

LOUISE 3D MARINE SEISMIC SURVEY, WA-382-P: ENVIRONMENT PLAN SUMMARY

This summary of the Environment Plan for the Louise three dimensional marine seismic survey (3D MSS), in WA-382-P, has been submitted in accordance with Regulations 11(7) & 11(8) of the *Petroleum (Submerged Lands) (Management of Environment) Regulations 1999*, as amended by Regulation 13 of the *Petroleum (Submerged Lands) (Management of Environment) Amendment Regulations 2005*. It may not be used for any other purpose without Roc Oil's prior approval.

1 Project Description

Roc Oil (WA) Pty Ltd (Roc) as Operator of the WA-382-P Exploration Permit proposes to undertake a three dimensional (3D) Marine Seismic Survey (3D MSS) in Commonwealth waters within the Perth Basin region offshore from Western Australia. The Louise 3D MSS is expected to cover an area of approximately 198 km². The Louise 3D MSS is scheduled to occur in the period between late February and early March 2008 and will be of approximately 15 days duration. The actual duration of acquisition is dependent on the weather and sea state conditions.

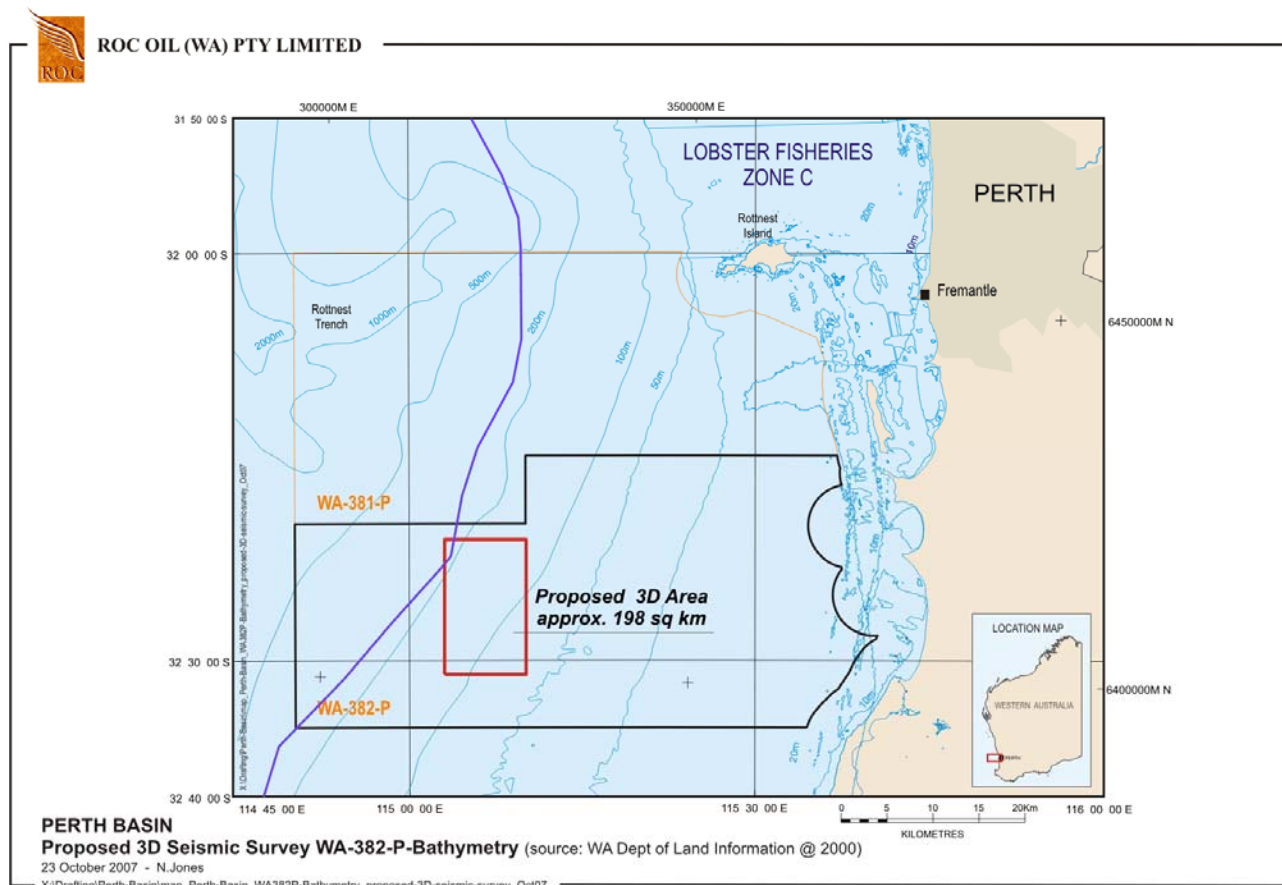
2. Coordinates of the Survey

The WA-382-P Permit Area is approximately 60 km south-west from Perth (Figure 1). The boundary coordinates (GDA94 MGA UTM 50S) for the survey area are listed in Table 1. Water depths across the area of activities range from 60 to 210 m.

Table 1: Boundary Coordinates of the Proposed Louise 3D MSS Survey Area

location point	Latitude			Longitude		
	degrees	minutes	seconds	Degrees	minutes	seconds
A	32	31	01	115	03	02
B	32	21	06	115	03	15
C	32	21	12	115	10	19
D	32	31	07	115	10	07

Figure 1: Location of Proposed Louise 3D Marine Seismic Survey, WA-382-P



3. Description of the Receiving Environment

Regional Setting

The project area lies within the 'Leeuwin-Naturaliste' meso-scale bioregion according to the IMCRA v4.0 classification. The Leeuwin-Naturaliste meso-scale bioregion extends from Perth to Black Point on the south coast of WA and typically comprises high energy, swell affected coast with a narrow continental shelf, where coastal waters are strongly influenced by the warm offshore Leeuwin Current and cooler inshore counter currents. South and south-westerly swell conditions dominate the region and many shores are exposed, whilst the north-facing Geographe Bay is sheltered from these prevailing conditions. Bathymetry is typically uncomplicated, especially in the northern section, where the seabed shelves gently westwards. Coastal heterogeneity to the north of Geographe Bay is produced by fine calcareous Holocene sands and sub-littoral reefs formed by Pleistocene limestone ridges that lie parallel to the coast.

At its closest point the survey area is approximately 55 km west of the western Australian coastline. The parts of the survey area closest to the coastline lie on the continental shelf with water depths of approximately 60 m while the outer parts lie across the edge of the continental slope in water depths of about 210 m. Complex bathymetry results in a range of coastal habitats, depending on the amount of exposure to ocean swells. Offshore limestone reefs, ridges, islands and shallow banks prevent up to 60% of wave energy reaching the adjacent coast. Where these structures protect the coast, sheltered sandy beaches and estuarine lagoons occur. The most significant feature is the presence of the Rottnef Trench (also known as the Perth Canyon), a large subsea canyon structure some 40 km to the north of the survey area. The trench is about 25 km long and 5 km wide at the deepest point. Water depth in the trench rises from more than 1,300 m to less than 180 m.

The marine environment of the south-west of Western Australia is dominated by the Leeuwin Current, which carries relatively warm, nutrient-poor water southwards during winter along the lower WA coast. The presence of the Leeuwin Current and the lack of large-scale ocean up-welling means that SW WA coastal waters are relatively warmer (up to 4° C) than other coastlines of comparable latitude, and this has a pronounced influence on the coastal and marine biota of the SW of WA. On the southern Rottneest Shelf, there is a cold water mass called the Capes Current that is present on the inner continental shelf between Capes Leeuwin and Naturaliste during summer. The nutrients brought to the surface by this upwelling result in large-scale phytoplankton blooms that are important for commercial fisheries. The Capes Current may also be important for the seasonal migration and spawning patterns of fish species such as salmon.

The dominant physical processes on the Rottneest Shelf are swell and storm waves from the Southern and Indian Oceans. As a result the shelf is a high-energy environment and wave abrasion and erosion is frequent, particularly on the inner shelf. Currents are weak and variable on the middle of the continental shelf. Tides are diurnal, with a small maximum range of less than one metre, and have very limited effect on water circulation in the area.

Habitats and Biota

The nearest intertidal habitats occur along the shores of the mainland, to the east of the survey area (Figure 1). The inter-tidal and sub-tidal habitats of the Shoalwater Bay Marine Park, located approximately 40-50 km east of the survey area and immediately adjacent to the eastern edge of the WA-382-P Permit Area, are typical of inshore habitats south of Cockburn Sound to Mandurah. Limestone ridges and reef platforms are found in the northern areas of the marine park, both along the coast and also as a broken chain of islands and reefs separated by linear depressions. These ridges and platforms protect the coast from south-westerly swell and waves. Underwater structures, including caves, archways, vertical channels, solution pipes, rocky slopes and platforms, are a result of chemical and mechanical weathering. Sand deposition has resulted in the formation of beach and dune systems, and mobile sandbars link islands to the mainland in some areas.

The plants and animals in the marine park are generally representative for those described for sandy bays and reefs along the metropolitan coast. An exception is the apparent absence of some of the tropical corals and sea urchins which are found in Marmion Marine Park, at Rottneest Island and in Cockburn Sound. The Shoalwater Islands region is dominated by beach and rocky shore shoreline habitats and include six major marine benthic habitat types; seagrass, sub-tidal mobile sand, bare reef (intertidal offshore), macroalgae (sub-tidal high relief and sub-tidal low relief) and silt.

Across the Rottneest Shelf, sediments generally occur as thin, discontinuous sheets over rocky or algal substrates. Seafloor photography reveals three main sediment distribution patterns. These include: 1) rocky seabed with abundant seagrass, macrophytes and sponges; 2) rippled sand with clumps of calcareous red algae; and 3) open expanses of rippled sands. Similar to the northern Rottneest Shelf, sediments have a distinct shelf-parallel zonation and are associated with substrate type. Sediments form a thin (<1 m) veneer overlying Pleistocene limestone with the inner shelf consisting of wave-rippled sand and localised algal hard grounds in nearshore regions. Algal hard grounds and rhodolith pavements occur on offshore ridges on the inner shelf margin. Extensive areas of bioturbated fine sand occur on the outer shelf.

Review of online databases held by the Commonwealth Department of the Environment and Water Resources (DEW) indicates that there are a total of 76 Marine Listed Species, under the EPBC Act as Endangered, Vulnerable, Migratory or Cetacean, including birds, that may occur, or the species habitat may occur, within or near to the entire survey area. The search of the EPBC Protected Matters database also returned 21 marine species covered by the Migratory Species provisions of the EPBC Act that may occur within the survey area. Ten of these are seabirds, five species (other than seabirds) have also been identified as threatened species and are described below. All of these migratory species may transit through the survey area, however there are no known roosting or breeding habitats for these species within, or adjacent to, the survey area.

Cetaceans

The Rottneest Trench has recently been found to be a feeding aggregation area for blue whales, both 'true' blues and the pygmy variety. The trench is frequented by blue whales over the summer-autumn period (January to March), with anywhere from zero up to possibly 60 or so individuals present in the area at any one time. The head of the trench, where most of the blue whales are sighted, has been noted as an area where krill are present in large concentrations. It is assessed that blue whales use the area principally for feeding. Blue whales arrive in the trench as early as November, with the numbers of animals steadily increasing to a peak in the following March to May. After May the number of whales drops, so that by late June most animals have left. Although little is known of blue whale migratory movements they are usually found at or beyond the shelf break and it is unlikely that they would be found in the relatively shallow waters of the survey area other than occasionally.

It is likely that humpback whales follow a predictable migratory path and migrate both north and southbound within the continental shelf boundary (200 m bathymetry). However, on the southbound migration it is likely that most individuals, and particularly cow/calf pairs, will stay closer to the coast than the northern migratory path. The survey timing means that it will occur after the end of the southbound migration for humpback whales moving down the coast, and well before the commencement of the northbound migration at the start of winter. Therefore, no humpback whales are expected to be encountered in waters in and around the WA-382-P Permit Area during the period of the survey.

Pinnipeds

The Australian sea-lion is commonly found between Houtman Abrolhos Islands on the west coast of Western Australia to The Pages in South Australia. It is possible that sea-lions may occur feeding or passing through the survey area. New Zealand fur seals are widely distributed across southern Australian waters and there are 16 known breeding areas along the south coast of Western Australia. They are deep diving and it is possible that they may feed or pass through parts of the survey area. A colony of male Australian sea-lions uses some of the islands within the Shoalwater Bay Marine Park as haul-out areas.

Fishes

Fish species listed under the EPBC Act that may occur in the survey area and adjacent waters are not expected to be specifically linked to any specific benthic habitat - i.e. their distributions are likely to be widespread. The pipefishes, seadragons and seahorses (Family Syngnathidae) are most likely to occur in seagrass (pipefishes) and macroalgal (seadragons and seahorses) habitats. However, given the widespread nature of these benthic habitats, all of these species are predicted to have a widespread distribution and to be broadly represented throughout the inshore habitats from Fremantle to the southern extent of Geographe Bay. The waters within and adjacent to the Louise 3D MSS survey area are not expected to include any particular areas that represent critical habitat for any of the listed fish species. For instance, species in the Family Syngnathidae are egg brooders rather than broadcast spawners - the females lay their eggs in a brood pouch on the males' chest, and the male then fertilizes and incubates the eggs. These species, therefore, don't have spawning aggregations that could be particularly susceptible to disturbance from seismic survey airgun noise.

Typical west coast populations of grey nurse sharks are commonly found in deep offshore waters and distributed between the area just north of Exmouth down the south west coastline and along southern Western Australia. Limited data is available on the grey nurse shark however it is possible they may occur in the survey area. The great white shark is widely distributed and located throughout temperate and sub-tropical regions in the northern and southern hemispheres primarily in coastal and offshore areas of the continental shelf. Archival and satellite tagging research has recorded shark movements mainly restricted to shelf and coastal waters with some swimming depths down to 94 m.

On the mid-continental slope, south of Cape Mentelle, there is a commercial orange roughy aggregation fished sporadically by trawlers of the Great Australian Bight fishery. This is the western-most known occurrence of this species. Orange roughy are unlikely to be present in the survey area.

Seabirds

Albatrosses and giant petrel are migratory species (i.e. Bonn Convention, JAMBA and CAMBA) and tend to be the most oceanic of all seabirds, opting for land primarily for breeding purposes. Most species typically breed on remote islands in the middle of vast oceans. Many species, such as grey-headed albatrosses, are extremely dispersive, spending most of their time over the pelagic waters of the high seas. In contrast, others, like adult shy albatrosses, tend to remain sedentary, regularly foraging over coastal waters throughout their adult lives. The habitats of the Shoalwater Bay Marine Park are important for the feeding, resting and breeding of little penguins and other sea and shore birds.

Rock Lobster

Rock lobsters are found all around the Australian coast sheltering in caves and crevices during the day and moving out at night to forage in surrounding areas. The western rock lobster supports the most valuable single species fishery in Australia. The life cycle of the western rock lobster has been well studied. Breeding occurs in spring and early summer in waters near the edge of the continental shelf of 35 to 90 m depth. The eastern parts of the survey area would be an area of lobster breeding.

Seagrasses

Seagrasses form extensive meadows in shallow water environments along the shelf, such as protected embayments (e.g., Cockburn Sound), lagoons and bays (e.g. Geographe Bay). *Thalassodendron* proliferates on rocky substrates and occurs in up to 40 m water depth on the inner shelf and ramp. Along the Rottneest Shelf, macroalgae occurs frequently on rocky substrates in areas down to 50 m water depth. Southern Australian forms such as *Ecklonia* and *Sargassum* are common, with infrequent tropical macroalgal species occurring at Rottneest Island. Green calcareous algae such as *Halimeda* occur frequently on the shelf and ramp.

Socio-Economic Considerations

Commercial Fisheries

After 15th November 2007, all commercial fisheries except the Western Rock Lobster Fishery, are prohibited from waters out to the 250 m isobath between 33°S latitude (Preston Beach) and Lancelin. This closure has been introduced by Fisheries WA, under Section 43 of the *Fish Resources Management Act 1994*, following concerns about stock levels and the sustainability of some of the fisheries. In waters deeper than 250 m on the southern Rottneest Shelf to Cape Naturaliste, there will be only 1-2 vessels operating in the Deep Sea Crab Fishery and Western Deepwater Trawl Fishery.

The survey area is located within the Western Rock Lobster Fisheries Zone B. The Western Rock Lobster fishery in Zone B operates from 8th November (pot soaking) to 30th June. The survey will overlap the later part of the rock lobster fishing season after late February. However, consultations with commercial rock lobster fishermen and industry associations indicate that there will be very few, if any, commercial rock lobster vessels operating in the survey area at that time.

Recreational Fisheries and Tourism

Given the location of the WA-382-P permit just to the south-west of Fremantle and due west of Mandurah (Figure 1), it is possible that there may be some recreational fishing activities occurring on the inshore reefs adjacent to the survey area. Inshore boating, diving and recreational fishing activities probably occur on the inshore reef areas to the east of the survey area, given its location just south-west of Fremantle and due west of Mandurah.

Marine Protected Areas

The closest marine protected area to the Louise 3D MSS survey area is the Shoalwater Bay Marine Park, which is located in WA State Waters approximately 40-50 km east of the survey area and immediately adjacent to the eastern edge of the WA-382-P Permit Area.

Shipping Activity

The survey area is located in an area of moderate level shipping. The area also lies within the Western Australian Exercise Area (WAXA), which is one of the primary maritime exercise areas of the

Australian Defence Force.

Shipwrecks

A search of the National Shipwrecks Database indicates that there is one known historic shipwreck within the WA-382-P Permit Area.

Indigenous Heritage

There are no known Indigenous Heritage issues associated with the WA-382-P Permit Area or adjacent waters.

4. Description of the Action

The seismic array will comprise of four (4) streamers, with a maximum length of approximately 3.75 km, and separation distance of 100 m. The source depth will be 5 m and the streamer depth will be 6 m (or deeper, depending on sea state). The operating pressure for the airgun array will be approximately 2,000 psi. Each airgun array will have a volume of approximately 2,500 cui and will produce at source (i.e. within a few metres of the airguns) sound pulses in the order of 220-240 dB re 1 μ Pa-m at frequencies extending up to approximately 110 Hz. Airguns of this size are known to produce sound pulses within a few metres in the order of 220 dB re 1uPa-m at frequencies extending up to approximately 110 Hz. These sound pulses will decrease to levels in the order of 170 to 180 dB re 1uPa-m within 1 km of the source and approximately 160 dB re 1uPa-m within 2 km, dependent on the sound propagation characteristics of the area.

The majority of the survey will be conducted in water depths of 60 to 210 m and therefore it is highly unlikely that any of the towed equipment will make contact with the seafloor or benthic communities. A supply vessel will accompany the survey vessel during the survey.

5. Major Environmental Hazards and Controls

An environmental risk assessment has identified environmental hazards and potential environmental effects associated with the Louise 3D MSS. The principal environmental hazards have been determined to be associated with noise generated by the seismic source array.

Other environmental aspects of the marine seismic survey include:

- operation of the seismic vessel and towing of the airgun and streamer (hydrophone) array through the survey area;
- routine waste discharges from the survey vessel;
- accidental fuel and oil spills from the survey vessel;
- accidental loss of streamers and associated equipment; and
- ballast water discharge and hull bio-fouling.

The potential environmental effects associated with the above environmental aspects are:

- acoustic disturbance to marine fauna;
- disturbance to benthic habitats;
- marine pollution;
- introduction of marine pests;
- interactions with commercial fisheries; and
- interactions with shipping.

6. Summary of the Management Approach

Table 2 identifies the key environmental performance objectives, measures and criteria for the Louise 3D MSS.

Table 2: Key Environmental Performance Objectives, Measures and Criteria

Objectives	Criteria
Minimise disruption to cetaceans	<ul style="list-style-type: none"> • Management procedures in place and adhered to • Observation zone of 3 km radius • Low power zone of 2 km radius • Shut-down zone of 500 m radius • 'Soft start' procedures • Firing of a single airgun during line turns • Dedicated MMOs present onboard to keep watch for whales and to monitor soft start and other procedures • Aerial survey one day prior to start of seismic survey to monitor for presence of blue whales • Responsibilities for monitoring, responding to and recording cetacean sightings clearly identified and conveyed to vessel personnel • Sighting reports completed and returned to Roc and DEW
Minimise disturbance to benthic habitats	<ul style="list-style-type: none"> • No anchoring of the vessel will take place during the survey unless in an emergency • Recording and reporting of all items lost overboard
Minimise interference with commercial fishing	<ul style="list-style-type: none"> • Operations carried out so that the survey is never operating in areas where lobster fishing is current • Fishermen advised of survey location in time to redeploy fishing equipment
Minimise interference with shipping traffic	<ul style="list-style-type: none"> • Notice to Mariners - written and radio warnings to shipping • Operations carried out in a manner that does not interfere with navigation to a greater extent than is necessary
Minimise interference with military exercises	<ul style="list-style-type: none"> • Consultation with the Australian Defence Force and the Royal Australian Navy • Notice to Mariners - written and radio warnings to shipping • Operations carried out in a manner that does not interfere with navigation to a greater extent than is necessary
Minimise effects of sewage discharge	<ul style="list-style-type: none"> • Procedures for treatment and disposal of sewage are in place • Sewage treatment system operational and includes maceration and disinfection • Relevant discharge requirements are adhered to • Sewage not discharged within 12 nautical miles of the coastline unless vessel has a certified approved sewage treatment plant in place under Regulation 8 (1) (b) of MARPOL 73/78 Annex IV, in which case, sewage must not be discharged within 4 nautical miles of land
Minimise effects of oily water discharge	<ul style="list-style-type: none"> • Oily effluents from bilges and machinery spaces collected in an oily slops storage tank, and treated in an oil-water separator prior to overboard discharge • Deck washdown and drainage water contained and directed into bilges and slops tank, prior to treatment in an oil-water separator. • Vessels are required to have a valid International Oil Pollution Prevention (IOPP) Certificate • An <i>Oil Record Book</i> is maintained which details how, when and where any waste oils/oily effluents are disposed of • Oily effluents from bilges and machinery spaces are treated in an oil-water separator to a 15 ppm oil content specification prior to overboard discharge (MARPOL 73/78 Annex I requirement)

Objectives	Criteria
Minimise occurrence of fuel and oil spills	<ul style="list-style-type: none"> • Procedures comply with MARPOL 73/78 requirements • MARPOL <i>Oil Record Book</i> kept up to date • Fuel spill contingency procedures are in place and operational • Designated containment areas onboard the vessel for storage of oils, greases and streamer fluid • Sufficient spill response equipment on board to respond to foreseeable spill events • Appropriate actions are taken to minimise pollution • Any spills >80 litres are reported to the Designated Authority • Personnel responsibilities are clearly identified • Use of solid streamers
Minimise potential impacts of solid and hazardous wastes	<ul style="list-style-type: none"> • Correct segregation of solid and hazardous wastes • A vessel <i>Waste Log Form</i> is kept detailing quantities of wastes transported ashore • Procedures comply with MARPOL requirements
Minimise potential for introduction of marine pests – ballast water	<ul style="list-style-type: none"> • If required, submission of a Quarantine Pre-Arrival Report (QPAR) for the survey and support vessels to AQIS • No ballast water discharge without express written permission from AQIS • Completion of AQIS <i>Ballast Water Log</i>
Minimise potential for introduction of marine pests – ballast water	<ul style="list-style-type: none"> • Seismic and support vessels to have operated continuously in Australian waters for the last 12 months • Seismic and support vessels to have been dry-docked, and had hull inspection, cleaning and new anti-fouling systems applied within the last 12 months

7. Consultation Details

Ongoing consultation during planning and preparation for the proposed Louise 3D MSS has involved, and will continue to involve, discussions with the following agencies and stakeholder organisations:

- WA Department of Industry and Resources (DoIR).
- Commonwealth Department of the Environment and Water Resources (DEW) – Ports & Marine Section, Approvals and Wildlife Division.
- Australian Maritime Safety Authority (AMSA).
- Australian Defence Force (ADF).
- Royal Australian Navy (RAN).
- Curtin University Centre for Marine Science and Technology (CMST).
- Western Whale Research (WWR).
- Centre for Whale Research (CWR).
- WA Fishing Industry Council (WAFIC).
- Western Rock Lobster Council.
- Western Rock Lobster Fishermen's Federation (WARLFF).
- Fisheries WA.

8. Contact Details

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