Australian Government
Department of Industry, Innovation and Science

Submission by the Department of Industry, Innovation and Science to the Environment and Communications References Committee

Impact of seismic testing on fisheries and the marine environment

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1. Overview

Australia's offshore petroleum (oil and gas) regulatory framework is an effective and robust regime that supports the exploration and development of Australia's offshore petroleum resources while ensuring stringent environmental protections.

The Department of Industry, Innovation and Science (the department) welcomes the opportunity to make a submission to the inquiry into the impact of seismic testing on fisheries and the marine environment. The department's submission provides an overview of the use of seismic surveying in the oil and gas industry; and describes the regulatory regime for this sector, focusing on the regulation of seismic activities in Commonwealth waters. The submission also outlines the important role of the independent offshore regulator, the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA), the effectiveness of the domestic regime, and provides some comparison with international regulatory approaches.

This submission should be read in conjunction with the submissions by NOPSEMA and other agencies within the portfolio, including the Australian Institute of Marine Science (AIMS), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Geoscience Australia (GA). While the department is responsible for the regulatory framework for offshore exploration and development, which determines where and how these activities can occur, the science agencies within the portfolio play an important role in considering and contributing to the body of science and research around the impacts of these activities. This includes science and research into the effects of seismic testing, which informs the management decisions for Australia's offshore environment through consideration of this information in policy development and regulatory assessments and approvals.

2. Introduction

The Australian Government's policy framework for offshore petroleum and greenhouse gas storage aims to expand Australia's resource base, increase the international competitiveness of our resources sector and maintain a leading-practice regulatory regime to enforce stringent health and safety performance, environmental responsibility, and good resource stewardship requirements.

Petroleum exploration using marine seismic surveys has occurred in Commonwealth waters since the 1960s. Seismic testing is one of the early operational steps in the offshore petroleum exploration process and is conducted to help identify potential petroleum reservoirs and greenhouse gas storage formations below the sea floor. These surveys have contributed to a steady stream of petroleum development and production projects.

Australia's offshore oil and gas industry is a multi-billion dollar contributor to Australia's prosperity, energy security, employment and terms of trade. Investment exceeding AU$260 billion in Australia's oil and gas sector since 2007 has fuelled opportunity and growth. It is important that Australia continues to identify areas that are geologically prospective for oil and gas. This will ensure continuity of resource supply to support existing and potential new Australian oil and gas projects. In doing so, it will ensure the Australian community continues to receive the significant economic and social benefits from the responsible development of our valuable offshore resources.

Direct benefits are returned to the Australian people during development and production, as well as benefits during the exploration phase, such as direct and indirect employment and infrastructure development. Oil and gas production in Australia also continues to play a part in maintaining global and domestic long term energy security.

Offshore oil and gas activities beyond state and territory coastal waters are governed by the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act). The legislation provides for the orderly exploration for, and recovery of, offshore oil and gas resources and sets out a basic framework of rights, entitlements and responsibilities of government and industry. The regulatory framework ensures a high level of environmental protection whilst allowing development of an internationally competitive industry. The legal framework is objectives-based and encourages continuous improvement, rather than minimum compliance, in a multi-user marine environment.

The protections and measures provided under the regulatory framework are effective in meeting the Government's commitment to sustainable development while protecting the offshore environment. Petroleum titleholders are required to identify all environmental impacts and risks that may arise from a proposed activity – this includes consideration of new risks that are identified through scientific research. Companies can then adopt the best available technologies and design the most effective mitigation measures to protect the environment from potential adverse impacts. In addition, the titleholder must commit to, and be liable for upholding, stringent monitoring and reporting requirements before their plans are accepted and the activity is allowed to proceed.

NOPSEMA is an independent statutory authority with responsibility for the regulation of environmental management, safety and well integrity under the OPGGS Act for offshore oil and gas activities. Environmental approvals for oil and gas activities in Commonwealth waters are governed by the provisions of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Environment Regulations). Separate regulations are in place for safety and other matters.

Before any offshore petroleum activity can begin in Commonwealth waters a number of government approvals must be gained. Proponents for offshore petroleum activities, including seismic activities, must hold a valid offshore petroleum title. The National Offshore Petroleum Titles Administrator (NOPTA) manages the day-to-day administration of titles, and is part of the department. NOPSEMA has no role in granting or administration of offshore petroleum titles.

Proponents are also required to have an environment plan assessed and accepted by NOPSEMA before commencing an activity. The environment plan provides a detailed environmental impact and risk assessment and explains how those impacts and risks will be managed to a level that is acceptable and as low as reasonably practicable (ALARP). This includes consideration of potential impacts and risks to other marine industries and users, such as fisheries. NOPSEMA assesses environment plans against stringent regulatory requirements and on their scientific merits.

NOPSEMA employs highly qualified and experienced professionals with expertise in all facets of offshore petroleum to ensure that titleholders are held accountable for their offshore activities. NOPSEMA's regulation of Australia's oil and gas sector has been subject to numerous independent reviews and in every review NOPSEMA has been found to be a robust and competent regulator. Most recently, Australia's Chief Scientist, Dr Alan Finkel AO, found NOPSEMA to be a highly skilled, professional and competent regulator in his independent audit of NOPSEMA's consideration of exploration in the Great Australian Bight, released in September 2019[1].

[1] Report available at https://www.industry.gov.au/data-and-publications/independent-audit-of-nopsemas-consideration-of-exploration-in-the-great-australian-bight

3. Role of the Department of Industry, Innovation and Science

Under international law, Australia has sovereign rights to explore and develop mineral and petroleum resources within its Exclusive Economic Zone and its Continental Shelf. The Australian Government has jurisdiction for the regulation of minerals, petroleum (oil and gas) and greenhouse gas activities in offshore areas beyond coastal waters, which are those areas more than three nautical miles from the Territorial sea baseline. These areas are defined as 'Commonwealth waters'.

The Australian Government's role in relation to the offshore petroleum sector is to:

- establish the macroeconomic environment (broad economic policy)
- provide a regulatory framework for exploration, development, safety, environmental management, compliance monitoring and enforcement, and revenue collection
- reduce commercial risk in petroleum exploration by collecting and disseminating geoscientific information
- investigate ways to remove impediments to industry competitiveness.

Key functions of the department in offshore oil and gas matters include:

- Administration of the legal and regulatory framework for all offshore oil and gas exploration and production activities in Commonwealth waters. This framework ensures risks to the environment are managed to be as low as reasonably practicable and within acceptable limits, whilst providing for an internationally competitive and sustainable industry
- Administration of policy which encourages oil and gas exploration and development in Australia's offshore areas. The department aims to provide a stable, transparent and internationally competitive offshore exploration investment regime through best practice policy development, implementation and advice to government
- Management and facilitation, in partnership with the states and the Northern Territory through Joint Authority arrangements, of the release of offshore petroleum exploration areas, the granting of petroleum titles and ongoing management and compliance with title conditions, as well as core decisions about resource management and resource security
- Establishing situational awareness for the Australian Government, in close liaison with a range of stakeholders, in the event of a significant offshore petroleum incident
- Working with Geoscience Australia to reduce commercial risks in petroleum exploration by collecting and disseminating geoscientific information and investigating ways to remove impediments to industry competitiveness.

The department works closely with its portfolio science agencies, including GA, AIMS and CSIRO, in consideration of policy matters for offshore oil and gas. These agencies contribute to and consider the science behind the impacts of seismic noise on the marine environment and potential applications of new seismic technology.

- GA is Australia's pre-eminent public sector geoscience organisation. GA works with the department to reduce commercial risks in petroleum exploration by collecting and disseminating geoscientific information and investigating ways to remove impediments to industry competitiveness. GA is committed to continuing research on the impacts of seismic surveys and providing up-to-date advice.
- AIMS is Australia's tropical marine research agency. Its mission is to provide the research and knowledge of Australia's tropical marine estate required to support growth in its

sustainable use, effective environmental management and protection of its unique ecosystems. As part of the North West Shoals to Shore program, AIMS is investigating the long and short-term impacts of seismic activities on pearl oysters and demersal fish.

- CSIRO is Australia's national science agency, conducting world-renowned research and providing innovative solutions for industry, society and the environment. CSIRO's Oil and Gas Roadmap outlines four major strategic opportunities that could support the long term growth of the Australian sector, including enhancing basin productivity with the help of technological breakthroughs. The Roadmap identifies new methods of seismic acquisition that focus on acquiring data in an effective manner while minimising environmental impacts.

The department also works with other Australian Government departments, such as the Department of the Environment and Energy, the Department of Home Affairs, the Department of Agriculture and Water Resources and agencies such as the Australian Maritime Safety Authority, to ensure its policy formation and implementation reflects a range of considerations and policy objectives across government.

4. Seismic Surveys

Seismic surveys play an important role in identifying the potential for petroleum hydrocarbons, and greenhouse gas storage formations, beneath the sea floor. The data produced by seismic surveys is made available to the petroleum industry, research organisations and the public and can be used in other applications that benefit the wider resources industry. Seismic data also allows us to understand the structure of the sub-surface, to identify faults and other areas that may move over time. Understanding the earthquake potential of a region can assist with selecting the best routes for laying pipes and undersea electricity and communications cables, away from fault zones. This chapter also describes some emerging technologies which have the potential to reduce impacts of seismic surveying on the marine environment.

4.1 The petroleum lifecycle

Exploration is the initial phase of petroleum operations and is primarily concerned with assessing whether geological factors are likely to have created an accumulation of petroleum under the ocean floor. This assessment involves the use of a range of exploration geophysics techniques, beginning with the acquisition of new data through various surveying techniques (particularly seismic) to map the features of the ocean floor and the underlying sediment and rocks.

Data collected from these surveys is subjected to extensive processing and interpretation, in which complex computer algorithms are used to identify areas for further investigation. Preliminary features of interest (known as leads) are then subjected to more detailed evaluation including the application of more advanced processing and interpretation techniques and various geological and geophysical studies.

Through this analysis, leads can be upgraded into prospects (areas in which petroleum is predicted to exist in a quantity which is economic to recover). An exploration well will then typically be drilled into the prospect to test whether petroleum is present and can be recovered to the surface. If petroleum exploration is successful it will lead to further appraisal of the identified pool, and potential development of the petroleum resource.

4.2 Seismic surveys

An accurate understanding of the subsurface is critical to discovering Australia's resources. The discovery of petroleum requires evidence that a range of geological factors and processes have occurred that have allowed hydrocarbons to be generated and then trapped in the subsurface. To determine whether the necessary conditions have been met deep underground, the petroleum industry has developed a range of surveying techniques to identify areas of interest for further investigating petroleum potential. Surveys using reflection and/or refraction seismology techniques (seismic surveys) are a critical technique for addressing these risks and uncertainties.

Where the geology of the subsurface is poorly understood, two-dimensional (2D) surveys will be undertaken to identify broad structural features in which petroleum could accumulate. 2D surveys are acquired by a vessel towing a single recording streamer that collects data along individual traverses on a grid, where the traverses are typically between 2 and 10 km apart. Where obvious features have previously been identified and mapped, three-dimensional (3D) surveys will be undertaken to obtain greater definition. 3D surveys are acquired by vessels towing multiple recording streamers (usually between 4 and 8, but can be up to 12 streamers), covering all of the selected area.

Through detailed seismic surveying, processing and interpretation work, companies are able to focus drilling efforts on targets which are considered to have the best prospect of success.

The primary role of seismic surveying is to support the exploration process by helping to identify leads and prospects. However, seismic is increasingly playing a role throughout the petroleum lifecycle to assess changes to reservoirs during the production lifecycle. This occurs through time-lapse (4D) acquisition in which 3D data is re-acquired over the same area at a later date. This process is used to identify areas within a field where the petroleum is not being produced by the existing production wells. This can be very useful to optimise future drilling, in order to maximise the amount of petroleum recovered from the field using the minimum number of wells. 4D seismic can identify barriers to fluid flow in petroleum pools and changes in the reservoir over time, which might not have been identified in conventional seismic analysis.

Seismic surveying also has a range of applications in the wider resources industry. It can assist with identifying suitable geological formations for geosequestration and it can be used for identifying mineral deposits and geothermal energy sources.

While there has been a notable decline in the number of surveys completed since 2012-13 (Figure 1)[2], the size of the area covered varies considerably between individual surveys. As a result, while fewer surveys were undertaken in 2018-19 than in 2017-18, they covered a larger physical area so the amount of data acquired was greater. Total seismic activity has been on a downward trend since the 1990s (Figure 2), with five surveys occurring in 2019 compared to 62 in 1980.[3]

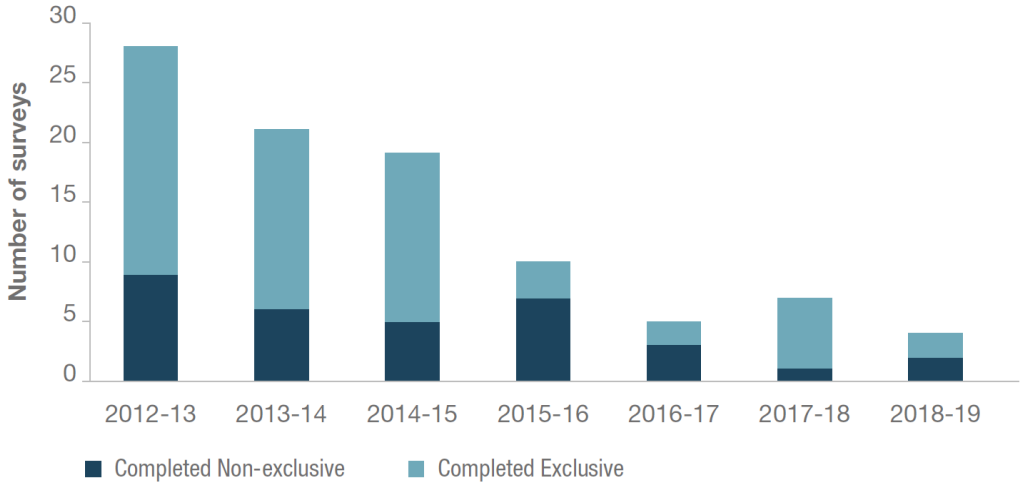

Figure 1. Number of seismic surveys completed 2012-13 to 2018-19

[2] Report available at https://www.nopta.gov.au/_documents/NOPTA-Annual-Report-of-Activities-2018-19.pdf
[3] https://www.ga.gov.au/nopims

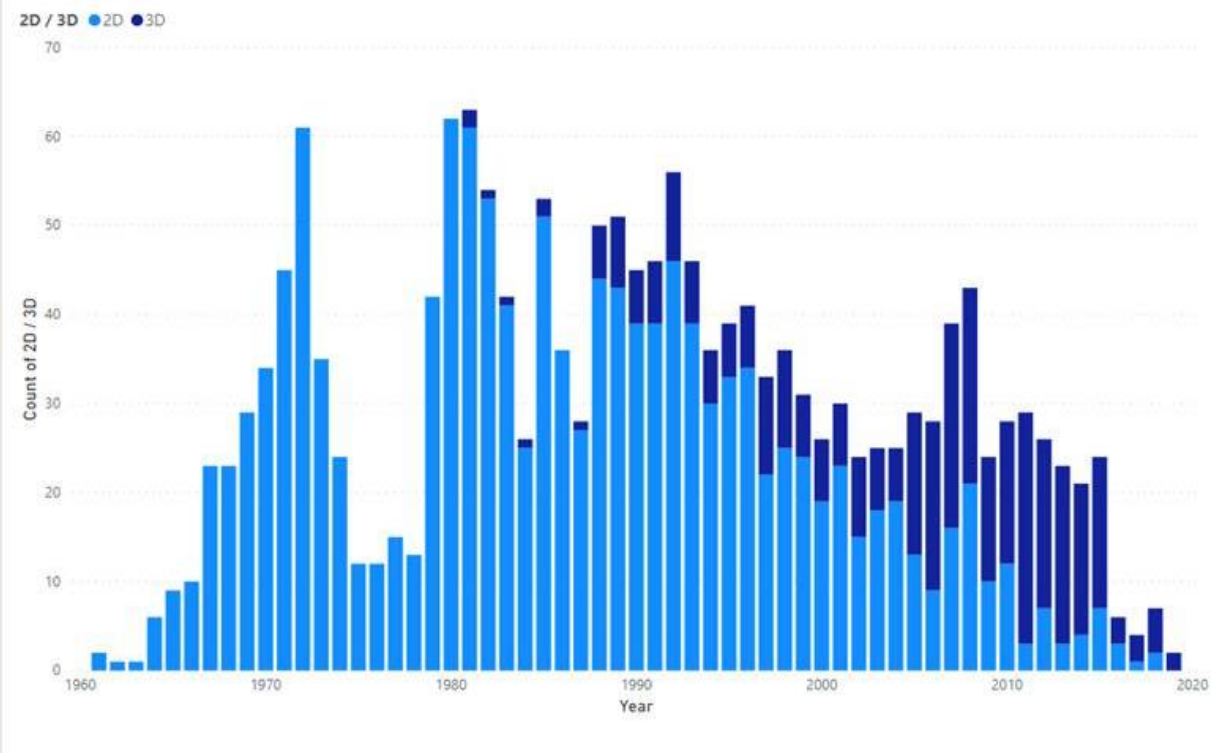

Figure 2. Number of 2D and 3D seismic surveys conducted between 1960 and 2019

4.3 Pre-competitive geoscience

Although oil and gas exploration over the past 50 years has resulted in numerous discoveries and has enabled oil and gas production in distinct offshore provinces, Australia is, by global comparison, largely underexplored. Many of the offshore sedimentary basins represent vast frontier regions in which very little or no previous exploration has taken place.

In order to gain a better understanding of the hydrocarbon prospectivity in these frontier regions, the Australian Government supports pre-competitive geoscience which aims to attract investment in offshore oil and gas exploration by reducing commercial risk. This is achieved through the collection and dissemination of geoscientific data (including the significant volume of data obtained from seismic surveys) and information that reduces geological uncertainties, increases efficiency by avoiding duplicative industry spend on the same information, and reduces the risks of costly investments in exploration in areas of low prospectivity.

Pre-competitive work is primarily carried out by Geoscience Australia, which undertakes a range of activities to increase Australia's offshore data including:

- acquisition of seismic data using seismic surveys
- integration of newly acquired seismic and other data with existing open file data sets
- assessment of hydrocarbon prospectivity at basin scale
- provision of rigorous and updated stratigraphic frameworks for offshore basins
- provision of regional geological overviews.

Geoscience Australia is subject to the same approvals process for seismic surveys as any other entity seeking to conduct a survey, with a valid offshore petroleum title and an accepted environment plan required before an activity can commence.

Australia's regulatory framework has been developed recognising that the release and dissemination of data, including seismic survey information, is a public good. This means that it is necessary to ensure that this data becomes available to the public on an 'open file' basis. Data under the OPGGS Act is acquired on either a 'proprietary basis' where the acquiring company has exclusive rights to the data for a period of 3 years after collection or a 'non-proprietary' basis, where the basic data is acquired by a third party which retains an exclusive right to the data for a period of 15 years. After these timeframes, this information is made publicly available through the National Offshore Petroleum Information Management System (NOPIMS).

Undertaking these pre-competitive geoscience functions and making data publicly available provides significant public benefit by:

- providing a significant short run economic multiplier to the economy
- reducing the need for high risk speculative exploration activities and the duplication of data acquisition by multiple industry participants over the same geographic area, reducing costs and environmental impacts, and
- ensuring that regulatory decisions on allowing exploration activity are based on the best possible information.

4.4 Technological advances in seismic surveys

While traditional seismic acquisition, towing a sound source and an array of 'streamers' behind a vessel, has been the predominant methodology used by the petroleum sector to assess geological factors to date, new technologies are emerging which may have lesser, and/or different environmental impacts.

Currently one of the most well-developed new technologies is *Marine Vibroseis*, which is a seismic technique that reduces noise impacts on the surrounding environment by removing the need for sound to be transmitted through the water column. This technique is similar to that used in onshore seismic surveys in which a vibrating plate is applied to the earth, and sensors collect reflected sound waves. As identified in CSIRO's Oil and Gas Roadmap, the use of these vibrating source technologies could result in better environmental outcomes. As automation in the sector progresses, this technology could be combined with the use of autonomous vehicles to allow exploration activities to be undertaken in remote areas in a more cost effective manner. While Marine Vibroseis may achieve a reduction in noise impacts, it is important to recognise the use of new technology may also introduce new and less well understood environmental impacts.

There is also great potential for the application of more targeted seismic processing through the use of Artificial Intelligence and machine learning technologies. These techniques could lead to improvements in the management of existing pre-competitive seismic data by applying big data analytics to develop broader, basin-wide geophysical and petroleum system models. Already machine learning techniques are beginning to be applied to seismic reprocessing to achieve uplifts in quality, reducing the need to undertake new seismic surveys where original datasets demonstrated quality problems. As these technologies continue to improve they will reduce the need for new seismic acquisition and allow improved capitalisation on existing datasets.

5. Australia's offshore oil and gas regulatory framework

Australia's offshore petroleum and greenhouse gas storage legislation, regulations and guidelines provide for the orderly exploration for and production of petroleum and management of greenhouse gas storage, and sets out a framework of rights, requirements and responsibilities of government and industry.

In Australia, offshore oil and gas activities in Commonwealth waters are governed by the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act). The OPGGS Act provides the legal framework for the exploration for and recovery of petroleum, and for the injection and storage of greenhouse gas substances, in offshore areas.

This objectives-based regulatory framework ensures a high level of environmental protection whilst allowing development of an internationally competitive and sustainable industry.

The OPGGS Act is supplemented by a set of regulations, including[4]:

- Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009 (Safety Regulations);
- Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Environment Regulations); and
- Offshore Petroleum and Greenhouse Gas Storage (Resource Management and Administration) Regulations 2011 (RMA Regulations).

Underpinning this legal framework are four key principles:

1. Australia's offshore oil and gas resources are best exploited (and risks managed) through commercial development.
2. Operations are to be undertaken in accordance with good oilfield practice and be compatible with the optimal long-term recovery of oil and gas.
3. All associated risks to the health and safety of persons, well integrity and the environment are to be managed to as low as reasonably practicable, and risks to the environment must also be deemed to be of an acceptable level.
4. Property rights are applied and respected through a system of licencing and titles - this gives titleholders exclusive rights and incentives to move through the oil and gas lifecycle, so long as all activities comply with the OPGGS Act, supporting regulations and title conditions.

5.1 Objectives-based environmental regulation

Under objectives-based regulatory regimes, project developers must consider and identify acceptable outcomes for all environmental matters, including matters of national environmental significance. The activity must also include a clear demonstration of how those outcomes will be delivered throughout the life of the project. This contrasts to a prescriptive regulatory regime, where those undertaking operations or activities are only required to consider the matters specifically identified by regulations and meet the minimum standards of protection prescribed.

[4] Complete list of regulations under the OPGGS Act is available at: https://www.legislation.gov.au/Browse/Results/ByTitle/LegislativeInstruments/InForce/

Key components of objectives-based regulation include:

- Responsibility for managing risks rests with those undertaking the operation or activity, on the basis they are best placed to identify and manage the impacts and risks of their activities to as low as reasonably practicable (ALARP), and to set appropriate performance measures (outcomes and standards). For environmental matters, the impacts and risks, including to matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), must also be managed to acceptable levels.
- Those undertaking the operation or activity must consider and identify the performance outcomes for all environmental or safety matters, and clearly demonstrate how those outcomes will be achieved.
- Risk management can be tailored to the impacts and risks of the activity.
- Those undertaking the operation or activity have the flexibility to implement new technologies to meet and exceed the performance outcomes and standards they have set for the activity, promoting continuous improvement.

The ALARP principle is generally the point where the sacrifice required to reduce the risks of an activity any further would be disproportionate to the benefit gained and may not be feasible. This means that the titleholder is required to demonstrate through reasoned and supported arguments, that there are no other practical measures that could reasonably be taken to reduce risks further. Factors to take into account when considering what is reasonably practicable include the likelihood of the risk occurring, the impact if it occurs, and the availability, suitability and cost of control measures to eliminate or reduce the risk.

Proponents of an offshore petroleum activity must demonstrate that the environmental impacts will be ALARP and acceptable. Where the risks are ALARP, but unacceptable, the activity will not be able to proceed.

The outcome of an objectives-based regime is that costs and implications to health, safety and the environment are considered as part of a company's investment decisions. In this regard, objectives-based regulation encourages continuous improvement to achieve appropriate health and safety and environmental outcomes. It ensures flexibility in operational matters to meet the unique nature of different activities, and avoids a 'one size fits all' approach to regulation, allowing industry to determine the most effective and efficient way to operate.

5.2 Commonwealth and state jurisdiction

The Australian Government has responsibility for offshore petroleum resources activities in Commonwealth waters which extend from the edge of the three nautical mile limit of designated coastal waters to the outer extent of the Australian Exclusive Economic Zone at 200 nautical miles from the baseline.

The regulatory framework within which offshore petroleum exploration and production activity takes place in Australia has its origins in the 1979 Offshore Constitutional Settlement and the division of powers and responsibilities between the Australian Government and the state/Northern Territory governments. Initially, Commonwealth legislation conferred powers on state and NT Ministers (the Designated Authorities) to regulate offshore petroleum operations, including occupational health and safety, environmental management and well integrity.

In 2012, after a series of regulatory reforms, state and territory Designated Authorities were abolished, and the Australian Government, together with the state and the Northern Territory governments, commenced administration of the regime of petroleum titles in Commonwealth waters through a Joint Authority arrangement.

Day-to-day administration of petroleum and greenhouse gas titles in Commonwealth waters in Australia is the responsibility of NOPTA, whose key functions are to:

- Provide information, assessments, analysis, reports, advice and recommendations to the Joint Authorities and responsible Commonwealth Ministers
- Grant short-term titles (petroleum access authority and petroleum special prospecting authority) and approve transfers and dealings
- Facilitate life of title administration, including compliance monitoring
- Manage the collection, management and release of data
- Keep the registers of petroleum and greenhouse gas storage titles
- Ensure petroleum resource management is undertaken in accordance with the principles of good oil field practice
- Implement effective field development review and performance monitoring strategies in order to secure optimum petroleum recovery for the benefit of the Australian community.

Petroleum exploration and development in coastal waters is regulated under relevant state or Northern Territory legislation, except where a jurisdiction has conferred powers or functions on to NOPSEMA. To date, Victoria has conferred structural (well) integrity and occupational health and safety powers and functions on to NOPSEMA, but has not conferred powers and functions for environmental management. As such, regulatory environmental assessments and approvals for seismic surveys in state or Northern Territory coastal waters are the responsibility of the relevant state or Northern Territory government, and also of the Department of the Environment and Energy where relevant.

5.3 Regulatory reforms

The current regulatory framework supports a safe, strong and competitive offshore petroleum sector, which contributes significantly to Australia's energy security and economic prosperity.

Prior to 2005, the states and Northern Territory governments carried out the day-to-day offshore safety regulation in Commonwealth waters. Following the 1999 Australian Government review into the adequacy of offshore safety regulation in Australia, the National Offshore Petroleum Safety Authority (NOPSA) was established as the sole regulator for offshore safety in Commonwealth waters in 2005.

In 2009, the Productivity Commission Review of the Regulatory Burden on the Upstream Petroleum (Oil & Gas) Sector found that the regulatory burden on industry could be reduced through new institutional arrangements, principally the establishment of a national regulator for offshore petroleum, on a full cost recovery basis, as well as the implementation of best practice regulatory principles in all jurisdictions. On 5 August 2009 the then-Commonwealth Minister for Resources and Energy announced the intention to establish a national regulator for offshore petroleum, minerals and greenhouse gas storage activities in Commonwealth offshore areas by 1 January 2012.

A significant offshore oil spill incident in the Montara oil field in the Timor Sea in August 2009, and the April 2010 Macondo Deepwater Horizon disaster, gave further impetus to regulatory reforms. The Australian Government moved quickly to implement the learnings from these incidents to improve the protection of human health and safety, and the marine environment. The Australian Government Report on the implementation of the recommendations from the Montara Commission of Inquiry is available on the department's website[5].

A number of significant amendments to the OPGGS Act were made in 2011. The most significant of these include:

- Offshore environment regulation and resource management functions were separated to avoid any potential or perceived conflicts of objectives. This resulted in the administration of offshore petroleum and greenhouse gas storage titles becoming centralised in the new National Offshore Petroleum Titles Administrator (NOPTA).
- Regulation of environmental management activities in Commonwealth waters was added to the former NOPSA's remit. The change in name, from NOPSA to NOPSEMA, reflected these additional regulatory responsibilities.
- Amendments to the RMA Regulations which gave the former NOPSA (now NOPSEMA) the responsibility for regulation of well operations management plans and approval of well activities.

In addition to the suite of regulatory reforms implemented immediately after the Montara and Macondo incidents, the regulatory and operational environment for the offshore resources sector in Australia has undergone a cycle of continuous improvement.

Reforms include:

- the introduction of a polluter-pays obligation in the event of an offshore petroleum incident, and provision of an ability for the regulator to take the necessary action and recover costs from the titleholder if the titleholder does not meet their obligations;
- improved the effectiveness of financial assurance requirements to ensure that titleholders are in a financial position to comply with the polluter-pays obligation and other costs;
- strengthened and clarified the inspection, compliance and enforcement powers of NOPSEMA;
- review of the compliance and enforcement measures in the OPGGS Act, increases to a number of criminal penalties and introduction of a broader range of enforcement tools;
- NOPSEMA becoming the sole Commonwealth environmental management regulator for offshore petroleum activities;
- review and amendments to the Environment Regulations to ensure the efficiency and effectiveness of their operation;
- amendment of the Environment Regulations to introduce full publication of environment plans on submission to and acceptance by NOPSEMA, and a public comment period for environment plans for seismic or exploration drilling activities.

[5] https://www.industry.gov.au/data-and-publications/montara-commission-of-inquiry

5.4 Regulation of Activities in Title areas

Before any offshore petroleum activity can begin in Commonwealth waters a number of approvals must be in place. Firstly, the company proposing an activity must obtain an offshore petroleum title, which entitles the holder (or an applicant for a Special Prospecting Authority) the right to apply for other regulatory approvals/permissions, such as environment plans and well operation management plans (WOMPs). Titles are granted by the relevant Joint Authority (or their delegates) or NOPTA. Only once a title is granted, and the relevant permissioning documents are accepted, can an offshore petroleum activity take place. For seismic surveys, this includes the requirement to have an accepted environment plan in place.

Under the OPGGS Act, in each offshore area there is a Joint Authority comprising the responsible Commonwealth Minister and the relevant state or Northern Territory Resources Minister. The Joint Authority for the Eastern Greater Sunrise offshore area, the offshore area of each external territory and for the Tasmanian offshore area is the responsible Commonwealth Minister only.

The Joint Authorities may delegate any or all of their functions and powers to officials in the respective Commonwealth and state/Northern Territory departments with responsibility for resources and energy. In the case of greenhouse gas titles, the decision maker is the responsible Commonwealth Minister. The Joint Authority for each offshore area makes key decisions under the OPGGS Act concerning: the release of offshore petroleum exploration areas; the granting of petroleum titles; the imposition or changing of title conditions (such as a variation or additional time to undertake an activity) and the cancelling of titles, as well as decisions about resource management and resource security.

NOPTA has the authority to grant short term titles (petroleum access authority and petroleum special prospecting authority) and approves certain commercial arrangements known as transfers and dealings.

NOPTA and GA have developed a strong collaborative relationship. This includes through the joint establishment of the National Offshore Petroleum Data and Core Repository to store, maintain and make available for use petroleum mining samples and digital data. In the ongoing management of data submissions, NOPTA undertakes compliance, quality control and release functions and Geoscience Australia and the Western Australian Department of Mines, Industry Regulation and Safety provide data storage and access services.

5.5 Role of NOPSEMA

The role of NOPSEMA, as an independent regulator, is to ensure that decisions to accept or refuse risk management plans for safety, well integrity and environment focus exclusively on the technical and scientific merits of the proposal. These decisions are made independently of economic, commercial and political factors and the workings of government. Neither the Minister for Resources and Northern Australia, Minister for the Environment and Energy nor the department have any involvement in NOPSEMA's decision-making processes for offshore petroleum activities.

NOPSEMA assesses whether the duty holder's proposed measures in their risk management plans are appropriate and meet the high-level requirements set out by the regulatory regime. Risk management plans may include an offshore project proposal, environment plan, safety case, diving safety management system and well operations management plan. Approval to begin an offshore petroleum activity, including a seismic survey, is only granted after NOPSEMA has conducted a

thorough and rigorous technical assessment of the relevant risk management plans and has determined the plans meet all the requirements of the law.

Once accepted, NOPSEMA carries out checks, including onshore and offshore inspections, to ensure that the duty holder is doing what they said they would do, through monitoring and enforcing compliance to ensure safety and environmental outcomes are maintained.

NOPSEMA is staffed by highly trained, qualified technical experts with extensive experience in offshore petroleum management, and biological sciences and industry regulation. Staff at NOPSEMA undertake extensive training to ensure they understand the role and regulatory environment. NOPSEMA also has the ability to seek external expertise on a case-by-case basis if required.

NOPSEMA's regulation of offshore petroleum activities is subject to a range of governance controls, including parliamentary oversight, ministerial policy direction and independent statutory reviews. NOPSEMA is accountable to the responsible Commonwealth Minister, the Minister for Resources and Northern Australia. NOPSEMA also has obligations under the EPBC Act as a Commonwealth agency under the streamlined arrangements that are further described in section 7.2.

6. Offshore Petroleum Titles

In general, offshore petroleum titles are awarded on a successive basis, beginning with an exploration permit awarded through the annual Offshore Petroleum Exploration Acreage Release (see Figure 3). If a discovery is made during the exploration phase and a location is declared, the titleholder may apply for a production licence if the discovery is commercial, or a retention lease if the discovery is not commercial but is expected to become commercial within 15 years. From a retention lease the titleholder progresses to a production licence once the discovery becomes commercial.

6.1 Offshore Petroleum Exploration Acreage Release

The Australian Government facilitates investment in petroleum exploration through an annual acreage release. 'Acreage' refers to vacant offshore areas in Commonwealth waters that companies can place a competitive bid for.

Each year, the acreage release comprises areas of vacant acreage in Commonwealth waters that have been nominated for inclusion in the acreage release by industry. The acreage release is supported by pre-competitive geological and geophysical data held by Geoscience Australia and information on third party rights or other considerations that may impact upon future petroleum activities in a release areas such as information made public resulting from consultation and links to relevant websites.

6.1.1 Nominations

Each year, interested stakeholders nominate vacant offshore acreage for potential inclusion in the acreage release. This process is open year round.

Prior to releasing nominated areas for consultation the department undertakes a check to identify any nominations or parts of nominations that may need special treatment or exclusion. In performing this check the department looks for nominations that are overlapping:

- marine parks with mining exclusions
- regions of national significance (e.g. areas with uncertain maritime boundaries)
- active titles
- native title claims
- state coastal waters.

6.1.2 Consultation

In recognition of the multi-use nature of the marine environment, the department undertakes public consultation over potential areas for release for around six weeks (https://consult.industry.gov.au/). This process allows interested stakeholders to identify any specific concerns about release areas.

Other Commonwealth and State and Northern Territory Government agencies use the public consultation to identify critical issues for other users of the marine environment such as fishing, defence, maritime boundaries, tourism and Native Title interests that may impact on the inclusion/size of an area in the acreage release.

The information is then collated and published as part of the final acreage release package. The outcomes of consultation may also lead to the inclusion of specific conditions if a title is awarded in that area and/or the reshaping or removal of an area to balance competing interests.

6.1.3 Final release areas

Following the consultation process, the Joint Authority then makes a decision on the final areas to be released in the relevant offshore area. This decision factors in the outcomes of public consultation.

Once the acreage areas have been released, the oil and gas sector is invited to submit competitive work program bids on area(s) of interest. Further information on the acreage release is available on the department's website.

6.2 Granting titles

Different types of petroleum titles may be granted, depending on the activity to be undertaken:

- **Exploration permit** – a six year title that may be renewed for two periods of five years and provides rights to apply for further approvals to undertake exploratory activities such as seismic surveys and drilling within the permit area in accordance with an approved work program
- **Retention lease** – a five year title that may be renewed and is granted to the holder of an exploration permit or a production licence where a discovery has been made that is not currently commercially viable, but is likely to be within 15 years
- **Production licence** – a life-of-field title that is granted to the holder of an exploration permit or a retention lease for the recovery of petroleum following a commercial discovery
- **Infrastructure licence** – an indefinite term licence granted to enable the construction of offshore facilities for the storage and conversion of petroleum. This can include the conversion of gas to liquefied natural gas (LNG) or methanol, or to operate a floating LNG facility or an offshore production facility that is located outside of the production licence area or held under a different ownership structure
- **Pipeline licence** – an indefinite term licence granted for the construction and operation of an export pipeline to transport petroleum to shore or to other facilities.

6.2.1 Short-term titles

To support the acquisition and assessment of data without making a commitment to longer-term exploration activities, the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* allows for limited petroleum exploration operations, such as seismic surveys, to be undertaken under a Special Prospecting Authority (SPA) or Access Authority (AA). Decisions on the grant of both short-term title types are made by NOPTA.

- A **SPA** authorises the holder to undertake petroleum exploration operations, other than drilling a well. A SPA can be granted over blocks that are not subject to an existing Exploration Permit, Retention Lease or Production Licence; or a Greenhouse Gas Assessment Permit, Holding Lease or Injection Licence (Greenhouse Gas titles).

  A SPA is most commonly sought by companies that do not hold a petroleum title, but who want to acquire data to sell to petroleum explorers (e.g. a speculative or multi-client seismic survey).

- An **AA** authorises a petroleum titleholder, including a SPA holder, to carry out petroleum exploration operations or operations related to the recovery of petroleum, other than drilling a well, outside the boundary of their existing title/s. An AA may be granted over any part of an offshore area, including an area subject to an existing petroleum or Greenhouse Gas title. For example, a company that holds an existing Exploration Permit, Retention Lease,

Production Licence or SPA may apply for an AA to acquire a seismic survey to gain a better understanding of the regional geological or structural settings of its title area.

- A **SIC** authorises the holder to carry on petroleum exploration operations, as specified in the consent, during the course of a scientific investigation. Specific operations to be authorised by a SIC will be considered on a case-by-case basis. Approval will generally only be given for drilling stratigraphic holes, not exploration wells. The SIC is consistent with Australia's obligations under the United Nations Convention on the Law of the Sea in relation to marine scientific research on its continental shelf.

- Petroleum exploration operations may include, but are not limited to, seismic surveys, aerogravity surveys, other geophysical and geological surveys, as well as seabed sampling, conducted for the purpose of discovering petroleum.

These titles are commonly sought by seismic survey providers who seek to acquire data for commercial sale and licensing purposes. By acquiring data through this model the industry achieves economies of scale and can minimise the risk of duplicated effort in acquiring seismic data over the same area. Multiple providers may develop proposals for large scale new surveys, undergo consultation with other users of the marine environment, and seek approval of environment plans to undertake these activities in overlapping areas. In practice, while multiple surveys might be proposed and obtain the required approvals, generally only one survey will get the necessary financial backing to proceed in a particular area.

Existing titleholders who wish to undertake petroleum exploration activities (other than drilling a well) in areas outside their existing title area may apply to NOPTA for an AA. An AA provides access to a vacant area or an area covered by an existing title to enable the area to be fully explored. An AA will remain in force for the period specified in the authority, unless surrendered or revoked, and does not provide any rights in relation to the award of a future exploration permit. AAs are often used in conjunction with SPAs in the acquisition of ‘speculative’ or ‘multi-client’ surveys to extend the survey into existing titles.

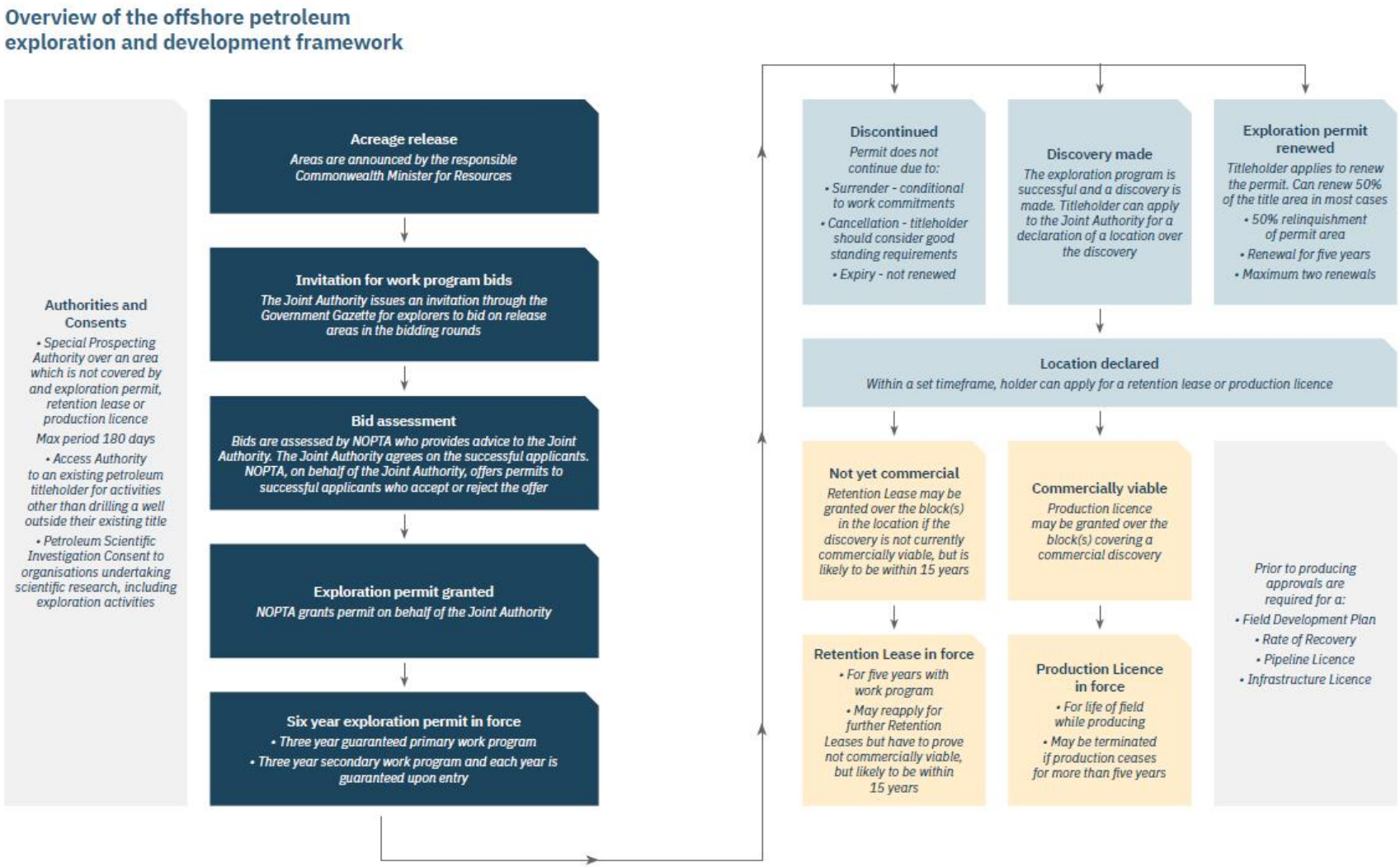

Figure 3. Overview of the offshore petroleum exploration and development framework

7. Regulation of seismic activities

Environmental approvals for offshore oil and gas activities in Commonwealth waters, including seismic surveys, are governed by the provisions of the Environment Regulations. Prior to commencing an activity under an offshore petroleum title, a titleholder must have an environment plan for the activity released for a public comment period and then be assessed and accepted by NOPSEMA. The Environment Regulations set out the content and acceptance criteria for environment plans. NOPSEMA monitors compliance with the environment plan through planned inspections, and may take enforcement action if non-compliance is identified.

The object of the Environment Regulations is to ensure that petroleum and greenhouse gas storage activities are carried out in a manner that is consistent with the principles of ecologically sustainable development and in a manner by which all environmental impacts and risks of the activity will be reduced to ALARP and acceptable levels. As part of the environment plan, titleholders must also include a comprehensive oil pollution emergency plan including detailed arrangements for responding to and monitoring any oil pollution event.

Division 2.3 of the Environment Regulations sets out the content requirements for an environment plan including, *inter alia*:

- a description of the activity
- a description of the environment that may be affected by the activity (including matters protected under Part 3 of the EPBC Act)
- a description of the regulatory and other requirements that apply to the activity
- identification and evaluation of environmental impacts and risks
- a definition of environmental performance outcomes and setting of standards against which environmental performance is to be measured
- measurement criteria to determine if the outcomes and standards have been met.

In order to be accepted by NOPSEMA, the environment plan must meet the acceptance criteria in Regulation 10A of the Environment Regulations. It must:

- be appropriate for the nature and scale of the activity
- demonstrate that environmental impacts and risks will be reduced to ALARP
- demonstrate that the environmental impacts and risks will be of an acceptable level
- provide for appropriate environmental performance outcomes, environmental performance standards and measurement criteria
- include an appropriate implementation strategy
- not involve any activity, other than environmental monitoring or responding to an emergency, in any part of a declared World Heritage area
- demonstrate the titleholder has carried out consultations as required by Division 2.2 of the Regulations, and that measures adopted because of the consultations are appropriate
- comply with the OPGGS Act and the regulations.

If a titleholder (or applicant for a SPA) is unable to demonstrate that their environment plan meets the criteria for acceptance NOPSEMA must refuse to accept the plan. This refusal is subject to NOPSEMA providing the titleholder a reasonable opportunity to modify and resubmit the environment plan. A refusal decision does not preclude a titleholder from submitting a new environment plan for assessment if they choose to do so.

NOPSEMA may request further written information about any matter in a submitted environment plan prior to making its decision. Such a request can be made at any point in the assessment process, with the titleholder required to provide the information incorporated into a resubmitted environment plan when submitting to NOPSEMA.

The Environment Regulations also provide a mechanism for NOPSEMA to assess compliance with the requirement to maintain financial assurance[6], as a condition precedent to the acceptance of an environment plan. The titleholder is therefore required to demonstrate that it has complied with the financial assurance obligations along with the submission of the environment plan for the relevant oil and gas activity. NOPSEMA must not accept the environment plan unless it is reasonably satisfied that financial assurance in relation to the activity (or activities) is sufficient, and in an acceptable form. The Environment Regulations also provide that a failure by a titleholder to continue to maintain sufficient financial assurance is a ground for NOPSEMA to withdraw its acceptance of an environment plan.

7.1 Stakeholder consultation

The Environment Regulations set out requirements for consultation, and were amended in 2019 to introduce mandatory publication of all environment plans, and a public comment period for environment plans for seismic or exploratory drilling activities that occurs prior to the assessment of that environment plan.

7.1.1 Relevant person consultation

The OPGGS Act requires that a person carrying out activities in an offshore area under a title must not interfere with the rights of other specified users of the offshore area, such as navigation or fishing, to a greater extent than is necessary for the reasonable exercise of the person's rights and performance of their duties. The Environment Regulations support titleholders to meet this obligation by requiring consultation with relevant persons who may be affected by a proposed petroleum activity, prior to commencement of the operations, during the preparation of an environment plan (relevant person consultation). Titleholders are also required to have a plan in place for ongoing consultation to be undertaken during the activity.

Regulation 11A of the Environment Regulations specify 'relevant persons' that must be consulted in the preparation or revision of an environment plan. These include:

- each Department or agency of the Commonwealth to which the activities to be carried out under the Environment Plan, or the revision of the Environment Plan, may be relevant
- each Department or agency of a State or the Northern Territory to which the activities to be carried out under the Environment Plan, or the revision of the Environment Plan, may be relevant

[6] The OPGGS Act requires a titleholder, at all times while the title is in force, to maintain financial assurance sufficient to give the titleholder the capacity to meet costs, expenses and liabilities arising in connection with the carrying out of an oil and gas activity in the title area. This includes costs, expenses and liabilities arising in connection with complying with the titleholder's legislative obligations under the OPGGS Act, including its duty in relation to controlling, cleaning up and monitoring the effects of any escape of oil and gas, or reimbursing NOPSEMA, or the responsible Commonwealth Minister, if the titleholder has failed to comply with its duty.

- the Department of the responsible State Minister, or the responsible Northern Territory Minister
- a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the Environment Plan, or the revision of the Environment Plan
- any other person or organisation that the titleholder considers relevant.

In identifying relevant persons, NOPSEMA recommends that titleholders apply this category broadly when considering who to consult with[7]. NOPSEMA's expectations for relevant person consultation include the direct and open communication between titleholders and relevant persons during the consultation process, and early engagement, appropriate consultation strategies and respectful communication techniques[8].

The titleholder is required to give each relevant person sufficient information and reasonable time to allow the person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities (NOPSEMA makes an assessment of the sufficiency of information on a case-by-case basis).

Titleholders must assess and appropriately address any objections and claims raised by the relevant person, and provide a statement of their response, to each objection and claim. This includes any actions the titleholder is proposing to take in response to the objections and claims raised (if any).

In addition, the environment plan must include an implementation strategy which provides for appropriate consultation with relevant authorities of the Commonwealth, a state or territory, and other relevant interested persons or organisations, whilst conducting the petroleum activity.

NOPSEMA cannot accept an environment plan that does not demonstrate that the required consultation, including ongoing consultation arrangements where appropriate, has been undertaken.

7.1.2 Publication of environment plans and public comment period

The Environment Regulations were amended on 25 April 2019 to implement the outcomes of a review of consultation and transparency requirements for offshore petroleum and greenhouse gas activities.

The relevant person consultation requirements outlined in section 7.1.1 remain unchanged with the introduction of these amendments. Titleholders are still required to undertake consultation with relevant persons and prepare an environment plan as per the regulatory requirements.

The amendments introduced the additional requirement of a mandatory 30 day public comment period for environment plans for seismic or exploratory drilling activities, and publication of environment plans for all petroleum and greenhouse gas activities both on submission and acceptance of the plan by NOPSEMA. All environment plans submitted on or after 25 April 2019 are subject to the new requirements.

[7] https://www.nopsema.gov.au/assets/Publications/A665131.pdf
[8] https://www.nopsema.gov.au/assets/Information-papers/A347285.pdf

These changes will enable the community to be better informed about possible risks arising from activities, how a company will manage those risks and the emergency response planning measures in place. They also ensure the public is able to have their say about the management of these activities.

For seismic or exploratory drilling environment plans, comments related to the content of the environment plan received during the public comment period must be taken into account by the titleholder, and by NOPSEMA when assessing the environment plan. NOPSEMA and the titleholder must not consider comments on matters not related to the content of the environment plan, or comments received outside the comment period.

The titleholder must prepare a report on its response to comments received, this report is published by NOPSEMA. NOPSEMA is required to prepare a statement detailing how it has taken into account any comments received during the public comment period in its assessment of the plan.
The statement is required to be published on the NOPSEMA's website at the same time as it publishes an accepted environment plan.

7.1.3 Transparency initiatives

In 2016, the department undertook a review of the of consultation and transparency requirements in place under the Environment Regulations at the time. The review was undertaken to ensure that consultation practices represent leading practice and continue to meet community expectations, and reinforce community confidence in the offshore petroleum regime and NOPSEMA's decision making processes. The review was informed by consultation with a range a government, industry and community stakeholders.

On 28 November 2017, Minister Canavan announced a suite of measures identified from the review to improve consultation and transparency for the offshore sector[9]. This included the requirement for the publication of environment plans and public comment period described above. Other measures now implemented include:

- Improved consultation processes for the annual Offshore Petroleum Exploration Acreage Release
- Holding community information sessions to provide an opportunity for the public to learn about the approvals process for offshore petroleum activities and the requirements in place to ensure companies manage the risks arising from such activities.
    - Information sessions were held in several locations in South Australia in August 2018, and in Newcastle (New South Wales) in early 2019.

These reform initiatives are complemented by NOPSEMA's efforts to increase transparency, which are outlined in its final report for the stakeholder engagement and transparency work program[10]. This includes the establishment of a 'Transparency taskforce' in July 2017 to align efforts on transparency initiatives with other jurisdictions and to assist industry in identifying solutions for common issues.

The government recognises there is a need to provide greater assurance to the community that all relevant scientific and environmental considerations are considered as part of the assessment process and decision-making of the independent regulator. The Chief Scientist's independent audit

[9] https://www.minister.industry.gov.au/ministers/canavan/media-releases/added-transparency-offshore-oil-and-gas
[10] https://www.nopsema.gov.au/assets/Environment-resources/A562339.pdf

into NOPSEMA's assessment of exploration in the Great Australian Bight identified a number of opportunities for government, NOPSEMA and titleholders to provide even greater assurance to the community, and the department is working with NOPSEMA and industry to address these actions.

7.2 Streamlining

In February 2014, the environmental approvals processes for offshore oil and gas and greenhouse gas activities were streamlined, establishing NOPSEMA as the sole designated regulator for these activities in Commonwealth waters.

Prior to 28 February 2014, offshore oil and gas and greenhouse gas activities that are likely to have an impact on matters of national environmental significance (as defined in the EPBC Act) were subject to regulation under both the OPGGS Act and the EPBC Act. This dual assessment, monitoring and enforcement imposed an unnecessary burden on stakeholders without providing any additional environmental protection benefits.

Several independent reviews recommended streamlining the regulatory requirements of the EPBC Act and the OPGGS Act. These reviews include:

- Productivity Commission Research Report on Review of Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector (April 2009)[11]
- Report of the Independent Review of the Environment Protection and Biodiversity Conservation Act 1999 (the Hawke Review) (October 2009)[12]
- Report of the Montara Commission of Inquiry (June 2010)[13]
- Draft Productivity Commission Report on Mineral and Energy Resource Exploration (May 2013)[14].

A strategic assessment was undertaken under Part 10 of the EPBC Act which examined NOPSEMA's environmental management processes for offshore oil and gas activities. On 27 February 2014, the Minister for the Environment granted a 'class of action' approval for petroleum and greenhouse gas activities undertaken in Commonwealth waters in accordance with the endorsed offshore environmental management authorisation process administered by NOPSEMA under the OPGGS Act (the Program[15]), subject to the exclusions described in the final approval decision notice.

The Minister's approval means titleholders seeking to undertake offshore oil and gas or greenhouse gas activities in Commonwealth waters in accordance with the Program do not need separately to refer those actions for assessment under the EPBC Act. Under these arrangements, environmental protection is examined and assured through the NOPSEMA decision-making and compliance processes.

[11] https://www.pc.gov.au/inquiries/completed/upstream-petroleum/report
[12] https://www.environment.gov.au/system/files/resources/5f3fdad6-30ba-48f7-ab17-c99e8bcc8d78/files/final-report.pdf
[13] https://www.industry.gov.au/sites/default/files/2018-11/montara-commission-of-inquiry-report-june-2010.pdf
[14] https://www.pc.gov.au/inquiries/completed/resource-exploration/draft
[15] https://www.industry.gov.au/sites/default/files/streamlining_offshore_petroleum_environmental_approvals_program_report.pdf

The endorsed Program describes a range of commitments by NOPSEMA to ensure that offshore activities do not have unacceptable impacts on matters protected under Part 3 of the EPBC Act. These commitments include:

- NOPSEMA will not accept an environment plan that involves the activity or part of the activity, other than arrangements for environmental monitoring or for responding to an emergency, being conducted in any part of a declared World Heritage property within the meaning of the EPBC Act.
- NOPSEMA will not accept an Environment Plan that proposes activities that will contravene a plan of management or proposes unacceptable impacts to a matter protected under Part 3 of the EPBC Act.
- In undertaking assessments, NOPSEMA will have regard to relevant policy documents, plans, conservation advice and guidelines on the Department of the Environment and Energy website.

In order to measure the performance of the Program against the objectives and commitments, a framework for evaluating, reporting and monitoring the Program was developed. NOPSEMA produces an annual report detailing all relevant decisions made under the Program, and a review of the Program is conducted every five years. The next review of the Program is due to be reported in 2020.

7.3 Australian Marine Parks

The Commonwealth Marine Area is a matter of national environmental significance protected under Part 3 of the EPBC Act. Australian Marine Parks have been established within the Commonwealth Marine Area to protect and conserve biodiversity and other natural, cultural and heritage values (Marine Park Values), while allowing for ecologically sustainable use and enjoyment of their natural resources.

There are 58 Australian Marine Parks in Commonwealth Waters, which are managed by Parks Australia. The management plans for each network of parks outline the management principles and objectives, and prescribe what and how activities are allowed to occur within each marine park and zone.

Six types of protected areas are defined by the International Union for the Conservation of Nature (IUCN), with the aim of including representative examples of marine habitats and features within the Commonwealth marine area. The Director of National Parks has authorised mining activities (which includes oil and gas activities) in Multiple Use Zones, and most Special Purpose Zones and Special Purpose Zones (Trawl), through class approvals[16]. These class approvals require (among other conditions) that operations are undertaken in accordance with any conditions attached to the class approval and an environment plan accepted by NOPSEMA. The construction and operation of pipelines in National Park Zones (IUCN category II) and Habitat Protection Zones (IUCN category IV), is only allowable if authorised by a Director of National Parks licence.

Under the Environment Regulations, an environment plan must include a description of the environment that may be affected by the activity, including Australian Marine Park values that may be affected. NOPSEMA cannot accept any environment plan for an activity in a marine park not consistent with the management plan governing that park.

[16] https://parksaustralia.gov.au/marine/activities/do-i-need-an-approval/mining/

The Chief Scientist's audit of NOPSEMA's consideration of exploration in the Great Australian Bight found that NOPSEMA has well documented processes to appropriately take into account matters protected under the EPBC Act and Australian Marine Park Values as part of the assessment process.

7.4 Consideration of scientific information

Scientific research plays an important role in informing the effective management of Australia's offshore environment and resources. The Australian Government is committed to ensuring that publicly-available, peer-reviewed research is considered in regulatory assessments and policy development. This approach is intended to ensure that regulatory assessments are informed by reliable published science, and that the principles of procedural fairness and natural justice are maintained. Where scientific understanding of potential impacts is limited, the Australian Government applies precaution to its regulatory decision-making. NOPSEMA has a published policy for environment plan assessments that describes the types of information it considers, including research findings[17].

NOPSEMA has published an information paper to provide advice to titleholders to assist with preparing environment plans for seismic survey activities, and in particular the components of an environment plan that relate to detailing, evaluating and managing impacts from acoustic emissions[18]. This paper identifies peer-reviewed scientific literature as an important consideration to be taken into account by titleholders in detailing and evaluating impacts from acoustic emissions and defining the acceptable level(s) of impact in an environment plan.

The Chief Scientist's audit of NOPSEMA's consideration of exploration in the Great Australian Bight found that NOPSEMA has appropriate processes and practices to ensure environment plans are assessed against relevant, sufficient and complete scientific and technical information. If there is scientific uncertainty, NOPSEMA standard practice is to take a precautionary approach. NOPSEMA has links to other organisations, including other government agencies, contractors, consultants and research bodies, to ensure staff are aware of new scientific and technical information.

Additional detail about how NOPSEMA takes scientific research into account in its decision-making is provided in their submission to this inquiry.

Limited information is available on the potential impacts of seismic surveys on fisheries and commercially important species. While there has been a small number of recent studies into impacts on certain specific species, it is difficult to draw generalised conclusions about broader impacts. The department acknowledges the need for additional research in this area, to enable better predictions of the effects of seismic on the marine ecosystem, and inform regulatory assessments and policy development.

[17] https://www.nopsema.gov.au/assets/Policies/A662608.pdf
[18] https://www.nopsema.gov.au/assets/Information-papers/A625748.pdf

8. Effectiveness of Australia's offshore regulatory regime

The OPGGS Act and associated Regulations provide a robust regulatory framework for ensuring stringent safety, well integrity and environmental protection. Australia's rigorous and transparent legislation and regulations strike a balance to develop the oil and gas industry in an environmentally responsible and sustainable way and to co-exist with other industries, including fisheries.

It is leading regulatory practice that an independent, expert regulator is responsible for ensuring a safe and environmentally responsible offshore oil and gas sector once a title has been issued. This model establishes a single, independent authority that is responsible for regulating the health and safety of Australia's offshore oil and gas workers and the environment, from exploration through to decommissioning. The streamlined approach for environmental approvals for offshore oil and gas and greenhouse gas activities prevents unnecessary duplication in regulatory processes, while ensuring the integrity and standards of the environmental assessment process.

As noted in the introduction, NOPSEMA's environmental regulation of Australia's oil and gas sector has been subject to previous independent reviews and analysis, including the 2015 operational review, which found NOPSEMA to be a competent regulator. The Chief Scientist's audit of NOPSEMA's consideration of exploration in the Great Australian Bight found NOPSEMA to be a highly skilled, professional and competent regulator that has developed and applies appropriate processes and practices to meet its regulatory requirements in considering exploration matters under the Environment Regulations.

Key to Australia's offshore regime is the assignment of responsibility to the creator of risk for evaluating and managing impacts and risks to ALARP and acceptable levels. The ALARP objective allows titleholders to adopt environmental practices and technologies that are suited to individual circumstances, activities and locations, while taking into account costs and other factors to ensure a reasonable approach to environmental impact and risk improvements. The requirement for all activities to be deemed environmentally acceptable ensures that risks are effectively mitigated.

For the offshore petroleum sector, a technically complex and continually evolving industry, the objectives-based regulatory model provides an adaptable, flexible and scalable approach which recognises the specific circumstances of each activity and the environment in which they take place. It encourages improvement by industry, allowing for flexibility in implementing new technologies and innovations in response to dynamic environmental conditions and emerging scientific research.

9. International regulatory regimes

This chapter provides a brief overview of the regulation and approval of seismic activities internationally, focusing on Norway, the United Kingdom, Canada and the United States. These countries, along with Australia, Brazil, Mexico and New Zealand, are all members of the International Offshore Petroleum Environmental Regulators. This is a collaborative group dedicated to raising environmental performance standards within the offshore petroleum exploration and production industry.

Norway

The Norwegian government has a clear commitment to ensuring the co-existence of the petroleum and fishing industries. The legislation applying to seismic surveys is outlined in the guideline '*Implementation of seismic surveys on the Norwegian Continental Shelf*'[19].

The Norwegian Petroleum Directorate is a specialist administrative body that reports to the Ministry of Petroleum and Energy, and focuses on resource management[20]. An operator, as the responsible party, must apply for a permit to commence and carry out any petroleum activities. In order to conduct a seismic survey, a company must hold either an exploration or production licence. Environmental permits, including for offshore petroleum activities, are issued by the Norwegian Environment Agency.

All seismic surveys must be reported to the Norwegian Petroleum Directorate at least five weeks prior to commencement. When the notification has been registered, copies are automatically sent to the Directorate of Fisheries, the Institute of Marine Research and the Norwegian Joint Headquarters. These agencies provide expert advice issues such as spawning, fishing and military activities in the specific area, which is then provided to the licensee by the Norwegian Petroleum Directorate[21].

The petroleum regulations also require any vessel engaged in seismic surveying to have a fisheries expert on board. The fisheries expert must have completed an approved course and be certified by the Norwegian Petroleum Directorate. The fishery expert will provide the seismic vessel master with information about any fisheries activities in the area, and facilitate communication between the seismic vessel and fishing vessels. Norway does not specify any required mitigation measures for seismic surveys related to the protection of marine mammals.

United Kingdom:

In the United Kingdom (UK), The Petroleum Act 1998 (the Petroleum Act) establishes the regulatory regime applying to offshore oil and gas exploration and production in the UK. All activities that could potentially impact on the marine environment are subject to rigorous assessment, and controlled through the issue of various licenses, permits, consents or approvals.

Under the Petroleum Act, exploration for and production of petroleum in the UK and on the UK Continental Shelf can only be undertaken under a licence issued by the Oil and Gas Authority (OGA). Exploration licences are useful for seismic contractors who wish to gather data to sell rather than to

[19] https://www.npd.no/globalassets/1-npd/regelverk/forskrifter/en/guidelines-seismic-surveys.pdf
[20] https://www.npd.no/en/
[21] https://www.norskpetroleum.no/en/exploration/seismic-surveys/

exploit geological resources themselves, and for holders of production licences who wish to explore outside the areas where they hold exclusive rights[22].

The UK takes a precautionary approach to protection of the environment. Across the regime, conditions are used to impose the Best Environmental Practice (BEP) and encourage the use of Best Available Techniques (BAT). All operators must comply with any conditions set under the permitting regime and the Offshore Environmental Inspectorate Team are responsible for reviewing that compliance and investigating any identified non-compliant activities.

The environmental aspects of offshore oil and gas exploration and production, offshore gas unloading and storage and offshore carbon dioxide storage activities are regulated by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED). The OPRED regulates activities from exploration through production and/or storage to decommissioning, in order to minimise any potential impacts on the offshore environment.

More information about the environmental regulations and guidance for offshore petroleum activities in the UK jurisdiction is available on the UK Government website[23].

Canada

The Canada-Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) and the Canada-Nova Scotia Offshore Petroleum Board (C-NSOPB) are responsible for the approval of offshore seismic surveys. The C-NLOPB and C-NSOPB operate under a permission-based system, similar to other countries, whereby industry must receive permission from the regulator before any operation or activity commences.

These regulators operate under a hybrid regulatory regime of prescriptive and performance-based requirements, with a focus on adapting to performance based requirements. The Department of Natural Resources Canada recognises that performance based requirements in regulations provide flexibility that allows industry to adopt the most appropriate technologies and practices to suit the specific circumstances of an activity[24].

Before a company can perform a seismic survey it must first undertake an Environmental Assessment (EA), which reviews potential environmental impacts in the proposed survey. The EA is reviewed by the Department of Fisheries and Oceans (DFO) and the Department of Environment and Climate Change, and must be approved by the C-NLOPB or the C-NSOPB before a survey can proceed. Seismic operators must also comply with the respective guidelines of each regulator[25].

Seismic vessels and their operators are also guided by DFO's Statement of Canadian Practice with Respect to the Mitigation of Seismic Sound in the Marine Environment[26].

[22] https://www.ogauthority.co.uk/licensing-consents/onshore-licences/
[23] https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation
[24] https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/clean-fossil-fuels/offshore-oil-gas/frontier-offshore-regulatory-ren/regulatory-approach-offshore-oil-and-gas-sector-canada/22246
[25] https://www.capp.ca/publications-and-statistics/publications/291866
[26] https://www.dfo-mpo.gc.ca/oceans/publications/seismic-sismique/index-eng.html

United States

In contrast to Australia and the other regimes described above, the United States has a prescriptive regime, rather than one that is objectives-based.

The US federal government regulates offshore exploration and production for the Outer Continental Shelf (OCS). The OCS extends from the states' offshore boundaries out to the edge of national jurisdiction, 200 nautical miles from shore.

The basis for most federal regulation is the Outer Continental Shelf Lands Act (OCSLA), which provides a system for offshore oil and gas exploration, leasing and development. The Bureau of Ocean Energy Management (BOEM) manages the responsible exploration and development of offshore energy and marine mineral resources on the US OCS. The Bureau of Safety and Environmental Enforcement (BSEE) develops and administers policies and regulations to improve safety and ensure environmental protection related to offshore energy (primarily oil and gas) activities on the OCS.

The BOEM permits and regulates all geological and geophysical exploration for oil and gas on the OCS. This exploration is primarily carried out by private companies operating under BOEM permits. Before permits can be issued, BOEM conducts an environmental analysis to ensure the safety of the marine ecosystem. This includes an environmental impact assessment including 'animat' modelling to calculate the predicted impact of the survey, BOEM then specifies the mitigation measures that must be applied. BOEM will also determine if activities need to be prohibited during particularly sensitive time periods. BOEM has acquired a large portion of data resulting from these activities. Federal regulations require this data be held proprietary for 25 years, then released to the public.

BOEM has worked with the National Oceanic and Atmospheric Administration (NOAA) Fisheries and other agencies to identify protection measures to mitigate the impact of seismic surveys, including that the operator establish an 'acoustic exclusion zone' for each survey, so that each zone is clear of any marine mammals and sea turtles for a certain amount of time before acoustic sound sources can be operated[27].

[27] https://www.boem.gov/NP-Geological-and-Geophysical-Factsheet/

10. Conclusion

Australia's globally competitive resources sector underpins much of our prosperity and delivers benefits for all Australians. Exploration through seismic surveys plays a vital role in ensuring the discovery of new oil and gas reserves, and is an important precursor to development and production activities.

Scientific research plays an important role in informing policy development and regulatory decision-making. The body of scientific literature on the impacts of seismic activities on the marine environment continues to grow, and is taken into account by industry and regulators to ensure potential impacts and risks are identified and effectively mitigated.

Australia's objectives-based regulatory approach ensures that proposed seismic activities are assessed against appropriate credible scientific information; and where there is scientific uncertainty, NOPSEMA applies the precautionary principle to safeguard the protection of the marine environment.

Our offshore oil and gas regulatory framework has proven to be an effective and robust regime that allows for the exploration and development of Australia's offshore resources while ensuring stringent environmental protections.