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Greater Bream
3D Seismic Survey

Summary Environmental Plan

Executive Summary

This is a summary of the Environmental Plan incorporating Cetacean Mitigation Plan prepared by Esso Australia Pty Ltd (Esso) for the Greater Bream 3D Seismic Survey and approved by the Department of Primary Industries on the 24 March 2006.

The Greater Bream 3D Seismic Survey will cover an area approximately 516 km2 over existing Esso Australia Pty Ltd oil and gas leases in the Commonwealth waters of Bass Strait in water depths of approximately 70m.

The purpose of the survey is to acquire seismic data, whose geophysical interpretation will assist in further delineating existing reserves of Greater Bream as well as defining potential additional commercial reserves in adjacent areas.

The survey is expected to commence in mid April 2006 for approximately 6-10 weeks depending on the weather and vessel availability.

The key potential environmental risks associated with the seismic survey are:

- Disturbance to marine fauna from the acoustic source arrays;
- Fuel and oil spills from the survey vessel during refuelling or vessel collision;
- Potential for the introduction of marine pests;
- Waste disposal (sewage, putrescible waste, chemicals, solid and hazardous wastes); and
- Interaction with commercial fishing activities or vessels.

Control measures have been developed to ensure that the risk associated with these aspects is as low as reasonably practicable. These include:

- Cetacean Mitigation Plan including cetacean observers, soft start up of acoustic source and source shutdowns when cetaceans are observed within 3000m of seismic vessel;
- Use of solid streamers rather than oil filled streamers, reducing the risk of spills;
- The risk of pest species being introduced by hull fouling is regarded as low as the vessels will be arriving from the North West Shelf;
- Only sewage and food/cooking waste may be discharged to the marine environment, all other wastes are either incinerated onboard the vessel (general waste) or stored and transported onshore for disposal; and,
- An extensive consultation program including fisheries operating in the area, to raise awareness of the survey, minimise impacts on fisheries and ensure a safe operation.

Contents

1. Introduction

This is a summary of the Environmental Plan incorporating Cetacean Mitigation Plan prepared by Esso Australia Pty Ltd (Esso) for the Greater Bream 3D Seismic Survey and approved by the Department of Primary Industries on the 24 March 2006.

It includes the following:

- Section 2- Coordinates of the activity and description of the action;
- Section 3- Description of the receiving environment;
- Section 4- Details of major environmental hazards and controls and a summary of the management approach;
- Section 5- Details of reporting requirements; and,
- Section 6- Details of consultation already undertaken and plans for ongoing consultation.

2. The Location

Esso Australia Pty Ltd (Esso) on behalf of Esso Australia Resources Limited and BHP Billiton Petroleum (Bass Strait) Pty Ltd plans to acquire approximately 515.8 square kilometres of 3D seismic data and approximately 60 kilometres of 2D seismic data in the Commonwealth waters of the Gippsland Basin in Bass Strait(Figure 2 3). The survey will cover the Bream field and surrounding areas in oil and gas concessions VIC/L13 and VIC/L14, and will also extend to VIC/L01, VIC/L16, VIC/P42 and VIC/P53 for acquisition boundaries required to fully image the prospective area, and to provide key tie lines to offset wells.

The purpose of the survey is to acquire seismic data, whose geophysical interpretation will assist in further delineating existing reserves of Greater Bream as well as defining potential additional commercial reserves in adjacent areas. The data acquisition is a critical requirement to maximise recovery of hydrocarbons from the producing Bream Field, and to allow the potential of geological structures identified, but not yet drilled, to be adequately assessed.

The coordinates of the corners of the 3D survey area are:

- 557,065 E, 5,752,326 S
- 556,243 E, 5,747,926 S
- 556,151 E, 5,733,478 S
- 581,633 E, 5,728,657 S
- 585,061 E, 5,747,026 S

The 2D survey lines will be conducted along lines as follows:

- 544,800 E, 5,751,418 S to 555,527 E, 5,735,574 S
- 543,790 E, 5,749,922 S to 565,129 E, 5,744,821 S
- 551,620 E, 5,737,724 S to 569,608 E, 5,737,085 S

2.1 Timeframe

The current estimated start for the Greater Bream 3D Seismic Survey in Bass Strait is mid April 2006.

The seismic program is expected to take a maximum of 6-10 weeks to complete. Currents, poor weather and associated sea conditions, as well as logistical constraints, can significantly affect the time taken to acquire seismic data in Bass Strait. As a contingency, the operational window of the project might potentially extend into August, but this is considered unlikely.

2.2 Survey Equipment

Data will be acquired using the seismic survey vessel SR/V Veritas Viking II and the undershoot vessel the M/V Pacific Sword. The main seismic vessel will tow an airgun acoustic source and an array of eight solid streamers for a total length configuration of approximately 5,000 metres long and 600 metres wide (Figure 2 1), while the undershoot vessel will tow a airgun acoustic source only. These survey vessels will be supported by the Voyager, which will be operating as a chase vessel warning off fishermen, undertaking resupply operations and, where necessary, performing minor maintenance to the seismic streamers. The Lady Roula may also be used as a chase vessel when the Voyager is unavailable.

The source array comprises of air guns, which generate the sound pulse from compressed air. The solid streamers in the array contain high sensitivity hydrophones used as receivers for the sound wave generated by the acoustic source (Figure 2-2). The streamers are deployed behind the vessel. During acquisition, the vessel sailing progress is about 4 knots.

Some undershooting of the existing Bream A and B platforms will be performed as part of the survey. Undershooting is performed where data needs to be collected very close to any platform, where operations with the main vessel have the potential to be hazardous for both the oil production infrastructure and the seismic recording equipment. In this instance, a second vessel (smaller) will be used to tow a separate source array (same volume as the main array) close to the platform and the streamers towed independently on the other side of the platform.

Figure 2-1: Hypothetical configuration of the vessel and towed equipment

The photograph shows how equipment is towed behind a seismic vessel (c) in a 3D seismic survey. In this case, it is an eight-streamer system. One of the eight streamers is marked (a) and there are two air-gun arrays marked (b).

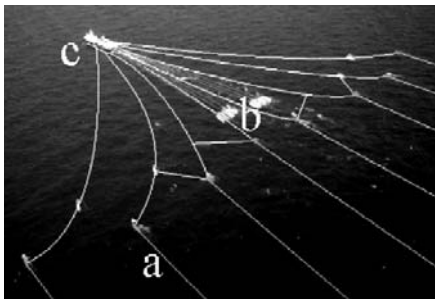
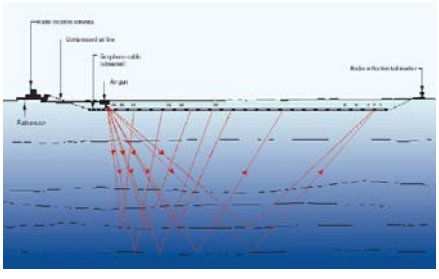


Figure 2-2



2.3 Boat Operations

The Greater Bream Survey will predominantly be a 3D seismic survey; however three single 2D 'tie-in' lines are also being acquired. The 2D lines are identical in nature to a single line acquired in the 3D component of the survey. During the 3D survey, the vessel will traverse the data acquisition area along a series of transects about 300 m apart but, due to the length and weight of the streamers, is limited to a maximum cruising speed of about 4 knots and a turning circle of about 7 to 9 km.

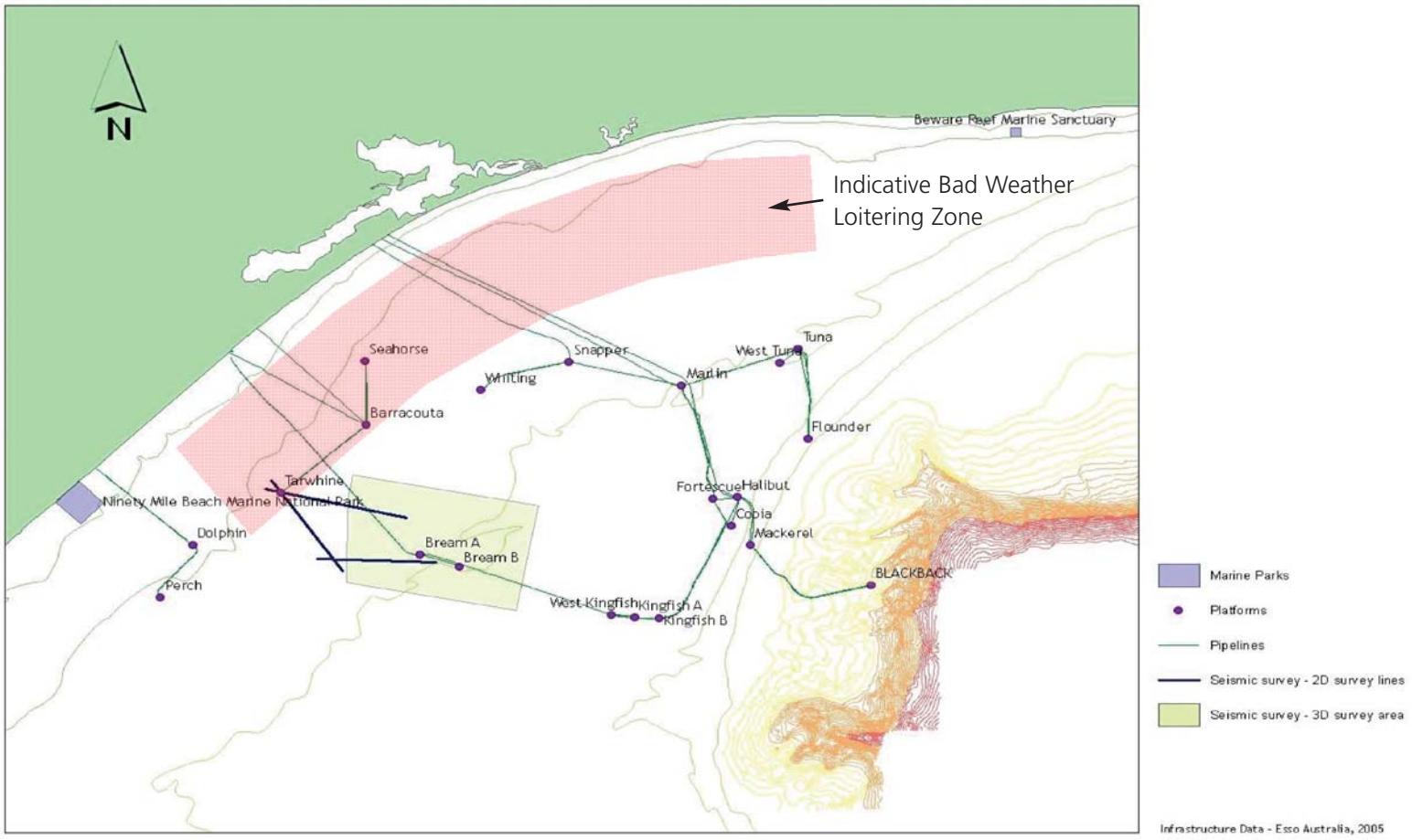
It is unlikely at any point in the operations that the towed equipment will make contact with the seafloor as it is towed just below the surface (approximately 6 m) and the vessel will not pass into very shallow water. The streamers are equipped with search and rescue devices that will activate should the streamer reach a depth of 40 m.

During periods of bad weather when the equipment may be inoperable, the vessel will travel into sheltered locations to minimise the risk of gear becoming damaged. These locations are referred to as the loitering zone and, for the proposed survey, will preferably be along the Ninety Mile Beach or, if weather conditions require it, in the lee of Flinders Island (Figure 2-3).

In particularly extreme weather conditions the gear may be retrieved onboard and redeployed thereafter but this is unusual. These contingencies ensure that the streamers are kept in working order and do not become tangled, thereby reducing the risk of equipment damage or loss.

Crew changes will be performed using helicopters out of Esso's Longford helicopter base. The support vessel Voyager will also be used to supply the seismic vessel with equipment, spares and provisions (if required given the short duration) throughout the survey.

Figure 2-3: Location of the seismic survey



3. The Environment

3.1 Physical Environment

3.1.1 General description

The proposed survey area lies in the Gippsland Basin on the eastern side of Bass Strait. The water depths in the area are generally less than 75 m.

Bass Strait is typically defined as that portion of the continental shelf stretching between Victoria and Tasmania. On either side of Bass Strait are the deep ocean waters of the Great Australian Bight and the Tasman Sea, where the depths drop to 3,000 m or more. The seabed rises sharply to the edge of Bass Strait where depths are typically 50-80 m along the western and eastern perimeters. The Strait has a gentle slope from its margins towards its deepest areas in the centre, but even here depths rarely exceed 80 m.

3.1.2 Winds

Bass Strait is located on the northern edge of the westerly wind belt known as the Roaring Forties. In all seasons, strong winds often freshen to gale force from the north and northwest, ahead of approaching fronts, then swing abruptly southwest behind the front at similar speeds and abate until they freshen ahead of the next front.

Winds tend to be strongest during spring and weakest during winter. In all seasons, winds under 10 knots are most common (50-60%) with a significant proportion of winds of 10-20 knots (30-37% occurrence). Stronger winds greater than 20 knots are predominantly from the west.

3.1.3 Currents

Tidal currents dominate the water circulation in Bass Strait, although wind-driven currents, coastal trapped waves, barometric pressure induced currents, density-driven flows and ocean-scale circulation patterns also make contributions.

3.1.4 Wave climate

Bass Strait can be subject to major and prolonged periods of wave activity. The wave climate will have components produced by locally wind-generated waves as well as easterly swells propagating in from the Tasman Sea. The region is well protected from westerly and south westerly swells by Wilsons Promontory, King Island and Tasmania.

As part of its meteorology and ocean monitoring program, Esso has been routinely measuring waves at the Kingfish B since 1977. These wave measurements indicate that small storms may occur several times a month and give rise to wave heights of 3-4 m. Severe southwest storms can result in significant wave heights in excess of 6 m.

3.1.5 Water temperatures

Temperatures in the lower waters of central Bass Strait indicate a range of about 3°C, from about 13°C in August/September to 16°C in February/March. In general, the western Bass Strait waters have cooler summer temperatures than eastern Bass Strait, which can reach 18°C at times in late summer due to the influx of warmer Tasman Sea waters.

Studies suggest the existence of upwelling events in eastern Bass Strait, typically between November and March. Even so, this is not the dominant process at depths less than 40 m. Whilst the survey area is in deeper waters, it is still distant from the Bass Canyon and works will be undertaken when upwelling events are less common.

3.1.6 Sedimentation

In general, the entrances to Bass Strait consist of medium to coarse sands grading to fine muds in the deeper sections of central Bass Strait. This is primarily due to the effect of the high tidal currents through the entrances winnowing fine material from the sediments, whereas the lower currents in central Bass Strait allow fine materials to settle out and deposit in this region.

Video observations of the Bass Strait inshore areas indicate that the seabed consists of symmetrical, wave-generated sandy ripples, becoming shell-dominated in the troughs as the depth increases. Further offshore, a change to an irregular bed colonised by marine growth occurs near 35-40 m depth. This is the depth at which storms are no longer able to move bed sediments around. Medium sands on the beach become coarser offshore before becoming finer again at greater depths.

3.2 Biological Environment

Bass Strait is an area of high biological diversity. This is due to the fact the area has been isolated in geological time and by climatic barriers, with a history of variable exposure and inundation during sea-level changes over time.

The greatest areas of ecological productivity are often associated with steep shelf slopes or other bathymetrical/oceanographic features that create upwelling or concentrate ecological productivity. Areas of ecological activity in the area include a relatively stable front over about 200 m depth at the margins of the Bass Canyon and east of Tuna Platform where, during summer months, the East Australian Current collides with surface water from Bass Strait.

The survey will be conducted in a shallower area of eastern Bass Strait at depths less than about 75m, with a relatively low biological diversity.

3.2.1 Protected matters

A report on matters of national environmental significance was compiled for the survey area from the Department of Environment and Heritage's (DEH) online EPBC Act search tool. The results of this search identified one Ramsar site, Gippsland Lakes located about 35 km from the survey site, 21 threatened species, 24 migratory species, 11 species of whales and dolphins and 47 listed marine species. The DEH search tool did not identify two additional species of cetacean likely to regularly occur in the area (fin whale and sei whale) so these have been included. The search also included whale shark but, given this is a tropical water species that does not occur in Bass Strait, it has subsequently been omitted from consideration.

Whales and Dolphins

There are significant data on the occurrence of whales and dolphins in eastern Bass Strait collected by observations from helicopter pilots and seismic exploration compliance monitoring by Esso.

The Bream 3D survey is located in an area of eastern Bass Strait at depths less than about 75 m. This significantly reduces the range of whale and dolphin species likely to be encountered during the survey.

The only threatened or migratory cetacean likely to be regularly encountered between March and August (mostly from May to July) is humpback whale. All other species are either scarce or absent at this time. Other non-listed species of whales and dolphins that may be recorded in the waters of offshore Bass Strait include common dolphin (common and widespread), bottlenose dolphin (occasional) and minke whale (occasional).

Seabirds

Due to a nomadic nature, most southern ocean seabirds could at some point in time occur in Bass Strait, but many would be considered as vagrants and other might regularly occur as accidentals (for instance, those blown in close to shore during bad storms). Table 3-1 lists only those threatened and/or migratory species that are likely to regularly occur and to some extent may be dependent on habitat within Bass Strait.

Table 3-1: Species of seabird listed as threatened and/or migratory regularly occurring in Bass Strait and likelihood of encounter across the proposed survey area

Common/Scientific Name	Status	Migratory	Description
Short-tailed Shearwater	-	Migratory	Largely absent during winter months and would therefore not pose a constraint.
Gibson's Albatross	Vulnerable	Migratory	Regular visitor, particularly to shelf slope waters in eastern Bass Strait.
Wandering Albatross	Vulnerable	Migratory	Regular visitor, particularly to shelf slope waters in eastern Bass Strait.
Southern Royal Albatross	Vulnerable	Migratory	Occasional visitor, particularly to shelf slope waters in eastern Bass Strait.
Northern Royal Albatross	Endangered	Migratory	Occasional visitor, particularly to shelf slope waters in eastern Bass Strait.
Southern Giant-Petrel	Endangered	Migratory	Occasional visitor, particularly to shelf slope waters in eastern Bass Strait.
Northern Giant-Petrel	Vulnerable	Migratory	Regular visitor, particularly to shelf slope waters in eastern Bass Strait
Buller's Albatross	Vulnerable	Migratory	Occasional visitor, particularly to shelf slope waters in eastern Bass Strait.
(Tasmanian) Shy Albatross	Vulnerable	Migratory	Adults depends on shelf waters of Bass Strait east of Wilsons Promontory in winter and some individuals forage in eastern Bass Strait in summer.
Campbell Albatross	Vulnerable	Migratory	Regular visitor to eastern Bass Strait.
Black-browed Albatross		Migratory	Regular visitor to eastern Bass Strait.
Salvin's Albatross	Vulnerable	Migratory	Occasional visitor to eastern Bass Strait.
White-capped Albatross	Vulnerable	Migratory	Regular visitor to eastern Bass Strait.

3. The Environment

Great White Shark
The area is known habitat for great white shark, regarded as Vulnerable under the EPBC Act, whose range extends primarily from Moreton Bay in Southern Queensland, around the southern coastline to the North West Cape of Western Australia.

Listed Marine Species and the Commonwealth Marine Area
Additional Listed Marine Species that may be present in the survey area include sea-snakes, seals, marine turtles (including Leatherback turtle), seahorses and pipefish and sea birds.

3.2.2 Zooplankton
Zooplankton include permanent planktonic organisms and larval forms of many invertebrates and fish. These are key components in the Bass Strait food web. More than 170 species of zooplankton have been recorded in central and eastern Bass Strait, with copepods making up about half of the species encountered. The high diversity appears to be related to the mixing of water masses from the Great Australian Bight, Tasman Sea and Antarctic Ocean.

3.2.3 Pelagic macroinvertebrates
Larger pelagic (living in the water column) invertebrates include various species of jellyfish, comb jellies and salps that feed mainly on phytoplankton and zooplankton. Larger invertebrate predators include species of squid, such as calamari and arrow squid, which are of importance to recreational and commercial fisheries.

3.2.4 Marine fish
It is estimated that there are over 500 species of fish found in the waters of Bass Strait, including a number of species of importance to commercial and recreational fisheries. There are two major groups of fish: pelagic fish that live in the water column and mostly near the surface, and demersal or benthic fish that live on or near the seabed. A summary of the main species of importance to commercial and recreational fishing and their distribution is given in Table 3-2.

Several species of fish live in the Victorian nearshore reef habitat either as permanent residents or as transients moving seasonally along the reef system. The most common reef fish are gummy shark, trevally, sand flathead, spiny gurnard, snapper, salmon and stingaree. Snapper and gummy shark are most sought after by commercial and recreational fishermen working from boats, and salmon is fished from the shore.

Snapper migrate southwestwards along the reef system from October to April, feeding on reef invertebrates, chiefly bivalve molluscs and echinoderms.

3.3 Socio-Economic Environment
A range of commercial fisheries operate in the waters off the Gippsland Coast. Most fishing vessels operating in eastern Bass Strait operate from Lakes Entrance, however, several trawl, shark and scallop vessels may come from other Victorian and interstate ports. Charter fishing operates mainly out of Port Albert and Port Welshpool.

3.3.1 Southern and Eastern Scalefish and Shark Fishery
The Southern and Eastern Scalefish and Shark Fishery (SESS) is a complex multi-sector, multi-gear and multi-species fishery targeting scalefish and shark stocks and extends from waters off southern Queensland south and then west to Cape Leeuwin in Western Australia. The fishery operates in both Commonwealth and State waters under complex jurisdictional arrangements due to different Offshore Constitutional Settlements with State Governments.

Table 3-2: Principal fish species occurring in Bass Strait and having commercial or recreational fishing importance

Habitat	Major Species	Distribution
Pelagic nearshore	Pilchards	Embayments and coastal waters.
	Anchovies	Embayments and coastal waters.
	Sandy sprat	Embayments and coastal waters.
	Southern garfish	Embayments and coastal waters.
	Silver trevally	Move into deeper water as adults.
	Blue warehou	Depth 10 to 180 m; often over reefs.
	Australian salmon	Embayments and coastal waters.
Demersal nearshore	Tiger flathead	Coastal and central Bass Strait.
	Sand flathead	Coastal and central Bass Strait.
	School whiting	Shallow inshore waters
	King George whiting	Shallow inshore waters
	Snapper	Coastal to continental shelf
	Gummy shark	Coastal to continental shelf
Demersal mid shelf	School shark	Coastal to continental shelf.
	Saw shark	Coastal to continental shelf.
	Elephant shark	Coastal to continental shelf.

The SESS fishery is one of the most important Commonwealth-managed fisheries, with landings of over 35,000 tonnes annually at a value of around $95 million.

The four fisheries that fall under the SESS fishery include the South East Fishery trawl sector and South East Fishery non-trawl sector (which have many quota species in common), the Southern Shark Fishery and the Great Australian Bight Trawl Fishery. Of these fisheries only the first three are relevant to the prospect area.

3.3.2 Bass Strait scallop fishery

Fishing for scallops involves the vessel towing a wire mesh dredge along the sea floor Dredges are approximately 4 m long with an opening of about 3 m wide and 0.3 m high, and are attached to the vessel via a wire cable. The dredge is towed at a speed of approximately 4-6 knots until it fills and then brought aboard using a hydraulic winch.

The scallop fishery will be closed in the Victorian zone until May and is closed until 2009 in the Commonwealth zone.

3.3.3 Southern rock lobster fishery

In Victoria rock lobster are caught in beehive shaped pots approximately 1.5 m wide and 0.5 m high. Pots are deployed on or next to rocky reefs at depths of between 2 m and 130 m.

Generally pots are pulled once a day in the mornings and re-set, but occasionally some fisherman will re-set their pots again for what is known as day shot, retrieve them a second time later in the afternoon and then set them again for a night shot. This day fishing is generally undertaken in deeper waters.

3.3.4 Victorian prawn fishery

A small but seasonally valuable prawn trawl fishery is based mainly at Lakes Entrance. The fishery predominantly focuses on two species, the eastern king prawn and the school prawn, as they migrate out of the Gippsland Lakes. As a result, most of the activity within the fishery is relatively close to shore and generally to the east of Lakes Entrance.

3.3.5 Abalone dive fishery

Two species of abalone are fished by commercial diving in Victoria: the blacklip abalone and the greenlip abalone. Blacklip abalone live at depths ranging from 0 m to at least 50 m, although abundances are highest at 0-15 m depth in most areas. Greenlip abalone occupy a more limited distribution in areas of strong tidal flow.

The main habitat for abalone is rocky reef and there is no abalone fishery off Ninety Mile Beach.

3.3.6 Southern Squid Jig Fishery

The Southern Squid Jig Fishery (SSJF) encompasses Commonwealth waters from Sandy Cape on Fraser Island to the Western Australia/South Australian border and includes the Commonwealth waters around Tasmania.

Consistently each season most of the catch is taken between January and July, with the highest catches occurring between February and June. If catches are poor in the west, the fishery will move to the eastern waters of the state. Even so, the fishery is likely to be active to the east of the prospect under such conditions.

3.3.7 Recreational charter fishing

There is also a small number of recreational charter fishing operators based out of Ports Albert and Welshpool. The predominant species being fished is snapper. Much of the activity of this fishery is focussed alongshore and inshore of the prospect. Whilst there is a perception that snapper will avoid seismic activities, the charter operators will chase the snapper and will not be significantly impacted by the survey activities.

3.4 Cultural Heritage

3.4.1 Aboriginal heritage

The marine waters and seascapes of the Gippsland coast are considered part of the traditional 'Country' of the Gunai/Kurnai Aboriginal people. There is a strong relationship between Aboriginal people, the sea, and many of the marine plants and animals in this area. All indigenous cultural resources are protected under the Aboriginal and Torres Strait Islander Heritage Protection Act 1984.

As operator, Esso will ensure that it is aware of indigenous marine rights, and wherever possible, be in contact with any local indigenous fishing groups to notify them of the survey, should they be identified as operating in the area.

3.5 Ninety Mile Beach Marine Park

The closest reserve area to the survey location is the Ninety Mile Beach Marine Park, near Seaspray. The vessel will not enter the Marine Park and will be acquiring seismic data well outside of the Marine Park (the closest point to the survey area is approximately 25-30 km away).

4. Environmental Hazards, Management Approach and Controls

Esso is committed to conducting our business in a manner that is compatible with the environmental and economic needs of all communities in which we operate and in a way that protects the safety, health and security of our employees, those involved in our operations, our customers and the public. These commitments are documented in our safety, health, environmental, product safety and security policies. These policies are put into practice through a disciplined management framework called the Operations Integrity Management System (OIMS).

Within the framework of OIMS, environmental management is addressed by OIMS System 6-5 Environmental Management. Esso's Environmental Management System fully meets the requirements of the International Organisation for Standardisation (ISO) 14001: Environmental Management Systems, the recognised international standard for Environmental Management Systems.

The Environmental Management System objectives relevant to the Greater Bream 3D Seismic Survey are as follows:

- Environmental aspects are addressed and controlled consistent with policy, regulatory requirements and business plans; and,
- Emissions, discharges and waste are tracked, managed and minimised consistent with policy, regulatory requirements and performance objectives.

4.1 Potential Environmental Effects

To achieve Environmental Management System objectives a comprehensive environmental risk assessment has been undertaken for the Bream Seismic Survey. The most significant potential environmental effects associated with survey activity were identified as follows:

- Noise;
- Oil spills;
- Introduced marine species;
- Waste; and,
- Interference with commercial fishing operations.

4.1.1 Noise

Seismic surveys use an exploration technique that uses the controlled release of compressed air to make sound waves that travel into the sea bed and reflect back from rock layers under the sea floor. With the experience of over three decades of seismic surveying, no evidence has been found to suggest that seismic operations have resulted in physical injury or damage to hearing in any marine mammal.

The oil and gas industry has carefully studied the use of sound waves as an exploration tool and their effect on marine species and to the point were we believe that seismic activities can be managed with minimal impact on the environment.

Esso has developed a comprehensive Cetacean Mitigation Plan consistent with the Department of Environment and Heritage Guidelines on the application of the EPBC Act to interactions between offshore seismic operations and larger cetaceans (October 2001). Key aspects of the Cetacean Mitigation Plan are as follows:

- Dedicated marine mammal observers to monitor for cetaceans throughout the survey;
- Soft starts (gradual ramp up of acoustic source during start up);
- Pre-start up observations to ensure cetaceans are not within 3000m of the boat when the acoustic source commences firing; and,
- Source shutdowns when cetaceans are identified within 3000m of the source array.

According to whale and dolphin sighting data gathered from eastern Bass Strait, the only species that are likely to be encountered during the survey are humpback whale and common dolphin. It is possible, that sporadic encounters may be had with a range of other species that occur at low density in the area including killer whale, Risso's dolphin, bottlenose dolphin and possibly blue whale.

4.1.2 Potential Effects of Oil Spills

The risk of a fuel or oil spill from the survey vessel is related primarily to potential for to leaking hydraulic hoses (particularly during refuelling) and leaking oil drums. There is also the extremely remote possibility of an oil spill arising from a collision between the survey vessel and other craft or platform.

The survey vessels will be operating using marine diesel. Diesel fuel evaporates quickly and would not be expected to pose a significant risk to seabirds or marine mammals at the levels anticipated from refuelling. Only one boat refuelling is anticipated and operations will be undertaken with the vessels tied with mooring lines and under the watch of two senior staff.

The Bream 3D survey will utilise solid streamers, rather than oil filled streamers, reducing the risk of a spill in the event that a streamer is damaged. There may be some very small quantities of Isopar oil in the hydrophone element housing. This would not pose a significant risk to the environment as the quantities are minute and the oil is a very light fraction.

Overall, the risk to the environment associated with oil spills is considered low.

4.1.3 Introduced Marine Pests

Introduced marine pests are marine animals and plants that are accidentally brought to Australia, or translocated within Australian waters, on the hulls of boats and ships and in ships' ballast water. Australian waters are particularly susceptible to introduced species as we rely so heavily on the global shipping trade and there are many small boats using our waters. With shipping traffic increasing each year, care is needed to ensure that marine pests are not introduced and spread.

The seismic vessels are arriving from the North West Shelf and, given that there are no identified pest species present in the North West Shelf area that have a high potential for translocation, the risk of pest species being introduced by hull fouling is regarded as low.

4.1.4 Waste Management

Only sewage and food/cooking waste may be discharged to the marine environment. All other wastes are either incinerated onboard the vessel (general waste) or stored and transported onshore for disposal.

The disposal of sewage and putrescible waste overboard may increase the nutrient content in the water column, however the short-term, infrequent and mobile nature of the discharge is unlikely to have significant impacts.

4.1.5 Interference with Commercial Fishing Operations

Shark Fishing and Danish Seine Trawler fishing for whiting have been identified to have a potential for interaction with the seismic survey. Esso has undertaken and will continue to undertake an extensive program of consultation with fisheries operating in the area, with the objectives of:

- Raising awareness of the survey:
- Minimising the impact of the survey on the local fishing industry; and,
- Developing procedures to minimise the potential for interference and to ensure that the survey is carried out safely.

4. Environmental Hazards, Management Approach and Controls

4.2 Controls

Table 4-1 contains a summary of the key environmental risks associated with the survey and control measures implemented to reduced the risk to as low as practicable.

Table 4-1: Identified risks and mitigation measures

Activity and Potential Impacts	Mitigation Measures
Noise from airguns impacts whales and dolphins (cetaceans)	Implementation of the Cetacean Mitigation Management Plan including • Dedicated marine mammal observers to monitor for cetaceans throughout the survey; • Soft starts (gradual ramp up of acoustic source during start up); • Pre-start up observations to ensure cetaceans are not within 3000m of the boat when the acoustic source commences firing; and, • Source shutdowns when cetaceans are identified within 3000m of the source array.
Noise from airguns impacts other marine biota.	As above
Release of diesel due to hose leak or rupture during refuelling.	Return to port for refuelling where practicable. Verify that refuelling operations are monitored by either the vessel's Master or First Officer.
	Verify that fuel will not be transferred during inappropriate weather conditions.
	Verify that equipment and procedures used for transferring fuel (e.g. 'Dry-Break' hose couplings) conform to the AMSA Code for the safe working of support vessels.
	In the unlikely event of a spill during fuel transfer, verify that the volume spilled is minimised by the automatic operation of shutdown pumps or safety valves and apply Emergency Response and OSCPs.
Rupture of support vessel fuel tanks resulting from a collision with another vessel or offshore structure would result in a fuel spill.	Verify that the seismic program is carried out in the shortest, safest time as possible and out of extreme weather conditions. Verify that all vessel operations are conducted in compliance with the AMSA OSV Code (eg. radar monitoring, vessel communications).
	Apply Esso procedures for close approach to platforms.
	Installation of real time current meters to predict impact in path of vessel and trailing cables.
	Apply Esso Emergency Response Manual and Oil Spill Contingency Plan to the operation.
	Verify that senior Esso personnel on vessels are familiar with the contents of the Emergency Response Manual and OSCP such that the initial response to an oil spill is carried out efficiently and that all personnel are aware of the existence and location of these documents.
	Verify that the Esso Oil Spill Contingency Plan (OSCP) is up to date and staff are appropriately trained.
	Verify that all necessary oil spill contingency plant and equipment is functional and accessible.
Translocation of pest species into the survey area by hull or gear fouling.	Viking II cleared into Australian waters in last quarter 2005. Voyager operates exclusively in Australian waters. Pacific Sword to dry dock in Fremantle prior to commencement of project.
	Towed equipment is routinely cleaned upon recovery. Will be onboard for approx. 2 weeks during transit from north-west Australia.
Translocation of species from the survey area to another location where it establishes as a pest species.	Towed equipment is routinely cleaned upon recovery. Will be onboard for during transit from Bass Strait to subsequent location.

Impact Activity	Mitigation Measures
Translocation of pest species into the survey area through ballast water	Comply with relevant ballast water requirements including AQIS guidelines.
Changes in planktonic or benthic organisms due to reduced water quality and added nutrients from sewage and fodd waste discharge.	Verify compliance with the Esso waste management procedures.
	Verify that kitchen and sewage wastes are treated to appropriate standards prior to discharge overboard.
Bacteria are discharged in sewage released from vessel.	Verify compliance with the Esso waste management procedures.
	Verify that kitchen and sewage wastes are treated to appropriate standards prior to discharge overboard.
	Verify that solid wastes are incinerated on board or returned to mainland as applicable.
Toxins, plastics and other items enter the water column.	Verify that combustible wastes are incinerated on-board or returned to the mainland and disposed of by a licensed waste disposal contractor as applicable.
	Verify that non-combustible wastes are returned to the mainland and disposed of by a licensed waste disposal contractor as applicable.
Interference with commercial fisheries.	Industry and government guidelines available on avoidance of conflict with commercial fisheries.
	Avoidance of key areas where practicable.
	Consultation with commercial fishing industry during planning phase.
	Liaison and communication process has been established with commercial fishing operators.

5. Consultation

Esso has developed a consultation program to accompany the survey that includes briefing Governments, industry representatives and associated key stakeholders on the survey activity and operational protocols.

Stakeholders include:

- Department of Environment and Heritage
- DPI Minerals and Petroleum
- Bass Strait Commercial Fisheries, including:
  - Victorian Inshore Trawl Fishery
  - South East Fishery
  - Southern Shark Fishery
  - Seafood Industries Victoria
  - Lakes Entrance Fishermen's Cooperative
  - Port Albert Fishermen's Cooperative
  - Port Welshpool Fishermen's Cooperative
- Commercial Charter Operators

Esso has undertaken and will continue to undertake an extensive program of consultation with fisheries operating in the area, with the objectives of:

- Raising awareness of the survey:
- Minimising the impact of the survey on the local fishing industry; and,
- Developing procedures to minimise the potential for interference and to ensure that the survey is carried out safely.

Contact Details

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