



ZEUS 3D MARINE SEISMIC SURVEY ENVIRONMENT PLAN: PUBLIC SUMMARY

This summary of the Environment Plan for the Fugro Zeus 3D marine seismic survey, which will be acquired within the Northern Carnarvon Basin offshore from Western Australia (WA), has been submitted to the WA Department of Mines and Petroleum (DMP), to comply with sub-regulations 11(7) and 11(8) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009.

INTRODUCTION

Fugro Multi Client Services Pty Ltd (Fugro) proposes to undertake a three-dimensional (3D) marine seismic survey (Zeus 3D MSS) within the Northern Carnarvon Basin offshore from Western Australia (**Figure 1**). The survey will be comprised of a maximum of 5,663 square kilometres (km²) of 3D seismic acquisition in Exploration Permit Areas WA-361-P, WA-388-P, Production Licence WA-30-L and adjacent vacant acreage.

The Zeus 3D MSS survey is scheduled to take place within the period June to November 2011, and it is expected to have a duration of three months.

COORDINATES OF THE PROPOSED ACTIVITY

The survey area is located approximately 160 km NE of Karratha, on the Pilbara coast of Western Australia. The nearest emergent land to the survey area is North West Island (part of the Montebello Islands), which is located approximately 90 km south of the Zeus 3D polygon. The Montebello Islands are a marine park, managed by the WA Department of Environment and Conservation (DEC).

The north-east corner of the survey area is located approximately 336 km west-south-west of Imperieuse Reef, in the Rowley Shoals. Together, Imperieuse and Clerke Reefs constitute the Rowley Shoals Marine Park (State Waters). At the closest point, the survey area is located approximately 90 km west of the Glomar Shoals, which have been identified as a key ecological feature (KEF) of the North-west Marine Region. The southern boundary of the survey area is located approximately 20 km north of the Rankin Bank.

Water depths in the survey area range from a minimum of approximately 130 m along the southern boundary to a maximum of approximately 1,500 m in the north-west corner of the survey area (see **Figure 1**). There are no shallow shoal or bank features within the survey area.

Boundary coordinates for the survey area are provided in **Table 1** below.

Table 1: Boundary coordinates of the Zeus 3D MSS

Latitude (S)			Longitude (E)		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
19	14	55	115	35	05
19	14	55	115	25	05
19	09	55	115	25	05
19	09	55	115	20	05
18	29	55	115	20	05
18	29	55	115	50	05
19	14	55	115	50	05
19	14	55	116	00	05
19	34	55	116	00	05
19	34	55	115	40	05
19	19	55	115	40	05
19	19	55	115	35	05

Datum: WGS84



DESCRIPTION OF THE PROPOSED ACTIVITY

The Zeus 3D MSS survey is scheduled to take place within the period June to November 2011, and it is expected to have a duration of three months.

During the proposed activities, the survey vessel will traverse a series of pre-determined sail lines within the survey area at a speed of approximately 8-9 km/hr. As the vessel travels along the survey lines, a series of noise pulses (every 8 seconds) will be directed down through the water column and seabed. The released sound is attenuated and reflected at geological boundaries and the reflected signals are detected using sensitive microphones arranged along a number of hydrophone cables (streamers) towed behind the survey vessel. The reflected sound is then processed to provide information about the structure and composition of geological formations below the seabed in an attempt to identify hydrocarbon reservoirs.

The seismic array will comprise of 10 solid streamers (Sercel Sentinel), with a maximum length of 6.6 km. The solid streamers do not contain any fluid filled sections. Streamer spacing will be 100 m, and line spacing will be 200 m. The source (airgun array) tow depth will be 6 m (+/- 1 m) and the streamer tow depth will be 7 m (+/- 1 m). The operating pressure for the airgun array will be approximately 2,000 psi. The airgun array will consist of two sub-arrays, each with a maximum volume of 3,200 cui. These sub-arrays will be fired alternately, with a shotpoint interval of 25.0 m vertical distance, and will produce at source (i.e. within a few metres of the airguns) received sound energy levels (SELs) in the order of 210-220 dB re 1 μ Pa².s at frequencies extending up to approximately 128 Hz.

Fugro proposes to conduct the Zeus 3D MSS using a purpose-built seismic survey vessel. The specific survey vessel for acquisition of this survey has yet to be determined. The selected vessel will have all necessary certification/registration and will be fully compliant with all relevant MARPOL and SOLAS convention requirements, including having a Shipboard Oil Pollution Emergency Plan (SOPEP) in place, in accordance with Regulation 26 of Annex I of MARPOL 73/78.

The survey vessel will travel within the survey area at an average speed of 4.5 knots (approximately 8.3 km per hour).

A support vessel will accompany the seismic survey vessel to maintain a safe distance between the survey array and other vessels, and also to manage interactions with petroleum production, shipping and fishing activities, if required. The specific support vessel for this survey has yet to be determined. The support vessel will also re-supply the survey vessel with fuel and other logistical supplies. The support vessel will have a crew of approximately 15 personnel.

During the survey, it is likely that the survey vessel will be refuelled at sea using the support vessel, either within or immediately adjacent to the survey area. At sea refuelling of the survey vessel will only take place during daylight hours.

DESCRIPTION OF THE RECEIVING ENVIRONMENT

The proposed Zeus 3D survey area lies entirely in Commonwealth marine waters in the Northwest Shelf Province of the North-west Marine Region (NWMR). The Northwest Shelf Province is located primarily on the shelf between North West Cape and Cape Bougainville, and encompasses much of the area more commonly known as the North West Shelf (NWS). Both survey areas are within the Pilbara system of the NWMR, which is characterised by:

- tropical arid climate;
- transition between Indonesian Throughflow (ITF) and Leeuwin Current dominated areas;
- predominantly tropical species;
- high cyclone activity with frequent crossing of the coast;
- transitional tidal zone;
- internal tide activity;
- large areas of shelf and slope; and

- a dry coast with ephemeral freshwater inputs.

Physical Environment

The NWS is subject to an arid (mainly summer rain) subtropical climate with tropical cyclone activity from November to April. The summer and winter seasons fall into the periods September-March and May-July respectively. Winters are characterised by clear skies, fine weather and predominantly strong east to south-east winds and infrequent rain. Summer winds are more variable, but west to south-west predominates. The cyclone season is November to April with the majority of cyclones moving down the northwest coast between 40-400 km offshore and at an average speed of 16 km per hour. During tropical cyclones, mean wind speeds of 56 ms^{-1} have been recorded with gusts up to 69 ms^{-1} . Three to four cyclones per year can be expected, primarily in the December to March period, though cyclones have been recorded as late as June.

Winds are predominantly WSW from October to April and ESE from May to September. Average 10 minute wind speed in non-cyclonic conditions is 6 ms^{-1} with a 5% exceedence value of 12 ms^{-1} .

The Pilbara system is a transitional oceanographic region between the strongly ITF-influenced surface waters to the north and the Leeuwin Current-influenced surface waters to the south. The along-shore pressure gradient in this system results in a predominantly southward movement of the surface water mass, which becomes the source waters of the Leeuwin Current

The Pilbara system is believed to have the strongest internal tides of the entire NWMR, which are thought to be an important physical driver in water depths of between 50 and 500 m depth on the shelf. Internal tides may result in the drawing of deeper cooler waters into the photic zone, stirring up nutrients and triggering primary productivity. The zone between 50 and 500 m depth is thought to be the highest energy zone in the system (possibly correlated with an increased incidence of internal tides) and it is thought that broadly the greatest productivity is found around the 200 m isobath associated with the shelf break

Offshore near surface water temperatures range from 30°C maximum in summer to 22°C minimum in winter. Tides are semi-diurnal and generally flow onshore-offshore with peak neap and spring speeds of 0.3 ms^{-1} and 0.65 ms^{-1} , respectively. Swells up to 2 m can be expected year round offshore with April being the calmest month and June and January the roughest. Wave direction predominantly follows wind direction (ESE in winter, WSW in summer) except during cyclone or storm events. Extreme wave heights offshore, associated with cyclonic activity are in the order of 14 m. Extreme wave heights inshore, associated with cyclonic activity, are in the order of 7-8 m.

The Zeus 3D survey area is expected to have fine-grained and soft seabed sediments. The predominant seabed type is likely to be characterised by deep (>5 m) soft silty sediments that become deeper, softer and finer quite quickly with increasing depth. The thin underlying calcarenite layer (approximately 0.5 m thick) becomes more weakly consolidated and at 300 m water depth is overlaid by up to 15 m of sediment. Sand streamers, approximately 100 m wide and 2-3 km long, support mobile sand ripples and occur occasionally over the sea floor.

The dynamic oceanic environment influences sediment distribution throughout the bioregion. The seafloor of this bioregion is particularly strongly affected by cyclonic storms, long-period swells and large internal tides, which can resuspend sediments within the water column as well as move sediment across the shelf.

Biological Environment

Enhanced pelagic production occurs on the outer shelf as a result of the interaction of surface and deeper water masses on the adjacent shelf break, via vertical mixing and possibly internal wave action. The mixed water masses travel towards shore and can stimulate biological productivity when the deeper nutrient-rich waters move into the photic zone where light allows phytoplankton to take up the influx of nutrients. However, such upwelling events are likely to be sporadic and short-lived. The most favourable conditions for upwelling are associated with a weakening of the ITF during summer, although some upwelling may still occur during winter.

Benthic Habitats

The sandy substrates on the shelf within the Northwest Shelf Province are thought to support low density benthic communities of bryozoans, molluscs and echinoids. Extensive seabed sampling has consistently shown that the soft sediments of the NWS support a low abundance, high diversity invertebrate fauna comprised largely of burrowing polychaete worms and crustaceans. Echinoderms and molluscs also contribute significantly to the faunal composition of soft sediments on the continental shelf and slope in this region.

Sharks and Ray-finned Fishes

The whale shark is listed as Vulnerable and Migratory under the EPBC Act. Although there are no records of the whale shark's presence in the Zeus 3D survey area there have been sightings in the region, and they are known to occur in both tropical and temperate waters and are normally oceanic and cosmopolitan in their distribution. It is possible that they may be encountered during the proposed Zeus 3D survey. Other EPBC Act protected marine species that may occur within the survey area include various species of pipefishes and seahorses.

Marine Reptiles

Five marine turtle species may occur in the Zeus 3D survey area and adjacent waters - the green turtle, leatherback turtle, hawksbill turtle, loggerhead turtle, and the flatback turtle. Green turtles feed on macroalgae and are by far the most common turtle seen in nearshore waters. Loggerhead turtles are carnivorous, feeding mainly on molluscs and crustaceans. Hawksbill turtles feed mainly on sponges and are more often found in deeper waters of the NWMR. Green, flatback and loggerhead turtles all breed from September to March, while the hawksbill turtle breeds from July to March. The reefal habitats in the photic zone are key feeding habitats for green and hawksbill turtles.

Green, hawksbill, flatback and loggerhead turtles are known to feed and nest in the Pilbara sub-system of the Northwest Shelf Province. Leatherback and olive Ridley turtles also migrate through the sub-system and feed there. No turtle nesting or feeding areas are likely to be present in the Zeus 3D survey area. The closest turtle nesting beaches to the Zeus 3D survey area are located at Trimoule Island in the Montebellos (90 km to the south) and at Rosemary Island in the Dampier Archipelago (115 km to the south-east).

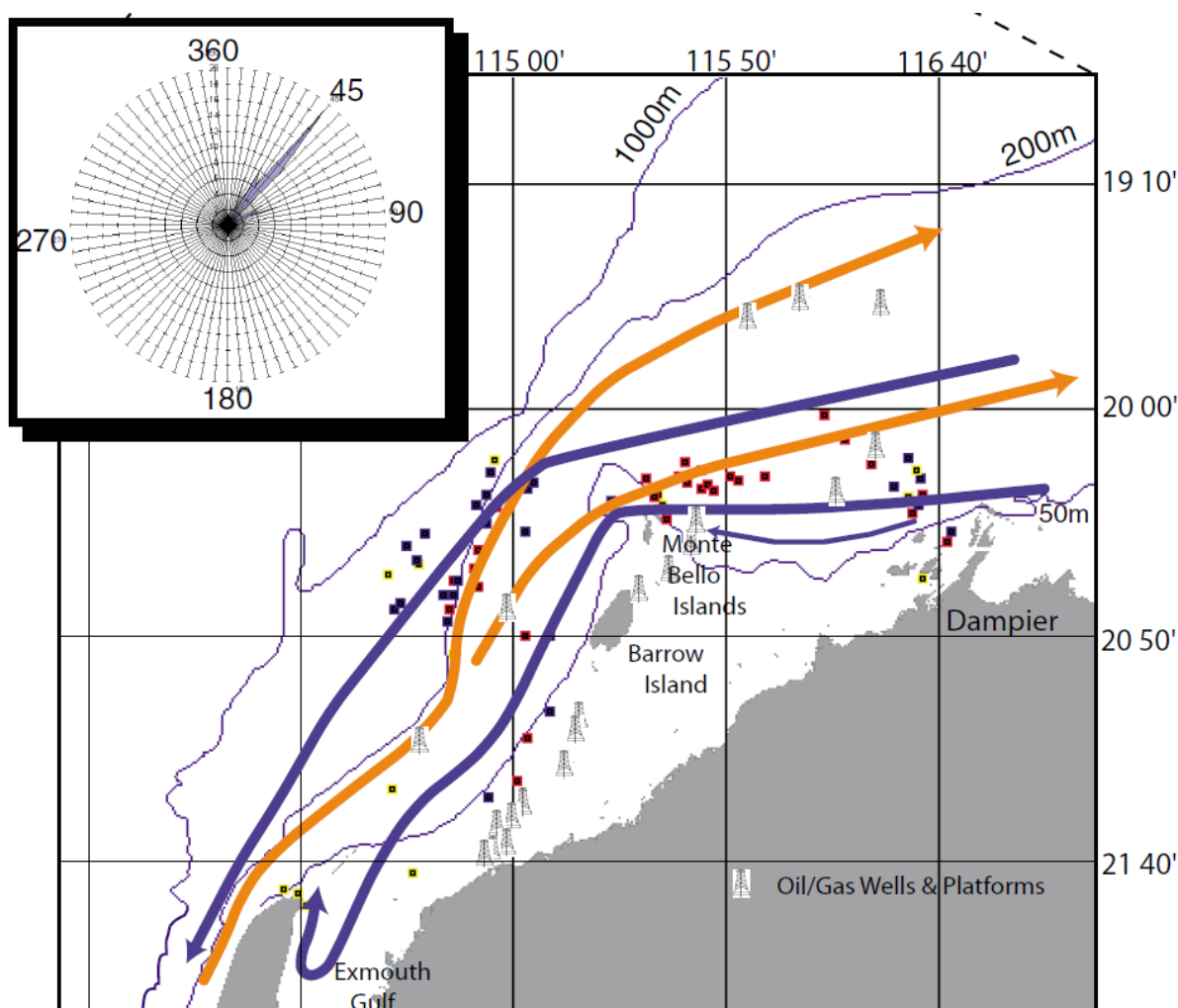
Other EPBC Act protected marine species that may be present in the survey area include seasnakes. Seasnakes are frequently observed in and around offshore islands and the waters of the shelf generally. There is no information on their frequency of occurrence in deeper offshore waters, though individuals are often observed at the surface.

Whales and Dolphins

Although whales and dolphins are not expected to be common inhabitants of the survey area, a number of cetacean species have broad distributions that may include the NWMR. The humpback whale is the most commonly sighted whale in north Western Australian waters. The species has been observed seasonally to complete their northern migration in the Camden Sound area of the west Kimberley, after feeding in Antarctic waters during the summer months. It is likely that the whales follow a predictable migratory path and migrate both north and south within the continental shelf boundary (200 m bathymetry) (**Figure 2**). 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 (**Figure 2**).

It is possible that humpback whales may be encountered within the Zeus 3D survey area and adjacent waters during the proposed survey, given that the survey is planned to occur in the period June to November 2011. The numbers of humpback whales that could be encountered will depend on exact timing of survey acquisition, and on whether the three month survey period overlaps peak periods for either the northbound or southbound migration. Given the water depth range over which the survey will occur (130-1,500 m) it is likely that most whale movements will occur inshore of the survey area, particularly during the southbound migration.

Figure 2: Humpback whale migratory routes past the Zeus 3D survey area



The blue whale may be present in the Zeus 3D survey area and surrounding waters. The blue whale is rarely present in large numbers outside recognised aggregation areas. Blue whales are believed to calve in tropical waters in winter and births peak in May to June, however the exact breeding grounds of this species are unknown. The Zeus 3D survey area and adjacent waters does not include any known blue whale feeding, breeding or resting areas. In the NWMR pygmy blue whales migrate along the 500 m to 1,000 m depth contour on the edge of the slope, and are likely to be feeding on ephemeral krill aggregations. The northward component of this migration takes place from May to mid-August, with a peak in July-August, and the southward component occurs from late October to November-December, with a few isolated individuals moving south in January. The migration appears to be centred on the 500 m depth contour.

Consequently, it is possible that blue whales could be encountered in the survey area and adjacent waters during the period when the proposed survey will take place (between June and November 2011). However, large numbers of blue whales are not likely, as most of the survey will be taking place in water depths shallower than 500 m, where the highest density of migrating blue whales may occur.

Other species whose broad distributions cover the region include whales that are infrequently observed usually restricted to cooler or deeper waters (e.g. killer and Bryde's whales) and are unlikely to be encountered in the area during the survey in significant numbers. There are no known breeding, calving or feeding grounds for any listed threatened or migratory whale species within, or in the immediate vicinity of

the Zeus 3D survey area.

By applying comprehensive cetacean interaction management procedures (including the use of 'Standard Management Measures': soft starts, a 2 km low-power zone and 500 m shut down zone, plus the additional mitigation measure of use of two dedicated Marine Mammal Observers [MMOs]), direct adverse physiological effects on any whales that may be encountered during the surveys are extremely unlikely and any potential disturbance would be minimised.

Seabirds and Shorebirds

Based on the results of two survey cruises and other unpublished records, 18 species of seabirds have been recorded over North West Shelf (NWS) waters. These included a number of species of petrel, shearwater, tropicbird, frigatebird, booby and tern, as well as the silver gull. Of these, eight species occur year round and the remaining 10 are seasonal visitors. From these surveys, it was noted that seabird distributions in tropical waters were generally patchy except near islands.

Socio-Economic Environment

Heritage Values

The closest marine protected area to the Zeus 3D survey area is the Montebello Islands Marine Park, which is located in WA State waters. The south-west corner of the Zeus 3D survey area is located approximately 80 km NNE of the boundary of the Montebello Islands Marine Park. The Montebello Islands Marine Area is a Listed Place on the Register of the National Estate.

The Proposed Dampier Archipelago Marine Park is located in WA State waters approximately 108 km south-east of the Zeus 3D survey area. The Dampier Archipelago is a Listed Place on the Register of the National Estate.

There are no listed Ramsar wetlands in or adjacent to the survey area. The nearest listed Ramsar site is Eighty Mile Beach, which is located approximately 425 km east of the south-east corner of the survey area. Eighty Mile Beach is also a Listed Place on the Register of the National Estate.

A search of the National Shipwrecks database indicates that there are no known historic shipwreck sites within or immediately adjacent to the Zeus 3D survey area.

Cultural Values

There are no known indigenous cultural heritage values or issues for the waters and seabed within and immediately adjacent to the Zeus 3D MSS area.

Commercial Fisheries

The proposed survey area overlaps or is in the vicinity of the following Commonwealth managed fisheries:

- North West Slope Trawl Fishery;
- Southern Bluefin Tuna Fishery;
- Western Tuna and Billfish Fishery; and
- Western Skipjack Tuna Fishery.

These fisheries are managed by the Australian Fisheries Management Authority (AFMA). The WA-409-P permit area coincides with a fishing area that is regarded as especially important for the North West Slope Trawl Fishery.

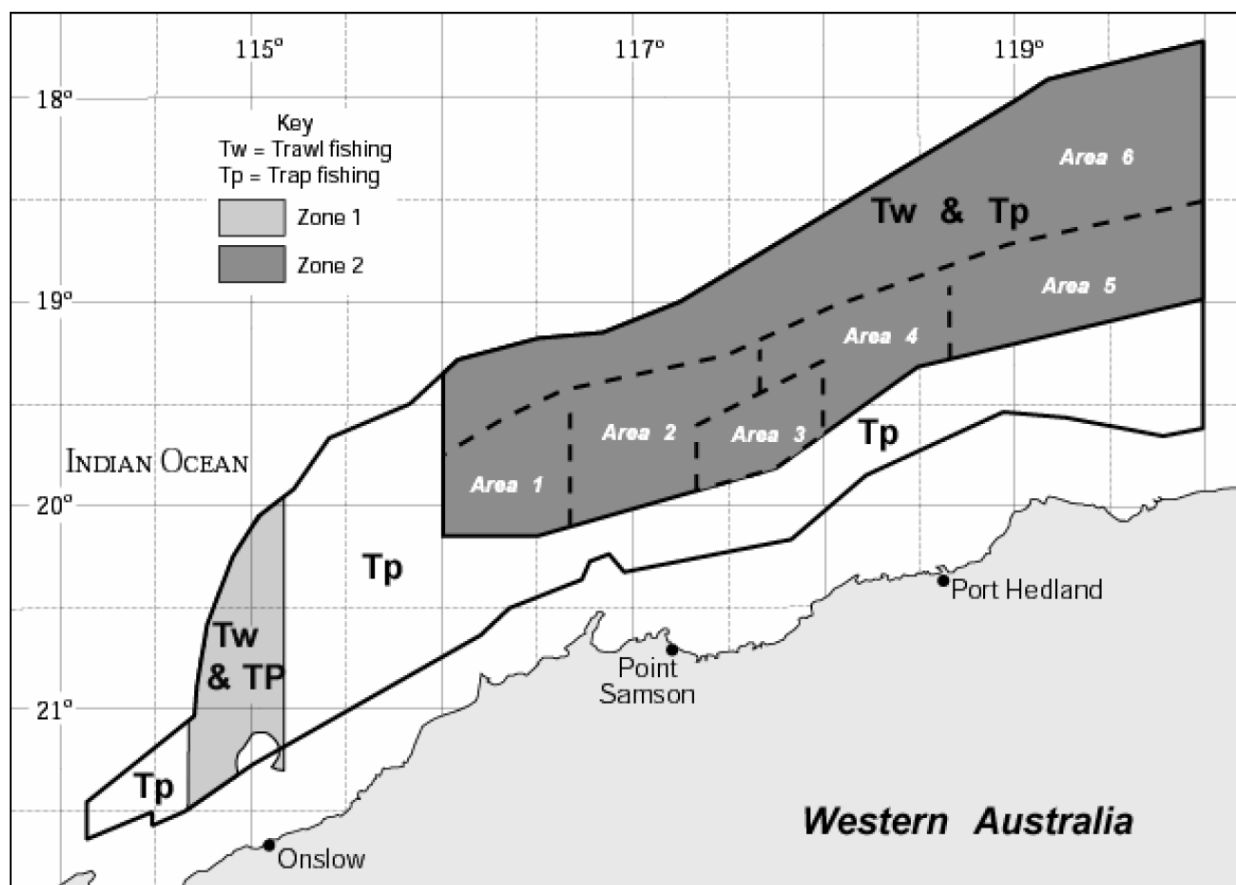
In WA State waters, the principal commercial fisheries in the North Coast bioregion focus on tropical finfish, particularly the high-value emperors, snappers and cods that are taken by the Pilbara Fish Trawl Fishery and the Pilbara and Northern Demersal trap fisheries. The typical catch is in the order of 3,000 t annually, making these fisheries, at an estimated annual value of around \$12 million, the most valuable finfish sector in the state.

The main State managed commercial fisheries that occur in the area, in the water depth range covered by

the proposed Zeus 3D MSS, are the Pilbara Fish Trawl (Interim) Managed Fishery, and the Pilbara Trap Managed Fishery. The Pilbara Trawl Fishery occupies the waters north of latitude 21° 35'S and between longitudes 114° 9' 36"E and 120°E. The Fishery is seaward of the 50 m isobath and landward of the 200 m isobath. The Fishery consists of two zones, Zone 1 in the southwest of Fishery (which is closed to trawling) and Zone 2 in the north, which consists of six management areas (**Figure 3**).

The Pilbara Trap Managed Fishery (**Figure 3**) lies north of latitude 21° 44'S and between longitudes 114° 9' 36"E and 120°E on the landward side of a boundary approximating the 200 m isobath and seaward of a line generally following the 30 m isobath.

Figure 3: Demersal scalefish fisheries of the Pilbara region



Exploration Permit Area WA-412-P, which overlaps part of Area 6 in Zone 2 (**Figure 3**), is of particular interest to the trawl fishery. WA-412-P is located immediately adjacent to the eastern boundary of the Zeus 3D survey area (**Figure 1**).

Recreational Fisheries

Due to the location of the survey area and distance to coastal areas of the Pilbara there are no recreational activities undertaken in this area or adjacent waters.

Commercial Shipping

The Zeus 3D survey area overlaps several shipping routes originating in Port Hedland and the port of Dampier. These routes carry significant traffic comprising bulk carriers and LNG vessels.

Oil and Gas Industry

Exploration Permit Areas WA-361-P, WA-388-P, Production Licence Area WA-30-L and adjacent acreage have been subject to a considerable level of petroleum exploration activities (seismic surveys and exploration

drilling) over the past 30 years or so. There have been two exploration wells (Gandara-1 and Zeus-1) drilled in the survey area in the past (see **Figure 1**).

The south-east corner of the Zeus 3D survey area is located immediately adjacent to a number of oil and gas production facilities that comprise part of the offshore facilities component of the NWS Project. The *North Rankin-A* (NRA) platform is located approximately 15 km due east of the south-east corner of the survey area, and the *Goodwyn-A* (GWA) platform is located approximately 8 km south of the southern boundary of the survey area (see **Figure 1**). At the closest point, the south-east corner of the survey area is located approximately 3.5 km from the trunkline connecting GWA to NRA, and also GWA to the Perseus subsea production infrastructure (**Figure 1**). The south-eastern boundary of the Zeus survey area is located approximately 70 km west of the *Modoc Venture II* FPSO (floating, production, storage and offtake) facility, which is located in 156 m water depth at the Mutineer-Exeter field (WA-191-P).

Statutory safety exclusion zones (500 m radius) are in place around each of these three surface production facilities.

Defence Activities

There are no designated military / defence exercise areas in the waters covered by the Zeus 3D MSS area, and the immediate vicinity.

MAJOR ENVIRONMENTAL HAZARDS AND CONTROLS

All aspects of the Zeus 3D MSS have been subjected to risk analysis, which has been used to evaluate the potential environmental risks and effects, and characterize risk likelihood and severity. **Table 2** summarises the risk analysis for the key aspects of the survey.

Given the management requirements that will be implemented for all environmental aspects of the survey, the risk of significant adverse environmental effects from the proposed Zeus 3D MSS has been assessed as low for all aspects, apart from acoustic disturbance to cetaceans, interference with commercial fisheries, interference with petroleum production activities, and spills of fuel or oil greater than 80 litres, which have been assessed as medium. The implementation of specific whale monitoring and encounter procedures will be used to minimise the potential for any adverse effects to whales. These procedures comply fully with the Australian Commonwealth Government Guidelines: *EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales* (September 2008). Two dedicated, expert Marine Mammal Observers (MMOs) will be aboard the survey vessel for the entire duration of the Zeus 3D survey. The key role of the MMOs will be to visually monitor the waters around the survey vessel for the presence of cetaceans, turtles and seabirds during daylight hours. The MMOs will be responsible for recording any marine fauna sightings during the survey on the appropriate sightings forms, using the DSEWPC 'Cetacean Sightings Application' software.

The survey will be conducted in water depths of 130-1,500 m away from any shallow water habitat areas that may be important for turtle feeding. The survey area is located at least 90 km away from any beaches and adjacent shallow waters that are important for turtle nesting, hatching and breeding.

The survey area is located at least 300 km from any locations important for seabird breeding (e.g. Bedout Island), and shorebird feeding (e.g. western end of Eighty Mile Beach). The survey is unlikely to have any effects on benthic communities due to the water depths across the survey area (130-1,500 m).

At sea refuelling of the survey vessel will only take place during daylight hours.

MANAGEMENT APPROACH

The environmental management approaches relevant to key aspects of the Zeus 3D MSS are summarised in **Table 2**. The survey will be conducted in accordance with all legislative and regulatory requirements, to the satisfaction of the Designated Authority (WA DMP). Fugro's overall environmental objective for the programme is to avoid or minimise environmental risks to levels as low as reasonably practicable (ALARP).

Table 3: Summary of Environmental Risks and Management Approach for Key Aspects of the Zeus 3D MSS

Hazard/ Incident	Potential Hazard Consequence	Risk and Management Approach
Disturbance to marine fauna	Cetaceans - behavioural reactions (avoidance, diving, increased dive times). Disturbance to marine turtles. Disturbance to fish communities. Disturbance to benthic invertebrates.	Low (benthic invertebrates, fish, turtles, dugong,) medium (cetaceans) risk. <ul style="list-style-type: none"> • Interaction 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 • Use of two dedicated MMOs for entire duration of the survey • Marine fauna sighting reports completed and returned to Fugro and to the Australian Marine Mammal Centre at the Australian Antarctic Division, using the 'Cetacean Sightings Application' software • Application of vessel-whale interaction procedures for non-acoustic energy source operations
Disturbance to benthic habitats	Small localised disturbance to epibiota in event of loss of equipment	Low risk. <ul style="list-style-type: none"> • The survey will be conducted in water depths of 130-1,500 m away from any shallow water areas • No anchoring of the either the survey vessel or support vessel will take place during the survey unless in an emergency • All reasonable efforts taken to retrieve lost equipment, and recording and reporting of all items lost overboard
Interference with commercial fisheries	Interference to commercial fishing vessels operating within or near the survey area and surrounding waters. Potential direct and indirect noise impacts on target species. Restriction of access to fishing grounds, loss or damage to fishing gear.	Medium risk. <ul style="list-style-type: none"> • Consultation with fisheries management agencies, fishing industry bodies and individual companies prior to survey commencing, to inform them about the location of survey area and timing of operations • Issuance of Notice to Mariners • Display of appropriate navigational beacons and lights, radar watch • Use of support vessel to warn fishing vessels of survey activities • Recording of sightings of fishing vessels, and consultation with fishermen at sea (if necessary)
Interference with petroleum production activities	Interference with activities of support and supply vessels servicing production facilities Potential direct impacts to subsea infrastructure due to anchoring of survey or support vessel	Medium risk. <ul style="list-style-type: none"> • SIMOPS plans established to ensure compliance statutory 500 m safety exclusion zones • Issuance of Notice to Mariners • Display of appropriate navigational beacons and lights, radar watch • Use of support vessel to warn other vessels of survey activities • Radio warnings to other vessels, as required • No anchoring of survey or support vessel within 10 nm (18.5 km) of any subsea infrastructure (pipelines, flowlines, wellheads, manifolds etc.)

Hazard/ Incident	Potential Hazard Consequence	Risk and Management Approach
Interference with shipping activities	Interference to commercial shipping operating within or near the survey area and surrounding waters.	<p>Low risk.</p> <ul style="list-style-type: none"> • Issuance of Notice to Mariners • Display of appropriate navigational beacons and lights, radar watch • Use of support vessel to warn other vessels of navigation hazard presented by survey activities • Radio warnings to shipping, as required
Waste disposal	Localised temporary decrease in ambient water quality from discharge of sewage, grey water, putrescible waste, chemicals and solid and hazardous wastes.	<p>Low risk.</p> <ul style="list-style-type: none"> • Procedures comply with MARPOL requirements • Procedures for treatment and disposal of sewage are in place and relevant discharge requirements are adhered to • Sewage treatment system operational and includes maceration and disinfection • Quantities of treated sewage and putrescible wastes discharged overboard are recorded on the vessel's <i>Waste Log Forms</i> • Correct segregation of solid and hazardous wastes • A vessel <i>Waste Log Form</i>s kept detailing quantities of wastes transported ashore
Fuel and oil spills	Acute toxicity effects on marine fauna such as marine turtles, fishes and seabirds.	<p>Medium risk.</p> <ul style="list-style-type: none"> • Procedures comply with MARPOL 73/78 requirements (e.g. <i>Oil Record Book</i> kept up to date) • Fuel spill contingency procedures are in place and operational • Adherence to the at sea refuelling procedures • At sea refuelling of the survey vessel will only take place during daylight hours • No at sea refuelling of survey vessel within 25 km of any petroleum production facilities • 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 significant spills (>80 L) are reported to the relevant sections within DMP • Personnel responsibilities are clearly identified
Introduction of marine pests	Introduction and establishment of non-indigenous (i.e. foreign) marine species with consequent impacts on benthic communities, fisheries etc.	<p>Low risk.</p> <ul style="list-style-type: none"> • Procedures comply with AQIS <i>Australian Ballast Water Management Requirements</i> • AQIS ballast water log is kept up to date • Both survey and support vessel have all AQIS clearances to operate unrestricted in Australian waters



CONSULTATIONS

Consultation regarding the proposed Zeus 3D MSS has been undertaken with stakeholder groups, including a number within the commercial fishing industry in Western Australia. The following organisations have been contacted and informed of the proposed operations:

- A Raptis and Sons
- Austral Fisheries Pty Ltd
- Australian Fisheries Management Authority
- Australian Hydrographic Office
- Australian Maritime Safety Authority
- Border Protection Command
- Coastwatch
- Commonwealth Fisheries Association
- MG Kailis Group
- Northern Fishing Companies Association
- Recfishwest
- TunaWest
- WA Department of Fisheries (Karratha and Perth)
- WA Fishing Industry Council
- WA Northern Trawl Owners Association

To date none of the stakeholders consulted have raised any issues or concerns relating to the proposed Zeus 3D MSS. Consultation with all of the stakeholders listed above, plus any others identified during the consultation process, will continue during and after the survey, if necessary.

FURTHER DETAILS

For further information about the proposed Fugro Zeus 3D MSS within the Northern Carnarvon Basin offshore from Western Australia, please contact:

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