

Capreolus -2 – 3D Marine Seismic Survey 2020-2024

1. Purpose of this report

NOPSEMA has accepted the Capreolus-2 3D Marine Seismic Survey 2020-2024 (the EP) submitted by TGS-NOPEC Geophysical Company Pty Ltd (the titleholder) for a seismic survey activity in the Carnarvon Basin within the period(s) October 2020 until December 2024 (with geographical, temporal exclusions and limitations).

As required by the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (the Environment Regulations), the public was provided with an opportunity to comment on the EP. There were no public comments received during the public comment period.

Following the public comment period, the titleholder submitted the EP for assessment by NOPSEMA on 10 September 2020. NOPSEMA has since completed its assessment of the EP and has determined that it is satisfied that the EP meets the criteria for acceptance¹ on 10/11/2020.

This report explains how NOPSEMA took into account key matters raised by stakeholders in making its decision. Comments have been grouped into 'key matters' that capture the key issues, concerns or information provided during the consultation process. This report also contains other key matters that may be of interest to the public.

This report accompanies the accepted Capreolus-2 Marine Seismic Survey 2020 – 2024 Environment Plan (19 October 2020, Project No: 0526867) submitted by TGS-NOPEC Geophysical Company 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 Capreolus-2 Marine Seismic Survey 2020 – 2024 Environment Plan;
- the information raised by relevant persons, government departments and agencies that is relevant to making a decision;
- 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;

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

2. Next steps

Responsibility for the ongoing environmental performance of the seismic survey activity remains, at all times, with TGS-NOPEC Geophysical Company 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.

3. Sensitive Information

Sensitive information received during the public comment period, such as the names and contact details of commenters and specific information identified by the commenter or relevant person as 'sensitive', is not published in this report. Sensitive information is contained in a sensitive information part of the EP which 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 and on NOPSEMA's webpage for the Capreolus-2 3D Marine Seismic Survey 2020-2024.

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 from the https://info.nopsema.gov.au/home/approved_projects_and_activities on NOPSEMA's website.

5. References

DEWHA. (2008). EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales. Retrieved from <https://www.environment.gov.au/system/files/resources/8d928995-0694-414e-a082-0ea1fff62fc8/files/seismic-whales.pdf>

DEWHA. (2013). Matters of National Environmental Significance – Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Retrieved from https://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

DoE. (2015). Conservation Management Plan for the Blue Whale – A recovery plan under the Environment Protection and Biodiversity Conservation Act 1999. Retrieved from <https://www.environment.gov.au/system/files/resources/9c058c02-afd1-4e5d-abff-11cac2ebc486/files/blue-whale-conservation-management-plan.pdf>

DoE. (2015). Conservation Advice. *Megaptera novaeangliae*- humpback whale. Retrieved from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/38-conservation-advice-10102015.pdf>

DoE. (2015). Conservation Advice. *Rhincondon typus*- whale shark. Retrieved from <http://www.environment.gov.au/biodiversity/threatened/species/pubs/66680-conservation-advice-01102015.pdf>

DoE. (2017). Recovery plan for marine turtles in Australia. Retrieved from
<https://www.environment.gov.au/system/files/resources/46eedcfc-204b-43de-99c5-4d6f6e72704f/files/recovery-plan-marine-turtles-2017.pdf>

How NOPSEMA has taken into account key matters raised during the assessment and decision making process for Capreolus-2 3D Marine Seismic Survey

#	Matter	Titleholder response	NOPSEMA's assessment and decision
1	<i>There would be unacceptable impacts to whales due to the overlap of the seismic acquisition area with the pygmy blue and humpback whale migration biologically important areas (BIAs).</i>	<p>TGS-NOPEC Geophysical Company Pty Ltd (TGS) undertook a comprehensive assessment of the potential impacts to blue and humpback whales. This was informed by underwater acoustic modelling to predict the range to both physiological and behavioural effects, as well as animal movement modelling (ANIMAT) to simulate the realistic exposure of migrating blue whales to seismic sound fields.</p> <p>TGS will ensure that the activity is conducted such that there is no mortality or physical injury to EPBC listed species including blue and humpback whales (EPO 1.1), and that the activity is conducted in a manner that does not compromise the objectives of the Blue Whale Conservation Management Plan or Conservation Advice for <i>Megaptera noveangliae</i> (Humpback Whale) (EPO 1.3).</p> <p>The control measures that will be implemented to ensure there is no physical injury to whales are as follows:</p> <ul style="list-style-type: none"> • Implementation of EPBC Policy Statement 2.1 (Part A) Standard Management including observation zone, increased 2 km power down zone (CM 1.3), 500 m shut down zone, pre start-up visual, soft start procedure, night-time and low visibility procedure. • Implementation of EPBC Act Policy Statement 2.1 Part B.6 - Adaptive Management Measures (CM 1.4) including an increased 2 km shut down zone if there 	<p>NOPSEMA recognises that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on humpback and blue whales should they be migrating through the region, during the course of the seismic survey.</p> <p>In making a decision regarding this matter, NOPSEMA took into account the content of the EP and appended noise modelling report; relevant scientific literature; NOPSEMA's Decision Making Guidelines (GL1721), the Conservation Management Plan for the Blue Whale (DoE, 2015); <i>Megaptera novaeangliae</i> (humpback whale) Conservation Advice (DoE 2015); EPBC Act Policy Statement 2.1 (DEWHA, 2008), and the EPBC Act Significant Impact Guidelines 1.1- Matter of National Environmental Significance (DEWHA, 2013).</p> <p>During the course of the assessment NOPSEMA required TGS to consider the potential for injury (including TTS) to pygmy blue and humpback whales utilising migratory BIAs from cumulative sound exposure and the uncertainty in the distribution of pygmy blue whales during their northern and southern migration. This resulted in the adoption of a buffer zone on the migratory corridor that ensures that the seismic source will</p>

		<p>are three consecutive days or three or more shut down/power downs due to whale sightings.</p> <ul style="list-style-type: none"> • Ceasing acquisition for 24 hours within humpback BIA if there are greater than 3 shut downs/power downs for 3 consecutive days (CM 1.5) • No further seismic acquisition within humpback BIA until after the migration period (Jun-Oct) if there are 3 consecutive days of no acquisition as a result of humpback sightings (CM 1.5). • Use of two dedicated, trained MFOs, at least one with greater than 12 months experience in Australian waters (CM 1.6). • No operation of seismic source within 24 km of the pygmy blue whale migration BIA during migratory periods (Apr – Aug and Oct - Dec) (CM 1.15). • No operation of seismic source within humpback whale migration BIA during migration period (Jun – Oct) 	<p>not be operated within 24 km of the pygmy blue whale migration BIA during migratory periods.</p> <p>Given the temporal avoidance of humpback and blue whale migratory times, the acoustic source exclusion zone for the blue whale migratory BIA, and with the adaptive mitigation measures proposed, NOPSEMA is satisfied that there will be no injury to humpback or blue whales utilising their respective BIAs. Additionally, NOPSEMA is satisfied that impacts to migrating blue and humpback whales will be limited to short term behavioural responses in isolated individuals, with no injury or displacement from migratory corridors.</p> <p>NOPSEMA has concluded that after taking into consideration the proposed environmental management measures that the activity will not cause unacceptable impacts to humpback whales or pygmy blue whales.</p>
<p>2</p>	<p><i>There was concern from relevant persons that the survey may result in unacceptable displacement of commercial fisheries as a result of concurrent and subsequent seismic activities in the area</i></p>	<p>TGS conducted relevant person stakeholder consultation by identifying relevant persons whose functions, interests and activities may be affected by the activity. TGS then provided information in order to determine how the activity will affect their functions, interests and activities. The relevant persons were given sufficient time to respond with any objections or claims and those claims were responded to and/or incorporated into the EP consistent with the requirements of Division 2.2A of the Regulations.)</p>	<p>NOPSEMA acknowledges the potential for the activity, if not appropriately managed to have unacceptable impacts to commercial fisheries by displacing fishers and potential impacts on spawning.</p> <p>NOPSEMA also acknowledges the importance of appropriate consultation to ensure relevant persons have sufficient information and time and that any objections and claims made are appropriately dealt with by the titleholder.</p>

TGS also conducted an extensive evaluation of the historically fished regions and the proposed Capreolus-2 survey area to estimate the potential for displacement. TGS further considered the potential displacement to commercial fisheries as a result of other seismic survey operators (i.e. multiple adjacent seismic activities).

The benchmarking activity conducted by TGS of previous years' seismic activities indicated no long term impacts on the overall annual performance of the fisheries (in terms of distribution of effort or catch levels) or the sustainability of the fishery. This was particularly evident from the 2015 survey period (with a maximum spatial overlap of 50% with the total fished area), and where total catch remained stable, and the distribution of fishing effort remained broadly the same.

TGS will ensure that the potential impacts of the activity will result in no interference with commercial and other marine users fishing to a greater extent than is necessary for the exercise of right conferred by the titles granted to carry out exploration activities (EPO4, EPO5).

Further measures to ensure there is no unacceptable displacement of commercial fisheries as a result of concurrent and subsequent seismic activities in the same area include:

- Pre-survey consultation (4 weeks prior).
- Daily look ahead reports, outlining activities 72 hours in advance.
- Vessel tracking information.
- Potential changes to the survey vessel sail lines (to accommodate commercial fisher's requests), where

In making a decision regarding this matter, NOPSEMA took into account the content of the EP, NOPSEMA's Decision Making Guidelines (GL1721), the full text (sensitive information) correspondence with relevant persons, the extent of the consultation effort by TGS and how TGS addressed the merits of objections and claims made.

TGS were required to demonstrate the activity and associated concerns regarding displacement from fishing grounds, could be managed to acceptable levels. TGS committed to shortening the survey period to April – May, in the region where known fishing was to occur, minimising the likelihood of physical displacement to commercial fishing operators. TGS has implemented an open, regular and transparent communication process to maintain liaison pathways with concerned fishers, committing to maintaining dialogue throughout the course of the planned activity.

Before re-submitting the EP, TGS communicated the updated information to the concerned stakeholders, outlining the processes in place to achieve the relative EPO. Taking into consideration the nature and scale of the activity, NOPSEMA is satisfied that the consultation has met the requirements of Division 2.2A in that appropriate authorities and relevant persons have been engaged in consultation, with sufficient time and information provided, and that the response by TGS to objections and claims are appropriate. Further, taking into account the 2015

		<p>open and advanced communication is carried out and reasonable opportunity has been afforded.</p> <ul style="list-style-type: none"> • Compensation plans for equipment damage/loss will be assessed on merit in accordance with TGS Fisheries Compensation Process. • Use of dedicated support vessel. • Seismic acquisition maximum of 10,000 km² per calendar year, and; • AIS tail buoys (virtual or installed) for streamers. 	<p>benchmarking activity which showed stable catch levels and similar distribution of fishing effort NOPSEMA is satisfied that the potential displacement to commercial fisheries will not be of an unacceptable level.</p>
<p>3</p>	<p><i>There was concern from relevant persons that the survey may result in unacceptable impacts to the commercial fisheries as a result of cumulative impacts to spawning fish stocks.</i></p>	<p>TGS conducted an extensive evaluation of the potential impact of seismic on spawning behaviour and recruitment success using available science, FishCube data, fisheries stock assessments and noise modelling predictions. This included a benchmarking activity to compare historical surveys over the Pilbara Fish Trawl Interim Managed Fishery (PFTIMF) with long term catch data and fishery productivity.</p> <p>The assessment of potential impacts to spawning fish considered a realistic 7 day acquisition scenario which is based on the maximum observed duration of fish behavioural disturbance from peer reviewed studies, which resulted in a maximum predicted overlap from the Capreolus-2 seismic survey of 2.3 to 3.3% of the spawning range for principle indicator species. This predicted level of overlap was below historical high levels of overlap of seismic survey activities that have not resulted in an impact to fisheries catch or sustainability based on fisheries stock assessments.</p> <p>In addition to demonstrating that the spatio-temporal overlap of seismic activity and spawning fish was below historical highs and consequently would not result in an unacceptable impact to the sustainability of commercial</p>	<p>NOPSEMA recognises that there was concern from commercial fishing stakeholders that the survey could impact on their functions, activities and interests, through impacts to the spawning fish stocks.</p> <p>In making a decision regarding this matter, NOPSEMA took into account the content of the EP; NOPSEMA's Decision Making Guidelines (GL1721), relevant scientific literature, and the extent of the evaluation into cumulative impacts conducted by TGS.</p> <p>NOPSEMA required that TGS conduct a robust qualitative and quantitative assessment of the potential for impacts to the sustainability of commercial fish stocks both from the proposed Capreolus-2 3D MSS, and cumulative impacts in combination with concurrent seismic surveys. NOPSEMA required TGS to demonstrate that the potential impacts to spawning fish stocks from their survey in combination with other accepted seismic activities were of an acceptable level, and provide control measures to ensure acceptable</p>

		<p>fisheries, TGS committed to further reduce the km² of seismic acquisition within one year under the Capreolus-2 EP to 10,000 km² within any one calendar year. TGS also committed to no acquisition within the southern zone of the acquisition area between June and October which minimises the overlap with the spawning period of key indicator species.</p>	<p>levels of impact were not exceeded. This resulted in a comprehensive evaluation of potential impacts to the fish spawning behaviours and success, with historical seismic activity levels used to benchmark acceptable levels of overlap between the timing and location of fish spawning and seismic activity.</p> <p>Taking into consideration the control measures adopted to manage the activity, the sustainable status of commercial fish stocks, available peer-reviewed literature, and the outputs of extensive evaluation undertaken by TGS, NOPSEMA is satisfied that the potential impacts to spawning fish will be limited to short term, transient behavioural disturbance in a small percentage of spawning fish. Such an impact is small in magnitude when compared with natural levels of variability in larval recruitment, and will not constitute a significant impact to the sustainability of commercial fish stocks.</p> <p>After considering the nature and scale of the activity, NOPSEMA is satisfied that the consultation has met requirement of Division 2.2A in that appropriate authorities and relevant persons have been engaged in consultation, with sufficient time and information provided, and that the response by TGS to objections and claims are appropriate.</p>
<p>4</p>	<p><i>There would be unacceptable impacts to turtles and whale sharks due to the overlap of the acquisition area with Flatback turtle inter-nesting</i></p>	<p>TGS has analysed the activities and the potential for impacts to marine turtles and whale sharks as a result of seismic noise emissions. Based on acoustic modelling, mortality and potential injury to marine turtles and whale</p>	<p>NOPSEMA recognises that there is the potential for the activity, if not appropriately managed, to have an unacceptable impact on marine turtles should they be present within the deeper waters</p>

habitat critical and the whale shark migration BIA.

sharks are possible within 20 m and 60 m respectively, of the seismic source, while behavioural disturbances may occur out to 5.08 km from the source.

TGS will ensure that the activity is undertaken in a manner that prevents displacement of marine turtles from habitat critical during nesting and interesting periods, and ensures there is no injury or mortality to an individual of an EPBC listed species (EPO 1.1). TGS will ensure that seismic acquisition is undertaken in a manner that does not compromise the objectives of the Recovery Plan for Marine Turtles in Australia, or the Conservation Advice for *Rhincodon typus* (Whale Shark) (EPO 1.3).

The control measures that will be implemented to ensure there is no injury to marine turtles or whale sharks, or displacement of turtles from habitats critical are as follows:

- No seismic acquisition will be undertaken within the defined interesting BIA or Habitat Critical to Survival during the nesting period (Oct – Mar).
- Application of EPBC Policy Statement 2.1 Part A Standard Management Procedures to whale sharks and turtles.
- Employ two dedicated MFOs to undertake observations for turtles and whale sharks.

of the Flatback turtle habitat critical for interesting, and whale sharks migrating or feeding in the area.

In making a decision regarding this matter, NOPSEMA took into account the content of the EP with appended noise modelling report; relevant scientific literature; NOPSEMA's Decision Making Guidelines (GL1721), the Recovery Plan for Marine Turtles (DoE, 2017); Conservation Advice for *Rhincodon typus* (Whale Shark)(DoE 2015); and the EPBC Act Significant Impact Guidelines 1.1- Matter of National Environmental Significance (DEWHA, 2013).

NOPSEMA concludes that with the control measures in place, the potential for impacts to marine turtles or whale sharks is negligible and limited to behavioural disturbance of a small number of transient individuals outside of critical habitats at important times. It is demonstrated through the evaluation of impacts and risks in the EP that the activity can be conducted in a manner that is not inconsistent with the Recovery plan for Marine Turtles in Australia, and the Conservation Advice for *Rhincodon typus* (Whale Shark) and will not result in unacceptable impacts to marine turtles or whale sharks within the operational area.