one survey undertaken within a survey season
- One month prior to the commencement of the survey, Spectrum will agree and confirm locations for deployment of OBNs with relevant fishers operating within the Activity EMBA

Other measures are provided in Table 4.18 of the EP summary.

#	Matter :	What Spectrum are doing:	What NOPSEMA decided:
Fisheries Stock			
2	***There would be unacceptable impacts from seismic sound on fisheries stock in particular Southern Rock Lobster, Giant Crab, squid and finfish*** Claims were raised that seismic sound would cause mortality, injury and/or displacement of commercially important fish and invertebrate species resulting in reduced catch rates.	In response to these claims Spectrum assessed the potential for the survey to have an impact on fisheries stock, in particular Southern Rock Lobster, Giant Crab, finfish and squid. This assessment was supported by a comprehensive review of scientific literature and informed with the outputs of underwater acoustic modelling. In Victorian waters, sound modelling predicts that the area of Southern Rock Lobster habitat (<200 m depth) that may be exposed to sound levels above the 209 dB re 1µPa sub-lethal level (Day et al, 2017) is 122.2 km^2 (or 0.8% of the Western Zone Warrnambool Region of the VIC Southern Rock Lobster fishery). The EP concludes, based on literature cited (Payne et al 2007 and Parry and Gason, 2006) and limited fishing effort in affected water depths, that impacts on catch and catchability of Southern Rock Lobster would be minor. The same sub-lethal level applied to Southern Rock Lobster (209 dB re 1 µPa) was also applied to Giant Crab and the area of Giant Crab habitat (<400 m depth) that may be exposed to this sound level is 296 km^2 (or 1.64% of the Western Zone of the Victorian Giant Crab fishery). The EP concludes, based on available literature on effects of sound on crabs (Christian et al, 2003; Christian et al, 2004; Morris et al, 2018), limited overlap of survey area with actively fished area and the short duration of sound exposure (6 days in waters < 400 m), that impacts will be short-term and minor. As water depths up to 800m have been excluded in Tasmanian waters, the survey does not overlap with Giant	NOPSEMA recognises the matter raised and agrees that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on commercially important fish stock. In making a decision regarding this matter, NOPSEMA took into account the content of Spectrum's EP, the sound modelling report, scientific literature, view's expressed by relevant persons including fishery representative organisations Seafood Industry Victoria, South East Trawl Fishery Association, Tasmanian Seafood Industry Council, individual fishers and NOPSEMA's decision making guidelines (GL1721). NOPSEMA required that the evaluation of impacts from underwater sound on fisheries stocks was well supported and based on the best available scientific literature. This literature has been used to adopt conservative thresholds for effects and support conclusions about the extent, severity and duration of impacts. Studies cited include a wide range of scientific literature (e.g. Morris et al, 2018; Christian et al, 2003; Christian et al, 2004; Payne et al, 2007; Parry and Gason, 2006) that support the assessment that mortality is not expected to occur under the conditions of the Otway Deep marine seismic survey and sub-lethal effects (behavioural and physiological) to fished species are expected to be minor.

Crab or Southern Rock Lobster fished areas in the Tasmanian fishery.

Modelling predicts that the range at which demersal and pelagic fish could experience temporary (and recoverable) effects could be up to 3 km (Popper et al, 2014). However, recovery in fish from TTS is expected to be within 24 hours based on relevant literature. Temporary behavioural avoidance by fish of the sound would likely occur prior to these effects and it is not likely that fish would be displaced from the survey area.

The EP predicts that behavioural disturbance in squid (McCauley et al, 2000) may occur up to 4.3 km from the source. Given the survey area overlaps a minor portion of the SSJF (<1%), the timing of the survey is outside the period when peak catch and effort occur and behavioural impacts are likely to temporary, the EP concludes that impacts on catch would be minor.

Spectrum's assessment concludes that given limited overlap habitat and outputs of the sound modelling in relation to impact thresholds, any impacts to fisheries stock are likely to be low due to the impacts not being lethal to individuals and displacement being temporary.

The control measures in place to ensure that this level of performance is met are described below:

- maximum airgun array of 3,475 in^3
- the seismic source will not be operational outside of the survey area
- there will only be one survey undertaken within a survey season

In response to a request by NOPSEMA, Spectrum adopted a control to limit the temporal overlap of seismic operations with Southern Rock Lobster and Giant Crab habitat to 4 and 6 days, respectively. Given the low spatial and temporal overlap with Giant Crab and Southern Rock Lobster stocks and temporary behavioural impacts to pelagic fish species, impacts on catch and catchability are expected to be negligible.

NOPSEMA believes that Spectrum have provided a detailed evaluation of potential impact on commercial fisheries stocks and is reasonably satisfied that with the adoption of control measures, impacts of the survey will be reduced to as low as reasonably practicable (ALARP) and an acceptable level.

- the survey vessel shall not acquire data simultaneously within 40 km of another seismic vessel
- soft start procedures for 30 minutes prior to survey line acquisition
- the time between repeat seismic data acquisition lines is >24 hours

#	Matter :	What Spectrum are doing:	What NOPSEMA decided:
Reproduction and recruitment of commercially important species			
3	***There would be unacceptable impacts to eggs and larvae of commercially important species including rock lobster, giant crab and finfish*** Claims were raised that seismic sound from this activity would cause mortality to eggs and larvae resulting in impacts to recruitment and subsequent impacts on biological stock levels.	Spectrum has provided a comprehensive assessment of the potential for their survey to have an impact on eggs and larvae of commercially important fished species. Spectrum acknowledges the potential for seismic sound to negatively impact on zooplankton, including planktonic eggs and larvae, and has applied relevant scientific literature to the evaluation of impacts (McCauley et al., 2017; Popper et al, 2014). Sound modelling predicts that the range at which mortality or mortal injury for fish eggs and larvae would occur is 110m from the source at the surface and 166m from the source at the seabed. However, plankton populations will be replenished by currents from non-impacted areas and mortality would be low compared with natural mortality levels. While the survey overlaps the hatching time for Southern Rock Lobster and Giant Crab (September to November and October to November, respectively), there is limited spatial overlap with Southern Rock Lobster and Giant Crab habitat and larvae are expected to be in lower densities in offshore waters off the shelf break where the Otway Deep MSS will be undertaken (Bruce et al., 2007; Richardson et al., 2017). The EP considered impacts to egg bearing female crustaceans and concluded that noise from airguns at depths at which Southern Rock Lobster and Giant Crab females would be exposed would not adversely affect embryos (Day et al, 2016). Further, the survey will not occur over waters in which Tasmanian Giant Crab and Southern Rock Lobster species will be present (<800m) and the duration of sound exposure to Victorian Southern Rock	NOPSEMA recognises that seismic survey activities have a potential to impact upon zooplankton which includes eggs and larvae of fished species. In making a decision regarding this matter, NOPSEMA took into account the content of Spectrum's EP, the modelling report, scientific literature, view's expressed by relevant persons including fishery representative organisations Seafood Industry Victoria, South East Trawl Fishery Association, Tasmanian Seafood Industry Council, individual fishers and NOPSEMA's decision making guidelines (GL1721). NOPSEMA required that the evaluation of potential impacts to eggs and larvae was well supported and took into account relevant scientific literature (Popper et al, 2014; McCauley et al, 2017; Richardson et al, 2017 and Day et al, 2016) when considering modelled exposure levels. It is acknowledged that while zooplankton are susceptible to impacts from seismic sound, fish eggs and larvae present are likely to be spatially patchy and only a very small proportion of the plankton would be exposed at any one time. Based on the evidence presented, NOPSEMA is reasonably satisfied that there would not be unacceptable impacts to eggs and larvae in the region and that any potential impacts to zooplankton will be localised, temporary and negligible, and managed to a level that is acceptable.

Lobster and Giant Crab habitat is limited to 4 and 6 days, respectively.

The commercially important finfish species that occur within the survey area are largely broadcast spawners, with several species forming spawning aggregations on the continental shelf, shelf break and slope. Significant spawning aggregation areas are not known to occur in the vicinity of the survey area with most spawning activity expected to occur in waters <400 m depth.

Based on the outcomes of the evaluation, Spectrum has concluded that impacts will be of an acceptable level.

Control measures to be implemented are outlined above in section 2 and below:

- Survey lines shallower than 500 m will be completed prior to the start of December.
- No seismic survey (including infill lines) within the Victorian giant crab actively fished area after 15 November

#	Matter :	What Spectrum are doing:	What NOPSEMA decided:
EPBC Listed Whale Species			
4	***There would be unacceptable impacts on protected matters, specifically southern right whales (SRW) and pygmy blue whales (PBW).*** Concerns were raised in relation to managing impacts to whales, in particular SRWs and PBWs.	Spectrum has described the known and established biologically important areas for SRWs and PBWs including the timing and location of biologically important behaviour in order to inform the evaluation of impacts (Sections 2.5.7.1.2 and 4.1.3.5.1 for SRWs and Sections 2.5.7.1.1 and 4.1.3.5.2 for PBWs). The evaluation of potential impacts to southern right whales and pygmy blue whales was supported by a comprehensive underwater acoustic modelling study (described in Section 4.1.2) and the application of suitable effect thresholds (Section 4.1.2.2.5). The acoustic modelling predicted that received sound levels within the outer margin of the aggregation BIA will exceed the behavioural disturbance threshold applied for SRW cows and calves in their calving habitat (based on Southall et al, 2007). Spectrum provided evidence to show that SRWs primarily utilise inshore waters of the BIA within 2 km of the coast and the timing of the activity means that the peak of the season is avoided and some SRWs will have already left the BIA at the time of activity commencement. The Otway Deep survey area spatially overlaps the annual high use foraging BIA for PBWs with temporal overlap over the period from November to January. The survey vessel will start acquiring the inshore survey lines in October and move progressively offshore in order to reduce interaction with the foraging BIA during the foraging period. Spectrum will ensure that there is no injury or disruption to biologically important behaviour to SRWs or PBWs.	NOPSEMA recognises the conservation significance of the SRW and PBW and the potential for the activity to have impacts on these species if biologically important behaviour is disturbed, or if whales come within close proximity to the seismic source and were subject to injurious levels of sound. In making a decision regarding this matter, NOPSEMA took into account the content of Spectrum's EP, NOPSEMA's Decision Making Guidelines (GL1721), the Conservation Management Plan for the Southern Right Whale (SEWPC, 2012), the Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015), EPBC Act Policy Statement 2.1 (DEWHA, 2008), and EPBC Act Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DoE, 2013). <u>Southern right whales</u> NOPSEMA is reasonably satisfied that the survey avoids the critical period when pregnant SRW females migrate into the coastal BIA for calving and resting activity. There is a low likelihood that cows and calves migrating out of the calving areas in October, may demonstrate avoidance behaviours. However, based on the information provided and current research, there are no restricted migration corridors (SEWPC, 2012) and thus the activity would not impact on the ability of animals to undertake migration. NOPSEMA required that Spectrum: • Apply a more precautionary behavioural disturbance threshold • Implement larger mitigation zones

The control measures in place to ensure this level of performance will be met include:

- No seismic operations within 10 km of the PBW foraging BIA during the peak month of February
- Implementation of EPBC Policy Statement 2.1, Part A standard management measures
- Application of a range of EPBC Policy Statement 2.1, Part B management measures, including:
  - Trained and dedicated marine fauna observers
  - Passive acoustic monitoring (PAM) and thermal imaging
  - Trained and dedicated PAM operators
  - Increased precaution zones
  - Cetacean monitoring vessel
  - Adaptive management.

Refer to Section 4.1.6 of EP Summary for further details.

- Conduct a thorough assessment of the habitats utilised by SRWs.

NOPSEMA considered the following key factors in making a decision:

- The survey area will not disturb SRWs in high use coastal waters
- The peak of the SRW season is avoided and duration of disturbance within the outer edge of the BIA is < 3 days.
- A suite of appropriate whale detection measures will be implemented by trained and competent personnel and a precautionary shut down zone has been applied.

<u>Pygmy blue whales</u>

The Otway Deep survey overlaps the foraging BIA for pygmy blue whales over the months November to January, with a commitment to avoid seismic operations within 10 km of the foraging BIA during February (month of peak use).

NOPSEMA required that Spectrum enhance the effectiveness of detection and mitigation measures for pygmy blue whales during the months November through January.

NOPSEMA considered the following key factors in making a decision:

- Temporal and spatial overlap with the foraging BIA.

- The effectiveness of cetacean detection measures, including use of a dedicated cetacean monitoring vessel.
- The application of a precautionary shut-down for PBWs.

After taking into consideration these factors, NOPSEMA was reasonably satisfied that the activity will not result in unacceptable impact (no injury or disturbance to biologically significant behaviour) to SRWs and PBWs and the activity can be conducted in a manner that is not inconsistent with the Conservation Management Plans for Southern Right Whales and Blue Whales.

#	Matter :	What Spectrum are doing:	What NOPSEMA decided:
Consultation method			
5	***The consultation in the course of preparing the EP was inappropriate*** Claims were raised that fishing stakeholders including peak fishing industry association were not provided with sufficient information or time.	Spectrum commenced consultation with relevant persons (stakeholders) in February and March 2018 with initial information provided. This consultation continued throughout 2018 and relevant persons were updated when a change to the survey season occurred in early 2019. A large number of organisations and individuals were consulted during the course of developing the EP and a fisheries liaison officer employed by Spectrum to assist with the process. SETFIA was engaged by Spectrum to develop a report on the potential impacts of the activity on commercial fishing in the area. The report includes a list of key contacts for representative bodies for each potentially affected fishery sector and a list of relevant fishers. Spectrum also engaged SIV and TSIC to facilitate consultation with their members and requested information from AFMA on commonwealth fisheries licence holders. This information was used by Spectrum to ensure that all fisheries licence holders were included in consultation. Between February 2018 and March 2019 stakeholders were engaged through various means such as face to face meetings, direct correspondence, video and conference calls and phone calls. Adverts were also placed in local newspapers. Relevant persons were followed up by Spectrum via emails and phone calls when no response was provided. Information provided was tailored to the interest of the relevant persons and included a summary of the potential impacts of the activity, controls to be applied to the activity	NOPSEMA recognises the importance of consultation undertaken with individuals and organisations who may be affected by petroleum activities and recognises the value this has in informing the evaluation of potential impacts and risks, and the environment that may be affected. In making a decision regarding this matter, NOPSEMA took into account the content of Spectrum's EP, which included the full text of the correspondence with relevant persons including with fishers and fishery representatives, the extent of the consultation effort undertaken by Spectrum, NOPSEMA's Decision Making Guidelines (GL1721), and correspondence received directly by NOPSEMA during the assessment of the EP. During the assessment process, NOPSEMA required Spectrum to consult with relevant persons not initially identified by Spectrum, including fishing licence holders and to provide them and others with more information and time to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities. NOPSEMA also required Spectrum to provide a complete report on consultation as part of the EP submission to demonstrate that consultation had been undertaken in accordance with the regulations. NOPSEMA found that the consultation carried out met the regulatory requirements. Spectrum has adopted a methodical approach to the identification of relevant persons, formulation of a consultation strategy, and maintenance of consultation records. It is evident that the

	and a list of references used to develop the impact assessment. More detailed information was provided to relevant persons on request. In a number of instances Spectrum received feedback that stakeholders were not satisfied with the consultation process. In these cases Spectrum responded and affirmed its commitment to undertake meaningful consultation and encouraged further feedback or requests for information. Spectrum made a number of adjustments to the consultation approach in response to feedback from relevant persons, including clarifying consultation and notification preferences with individuals and proposing and testing different methods of contact. Spectrum has also committed to undertaking a full review of relevant persons to ensure that they are consulted and notified prior to commencement of the survey. The EP commits to ongoing consultation prior to, during and on completion of surveys conducted under the EP. Spectrum has committed to provide fishers who wish to be kept informed timely notification and daily updates via SMS.	information gathered from consultation has been used to inform the development of the EP. NOPSEMA is reasonably satisfied that Spectrum has provided each identified relevant person with sufficient information and a reasonable period to make an informed assessment of the possible consequences of the activity on their functions, interest, or activities. NOPSEMA concluded that consultation undertaken and the ongoing measures planned are consistent with the requirements of Division 2.2.A and that relevant persons have been provided with sufficient information and time. NOPSEMA is also satisfied that claims and objections about the activity have been adequately addressed through the impact evaluation and the adoption of appropriate control measures

5. References

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