



MOBY SICK: THE COSTS OF WOODSIDE'S BURRUP HUB FOR WHALES



(Cover Page) Humpback
Whale Mother and Calf
in Western Australia ©
Brooke Pyke

(Current Page) Aerial Shot
of Popular Ningaloo Coast,
Australia © Lewis Burnett

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Acknowledgements

Greenpeace Australia Pacific Limited acknowledges the Traditional Owners of Country throughout Australia and the Indigenous peoples of the Pacific Islands, and recognises their continuing connection to land, waters, and culture. We pay our respects to their Elders past and present.

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INTRODUCTION

The ocean off north west Western Australia is one of the most biodiverse marine regions in the world. Hosting a stunning array of species, it is home to many threatened and migratory whales who breed, calve, forage and migrate in these waters.

For blue whales, humpbacks, sperm whales and fin whales, whose global populations were severely reduced over many decades due to commercial whaling, protecting habitat and migratory routes remains essential in ensuring the proper recovery of these species. However, the various pollutants and hazards associated with the offshore oil and gas industry pose an existential threat to these already embattled species.

Woodside Energy plans to build the 'Burrup Hub' within the known habitat of several threatened and migratory whale species in north west Australian waters. The Burrup Hub comprises two offshore gas projects - Scarborough and Browse - and will entail seismic surveying, the dredging and installation of two extremely long subsea pipelines ranging between 430 kilometres (Scarborough) and 900 kilometres (Browse), and the drilling of 84 wells over the lifetime of the projects.

The proposed Scarborough project is located approximately 375 kilometres off the coast of Dampier, while the proposed Browse project is located further north on top of the ecologically significant Scott Reef where the untapped Torosa gas reservoir is located.

Whales are hyper-sensitive to subsea noise, and masterfully use sound and sonar to communicate, navigate and locate food. While toothed whales and dolphins use sonar and echo-location to find and pursue prey, baleen whales use their songs to navigate and communicate with each other. Seismic surveying and the ongoing operational noise associated with offshore gas extraction can result in behavioural changes among whales, as well as chronic and acute damage to their internal auditory organs. Moreover, a temporary or permanent threshold shift (TTS/PTS) in whales can prove fatal, as it degrades its ability to navigate, feed and communicate.

Alongside seismic surveys and ongoing operational noise pollution, Woodside's Burrup Hub presents a slew of other potentially fatal threats to whale species in Western Australian waters. These include ecotoxicological threats from pollutants released into the marine environment, such as toxic byproducts from deep sea drilling and processing, and dangerous persistent chemical pollutants that could result from an unforeseen emergency such as a well blowout or spill.

Ship traffic accessing the various Burrup Hub sites increases the risk of striking and either injuring or killing wildlife. Ship strikes are one of the main causes of whale deaths worldwide, growing with increased ship traffic and offshore oil and gas extraction. Woodside's 'Fast Crew Transfer Vessels', which are permitted to travel at speeds up to 30 knots, and large dredging vessels are the most dangerous in this respect, due to the speed at which they travel, presenting a serious risk to whales in the area.

This report profiles several threatened and migratory whale species that are known to occur within the Project Area, Trunkline Area and/or the Environment that May Be Affected (EMBA) for Scarborough and Browse. These include pygmy blue whales, Antarctic blue whales, humpback whales, sperm whales, fin whales, sei whales and Antarctic minke whales. Greenpeace Australia Pacific contends that Woodside has downplayed the impact its offshore Scarborough and Browse projects could have on these whale species. In most cases, Woodside appears not to have undertaken species-specific risk assessments or to have adequate management measures in place to prevent whale injury and death.

Five key risks are identified that threatened and migratory whales face as a result of offshore gas extraction. These are: seismic surveys, operational noise, ecotoxicological effects, vessel strikes and climate change. Greenpeace Australia Pacific holds that Woodside's Burrup Hub is dangerous to threatened and migratory whale species across all of these five risks.

LNG ship docked near Karratha
© Greenpeace





THREATENED & MIGRATORY WHALES AT RISK FROM WOODSIDE'S BURRUP HUB OFFSHORE GAS PROJECT

Newborn humpbacks
taking their first
breaths, Ningaloo Reef,
Western Australia ©
Alex Westover



Pygmy blue whales

(*Balaenoptera musculus brevicauda*)

Listed as **'Endangered'** according to *WA Biodiversity Conservation Act 2016* (September 2018 list).¹

Listed as **'Endangered'** according to *Australian Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.²

Listed as **'Endangered'** according to the IUCN's Red List of Threatened Species (last assessed in March 2018).³

Migrating pygmy blue whale near Ningaloo Reef, Australia © Lewis Burnett



Pygmy blue whales' migration routes and possible foraging areas are located within the Project and/or Trunkline Areas for both the Scarborough and Browse projects that comprise the Burrup Hub (see Figure 1). Pygmy blue whales migrate northwards and southwards along the West Coast of Australia. Their northward migration to Indonesia occurs during March/April - through to June (and sometimes extends into August).⁴ Southward migration from Indonesia occurs from September through to December (and sometimes into January).⁵ Whale numbers usually peak off the Western Australia coast in April, May, June and July (during northward migration) and November and December (during southward migration).⁶

Population estimates calculate the pygmy blue whale population to be between 662-1559 individuals (in 2004) and between 712-1754 individuals (in 2008).⁷ However, these population

estimates are out of date and even Woodside admits in its draft Environmental Impact Statement (EIS), "there is currently insufficient data to accurately estimate population numbers of pygmy blue whales in Australian waters"⁸ Neither of these population estimates account for whales further West in the Indian Ocean, and there "is evidence that along the WA coast north of latitude 19S that the migratory pathway spreads out with not all animals following the Australian coastline"⁹ On their southward migration, pygmy blue whales travel much further from the shore at distances up to 400 kilometres away. This is significant because Woodside's proposed Browse project is located far offshore, next to Scott Reef, which is 270 kilometres off the coast of north-western Australia - meaning that Woodside does not have reliable baseline population data for pygmy blue whales in its Offshore Project Area for Browse.¹⁰

For Browse, the worst case spill scenario is in reference to a loss of well containment (e.g. blowout) at the Torosa field that would leak gas and condensate, a substance similar in consistency to crude oil, for up to 77 days.

For Scarborough, the worst-case spill scenario is in reference to a vessel rupture of the pipelay vessel, which could happen anywhere along the trunkline route, and would spill marine diesel oil. The modeling takes into account ocean currents and winds to project the spills.

Pygmy blue whales vocalise at low frequency, communicating and hearing within low and very low frequency ranges.¹¹ Pygmy blue whales like all other baleen whales are known to communicate within similar frequencies as the anthropogenic noise caused by offshore gas and oil operations. According to marine biologists, baleen whales use these frequency bands for long range communication over hundreds of miles and to maintain social structure.¹² The noise from offshore gas operations can therefore mask the sounds that baleen whales need to communicate with each other, in addition to masking the other biotic noises in the ocean that these whales rely on for navigation.¹³

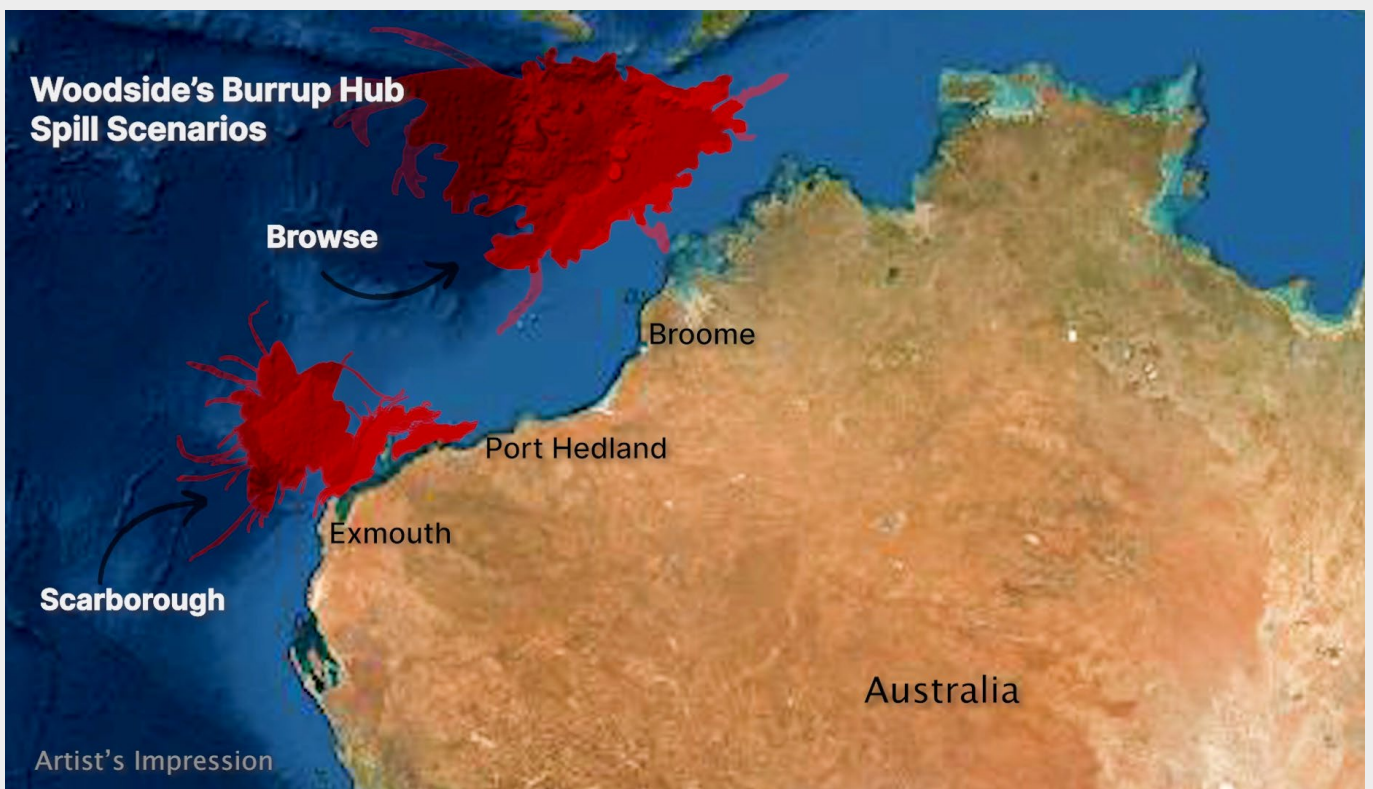
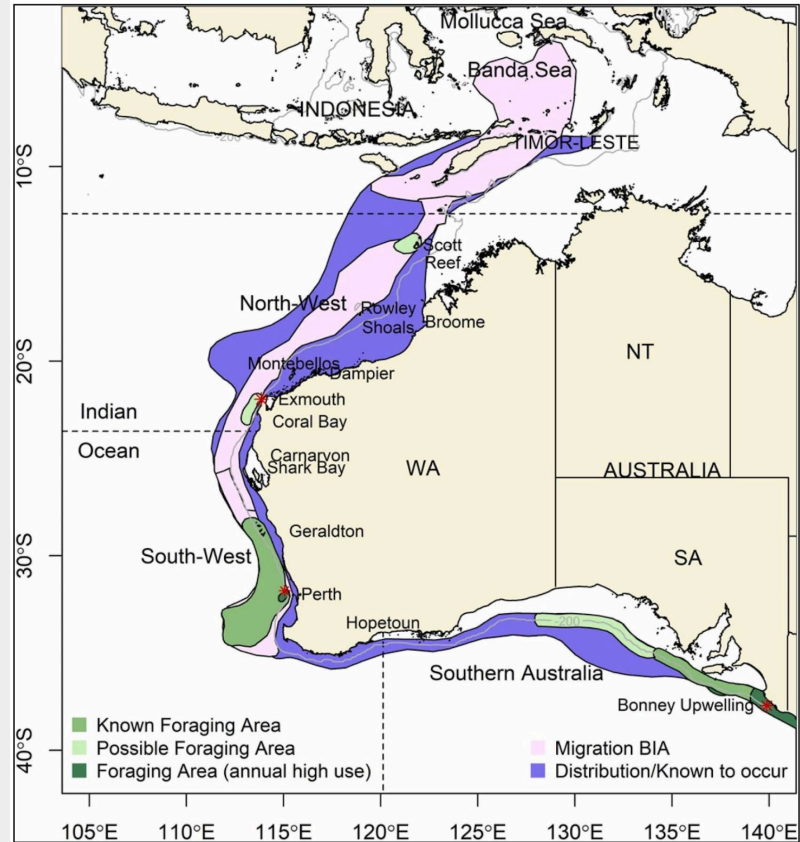


Figure 1 from Thums et al. (2022)¹⁴ shows the habitat of pygmy blue whales, with a possible foraging area at both Scott Reef where the proposed Browse project is located and North West Cape off Exmouth where the Scarborough Project Trunkline is located. Biologically Important Areas for migration also overlap the impact area for both projects.

Figure 1



Pygmy blue whales and Scarborough:

The Scarborough Project Area and Trunkline Project Area overlaps with Biologically Important Areas (BIAs) for pygmy blue whales for distribution, migration and foraging.¹⁵ Satellite tracking and passive acoustic monitoring has indicated rates of higher occupancy of pygmy blue whales around the North West Cape just off Exmouth.¹⁶

Noise pollution from the Scarborough Project Area could potentially interfere with whales using this area to feed, rest, sing or breed, and this site is within the area that would be impacted by a worst case scenario vessel rupture of the pipelay vessel for the Scarborough trunkline.¹⁷

Pygmy blue whales and Browse:

Pygmy blue whales inhabit Australian waters as far north as Scott Reef where the Browse project's Torosa gas reservoir is located.¹⁸

Figure 2

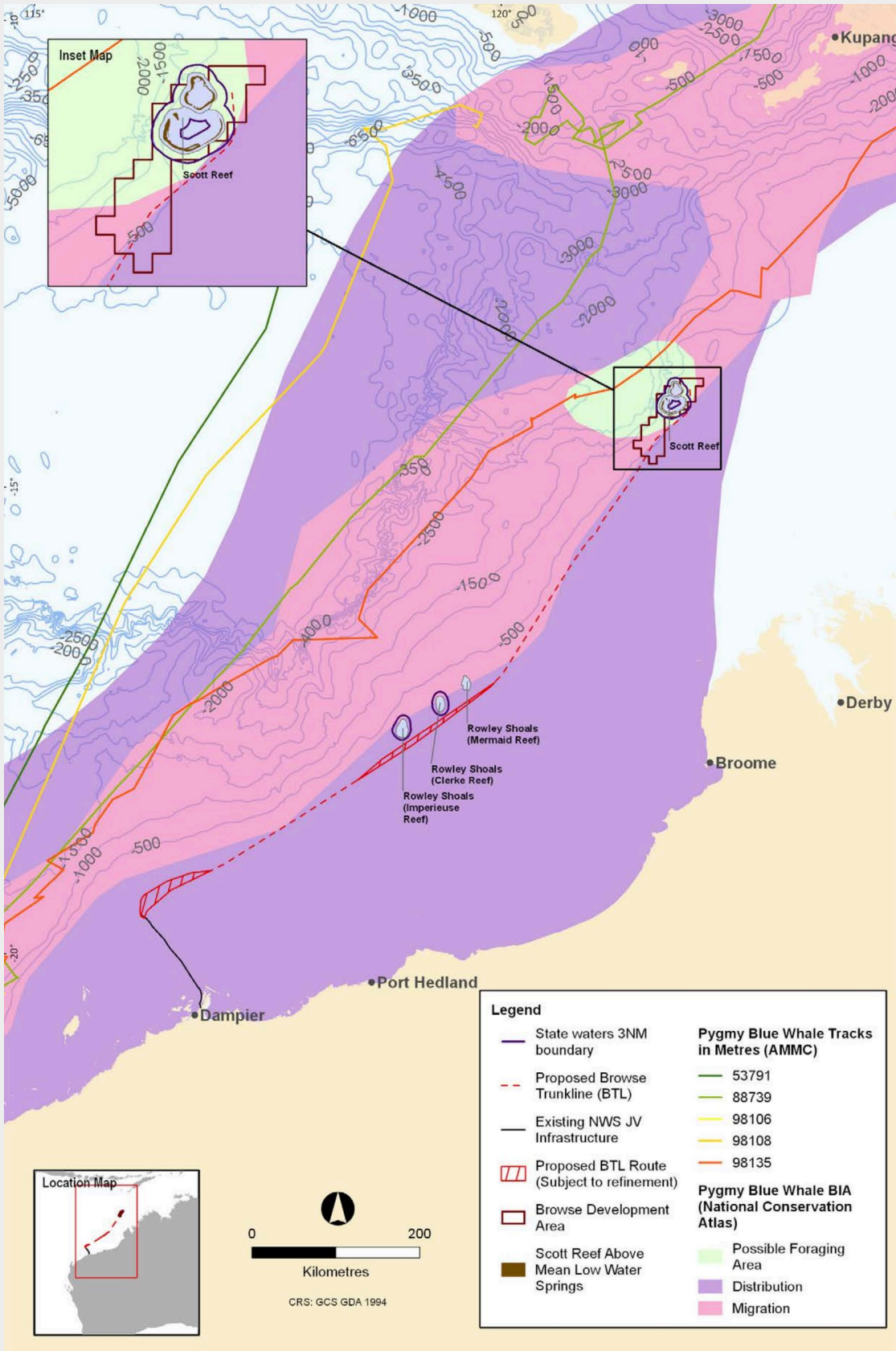


Figure 2 from Woodside's Browse draft EIS/ERD shows Biologically Important Areas for pygmy blue whales in relation to the Browse Project Area, with the project's drilling infrastructure on top of a possible pygmy blue whales foraging area (marked in green).

If Woodside's Browse project goes ahead, the Mobile Offshore Drilling Unit (MODU) and Floating Production Storage and Offloading (FPSO) vessel will be engaged in gas and condensate extraction and processing within a pygmy blue whale possible foraging area (see Figure 2)

The Calliance-Brecknock FPSO will also be directly adjacent to this foraging area (see **Figure 2**). Biologically Important Areas (BIAs) for the migration of Indo-Australian pygmy blue whales also overlap with the Browse Trunkline route.¹⁹

In Woodside's Browse draft Environmental Impact Statement (EIS)/Environmental Review Document (ERD), the company downplays potential impacts of the Browse project on pygmy blue whales, stating that "pygmy blue whales at Scott Reef have not been directly observed foraging".²⁰ However, observational research effort in this region is extremely low. Static passive acoustic monitoring provides a consistent pattern of detections of pygmy blue whales using this area, with "annual acoustic detections of Indo-Australian pygmy blue whales at Scott Reef."²¹ The draft EIS/ERD also states that "it is unclear if [krill] are at an abundance or density that would support pygmy blue whale feeding"; however, Woodside appears to contradict itself here as in the same document it also identifies that there are six genera of krill found at Scott Reef and that acoustic identification of pygmy blue whales at Scott Reef coincides with periods of high krill biomass, suggesting that the whales are feeding and this could be a potentially important foraging area.²²



Pygmy blue whale (*Balaenoptera musculus brevicauda*) in Mozambique © Paul Hilton



Antarctic blue whales

(*Balaenoptera musculus*)

Listed as **'Endangered'** according to *WA Biodiversity Conservation Act 2016* (September 2018 list).²³

Listed as **'Endangered'** according to the *EPBC Act*.²⁴

Listed as **'Endangered'** on the IUCN's Red List of Threatened Species (last assessed in March 2018).²⁵



Blue whale (*balaenoptera musculus*), Indian Ocean
© Andrew Sutton

The blue whale is the largest animal on the planet.²⁶ The Antarctic blue whale has been acoustically detected off Dampier in June,²⁷ which is within the Scarborough Trunkline Project Area and would be impacted by routine operations such as dredging, as well as non-routine events (accidents) such as a marine diesel oil spill from project vessels.²⁸

The Australian Federal Government's *Conservation Management Plan for the Blue Whale*, a recovery plan enacted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), outlines anthropogenic noise, climate change and vessel disturbance (in particular vessel strikes) as key threats to this endangered species.²⁹

Like pygmy blue whales, Antarctic blue whales vocalise at low frequency and communicate with other Antarctic blues across extremely long distances. The anthropogenic sounds from offshore oil and gas drilling can mask, or drown out, these low frequency calls. Antarctic blues use sound for "long range contacts, assembly calls, sexual advertisement, greeting, spacing, threat and individual identification".³⁰

Antarctic blue whales and Scarborough:

Within Western Australian waters, the Antarctic blue whale “has been detected off Dampier in June.”³¹ Academic research not cited by Woodside has also detected Antarctic blue whales off Dampier throughout May.³² It has been suggested that areas such as Dampier “form part of this subspecies’ migratory route and/or breeding habitat.”³³ This suggests that Antarctic blue whales are likely to occur within the Scarborough Trunkline Area, which is just off the coast of Dampier, and therefore would be impacted by noise pollution and vessel disturbance from routine operations as well as an accident such as a marine diesel oil spill from one of the trunkline project vessels.

It is possible that Antarctic blue whales could be found proximate to other proposed Scarborough project infrastructure, such as the Offshore Project Area where the Mobile Offshore Drilling Unit (MODU) and Floating Production Unit (FPU) will be located. Academic literature states that the “occurrence and distribution of Antarctic blue whales are still not fully understood”.³⁴ This is because of scientists’ “limited ability to observe them in their marine environment”, as Antarctic blue whales are “pelagic, highly migratory, are found in remote areas [and] spend much time submerged under the water”.³⁵

The difficulty with sighting surveys is that “trained observers can only see Antarctic blue whales for a short period of time when these mammals surface to breathe, and those sighting surveys can only be done in adequate daylight during good weather conditions”.³⁶ This is problematic because “pre-start visual observations” are Woodside’s primary management strategy for avoiding auditory injury to cetaceans from pile driving and vertical seismic profiling, yet is unlikely Antarctic blue whales would be visually detected even if they were present.³⁷

Offshore gas platform off
coastline © Yaroslavna Kulinkina
/ Adobe Stock

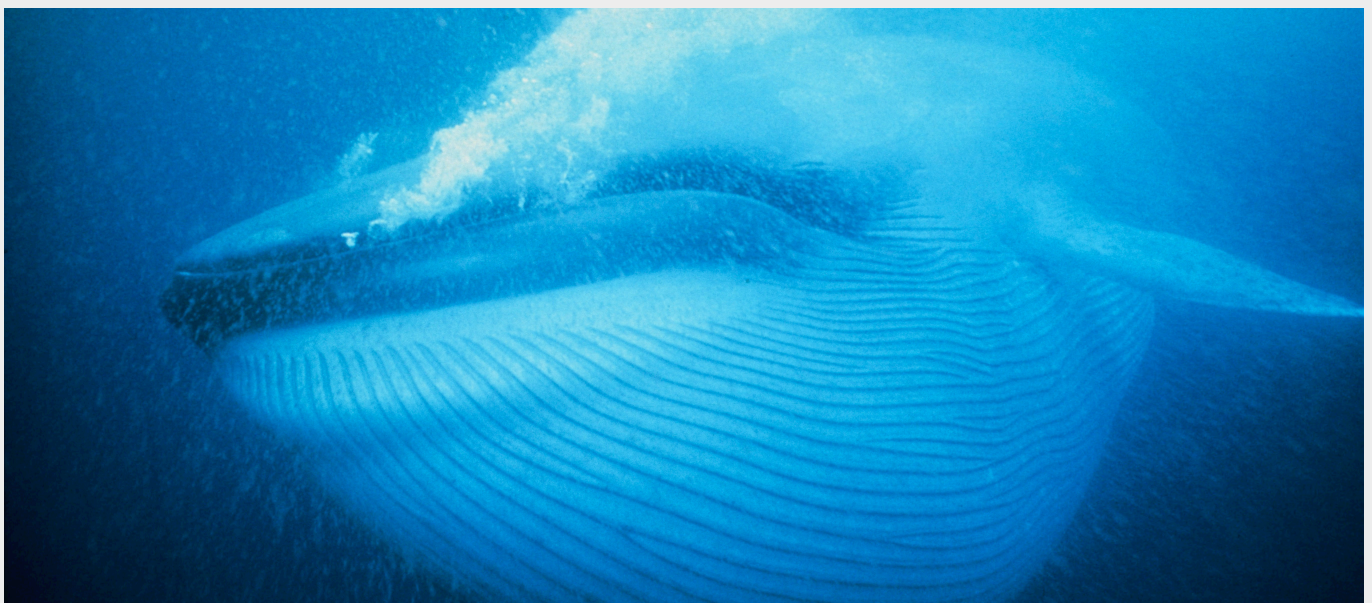


Antarctic blue whales and Browse:

Woodside's Browse EIS/ERD does not provide a specific impact assessment of Antarctic blue whales, dismissing their relevance. Woodside states that, "due to the known distribution of this subspecies it is not considered that the Antarctic Blue Whale will occur within the project area"³⁸

However, the confidence with which Woodside states this is surprising considering the available evidence. Indeed, the presumed distribution of Antarctic blue whales has been challenged by more recent academic studies locating Antarctic blue whales in warm, tropical waters such as around Tonga and Samoa in the Pacific, and Dampier in WA.³⁹

Furthermore, because the Browse Trunkline runs southwards from Scott Reef for 900 kilometres to just off the coast of Dampier, it is completely plausible that routine operations such as dredging for the Trunkline, or an accident (such as a breakage or corrosion) at the Trunkline, would impact Antarctic blue whales.⁴⁰ Woodside therefore needs to conduct an impact assessment specific to this endangered whale species rather than dismissing them as irrelevant.



Blue whale (*Balaenoptera musculus*) in Mexico © Doc White / SeaPics.com



Humpback whales

(*Megaptera novaeangliae*)

Listed as '**Conservation Dependent**' according to WA Biodiversity Conservation Act 2016.⁴¹

Humpback whale calf, Pacific
© Tomas Kotouc



By the early 1960s, humpback whales had been hunted so severely that it was estimated that a mere 5% of the population remained.⁴² Since then, recovery efforts have been largely successful, and by 2008 it was estimated that there were 21,750 Humpbacks worldwide.⁴³

The International Whaling Commission (IWC) currently lists seven humpback breeding stocks longitudinally across the Southern Hemisphere. Referred to as A through G (where G represents the south-eastern Pacific, and A represents south-western Atlantic), the waters off the coast of Western Australia are home to breeding stock D (BSD).⁴⁴ The breeding grounds of BSD are thought to be located between Broome and Camden Sound off the northern coast of Western Australia. Migratory routes of this breeding stock are located between 15°S and 35°S along the coast, while the major calving grounds are located between 15°S and 18°S (in the Kimberley region).⁴⁵ Exmouth Gulf serves as a resting area for mother and calf humpbacks between July and November.⁴⁶ Humpbacks are present in southern waters of Western Australia from May as they migrate north, and begin their southern migration back down the WA coast by October.⁴⁷

Humpbacks are highly intelligent and social mammals that 'sing', using communication to mark migration routes and also to alert others in their herd to prime feeding/foraging grounds.⁴⁸ Maintaining what are called 'acoustic herds', humpbacks able to sing to maintain contact with other humpbacks that may have lost their way, potentially bringing them back to correct migratory paths.⁴⁹

Humpback whales and Scarborough:

In Woodside's Scarborough Project Proposal, the company identifies one Biologically Important Area for humpback whales that will be impacted during the installation of the Scarborough trunkline (which will be installed diagonally across the seabed of the migration corridor).⁵⁰ Woodside also states that humpbacks may occur in the Offshore Project Area but are more likely expected in the Trunkline Area.

In addition to these impacted migration routes, humpback whales are known to use Exmouth Gulf as a resting area. Exmouth Gulf is within the project's EMBA (Environment that May Be Affected),⁵¹ and as such would be impacted by a non-routine accident such as a marine diesel oil spill or gas leak.

Woodside downplays the potential impacts of the Scarborough Project, including Trunkline installation, by stating that "these Biologically Important Areas will only represent important habitat for humpback whales for discrete periods of the year".⁵² According to Woodside's 'Scarborough Seabed Intervention and Trunkline Installation Environment Plan', which is currently under consideration by Federal offshore regulator NOPSEMA,

Humpback whales and calf,
Caribbean © Seb c'est bien



the pre-lay trenching for the Scarborough Trunkline is scheduled for Quarter 2 of 2023 and is expected to take 2 months, therefore coinciding with the peak northward migration period for humpback whales in the area.⁵³ The post-lay dredging and 'backfill' of the Trunkline trench is scheduled to take place in Quarter 4 of 2023 for 2-3 months thus coinciding with humpback whales southward migration.⁵⁴

Elsewhere in its Offshore Project Proposal, Woodside admits that "part of the Trunkline Project Area overlaps the migration BIAs for both species [humpbacks and pygmy blue whales], and noise exposure from vessel operations during pipeline installation may overlap migration periods within these BIAs".⁵⁵

Trunkline installation requires the dredging of 1200 square kilometres of the seafloor using trailing suction dredging equipment, and the 'backfill' of that trench using displaced seafloor materials from the dredged 'Borrow Ground' near Dampier Marine Park.⁵⁶ Seafloor dredging poses numerous risks to cetaceans, including noise pollution and vessel strikes, with academic research finding that dredging noise can mask low frequency baleen whale communication and lead to temporary hearing loss if the affected whale(s) stay for extended periods near the dredger.⁵⁷

Highlighted in purple on the below map (see **Figure 3**) is the migration corridor for Western Australian humpback whales in relation to the proposed Scarborough project.⁵⁸

Figure 3

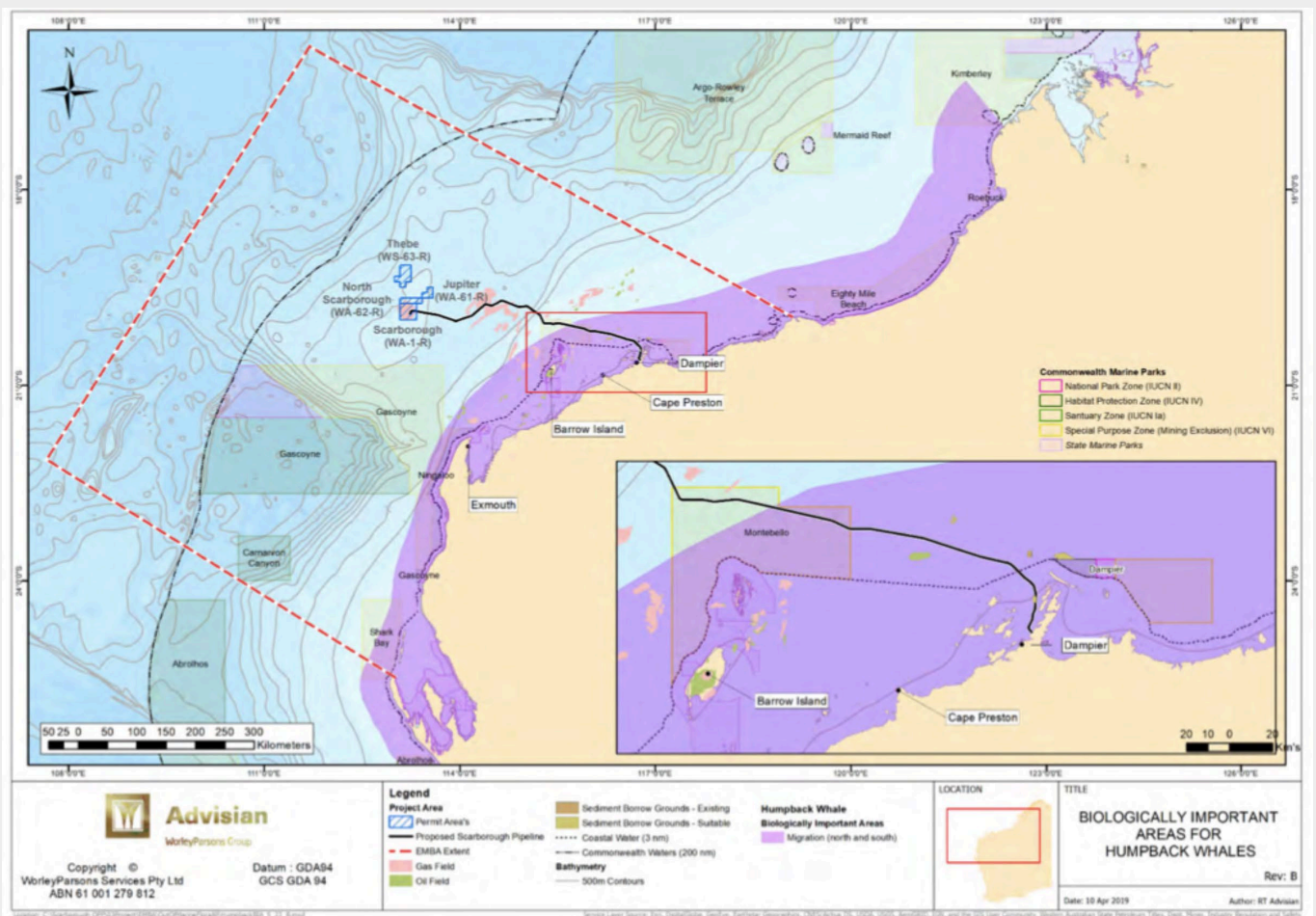


Figure 3 from Woodside's Scarborough Offshore Project Proposal shows the Scarborough Trunkline cutting directly through the humpback whales migration corridor.⁵⁹

Humpback whales and Browse:

Woodside's Browse Trunkline will transect the humpback migration route that follows the coastline off of Dampier.⁶⁰ Furthermore, acoustic data published in 2011, indicated the presence of humpbacks within a 50 kilometre vicinity of Rowley Shoals, Ashmore Reef and further north at Scott Reef. Humpbacks' historical presence near Scott Reef suggests that humpbacks will likely be found in the Project Area.

In its Browse draft EIS/ERD, Woodside recognises these areas as habitat for adult humpback whales and calves.⁶¹ Vessel strikes are among the top sources of human-caused mortality for humpback whales and other baleen whales such as Antarctic blues and fin whales.⁶²

To manage vessel strikes, Woodside states its 'Fast Crew Transfer Vessels' "will not travel at speeds greater than 30 knots in sensitive areas (e.g. the humpback whale migration corridor) at sensitive times".⁶³ This is significantly faster than internationally recommended limits of 10-14 knots to avoid vessel strikes with threatened and migratory whales, presenting significant risk to any whales in the area.⁶⁴ Research has shown that the chance of a whale experiencing lethal injury "increases significantly as vessel speed increases up to 13-15 knots", with one study finding that 89% of incidents where a whale was severely hurt or killed occurred when vessel travelling speeds were greater than 14 knots.⁶⁵



Humpback whale (*Megaptera novaeangliae*) in Wild Nature © Mikhail Korostelev



Sperm whales

(*Physeter macrocephalus*)

Listed as **'Vulnerable'** according to *WA Biodiversity Conservation Act 2016* (September 2018 list).⁶⁶

Listed as **'Migratory'** under the *EPBC Act*.⁶⁷

Listed as **'Vulnerable'** on the IUCN's Red List of Threatened Species (last assessed June 2008).⁶⁸



Sperm whales (*Physeter macrocephalus*) in *Wild Nature* © Maarten Van Rouveroy

Sperm whales are the largest of toothed whales, and differ from low frequency baleen whales in that they communicate at medium frequencies within the range audible by humans. Sperm whales produce characteristic clicks for both echolocating on prey during foraging and repeated patterns of clicks called codas during social communication.⁶⁹ Sperm whales are highly social and are known to exist in vocal clans that centre around the maternal lineages of the group.⁷⁰ Sperm whales have also been recorded making 230 different trumpet-like sounds.⁷¹ It is thought that these trumpet sounds are how mature males communicate with each other during foraging.⁷²

Sperm whales face several anthropogenic threats, including collisions with large vessels in deep waters (such as canyons and beyond the edge of the continental shelf), seismic operations in these areas that can cause "evasive responses, altered behaviour" and water pollution including the dumping of industrial wastes.⁷³ Studies examining the impact of oil and gas operations in the Gulf of Mexico suggest that spills and persistent disturbance are likely to reduce sperm whale stocks in the region by 26% by 2025.⁷⁴

In Western Australia, sperm whales inhabit and forage in the Albany Canyon and Perth Canyon in the south-west, which represents critical habitat for this species.⁷⁵ According to Woodside, "detailed information about the distribution and migration patterns of sperm whales off the WA coast is not available".⁷⁶ However, sperm whales are known to travel into the waters of northwestern Australia, following the northward flows of the Eastern Gyral Current and South Equatorial Current "enroute to breeding grounds off the Kimberley".⁷⁷

Twenty three sightings of sperm whales were recorded by marine mammal observers during the North West Cape MC3D marine seismic surveys conducted between December and April 2017.⁷⁸

Sperm whales and Scarborough:

Sperm whales have been observed in the deep, continental slope waters of the Montebello Saddle (approximately 90 kilometres away from North West Cape) where they may feed, and the waters overlying the canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula.⁷⁹ These canyons are approximately 21 kilometres away from the Scarborough Trunkline Area and 130 kilometres away from the Offshore Project Area.⁸⁰

Marine biologists have found that the efficacy of sperm whale foraging is greatly reduced when exposed to seismic airguns, with attempts to capture prey 17% lower during exposure.⁸¹ As such, if any sperm whale were to come within close range of the Project Area there is a likelihood of population level impacts as a result of the noise generated through Woodside's activities. In its 'Scarborough 4D B1 Marine Seismic Survey Environment Plan', Woodside states that it will install a Passive Acoustic Monitoring (PAM) system onboard the seismic survey vessel to detect toothed whales, specifically sperm and beaked whales.⁸² However, Woodside makes an allowance for continued seismic surveying after a malfunction or breakage of the PAM system for up to 2 hours and 20 minutes.⁸³

Group of sperm whales in Indian Ocean © Alex Westover



Sperm whales and Browse:

Female sperm whales with their young may reside within the North West Marine Region all year round and males may move through the region using underwater canyon habitats.⁸⁴ Anecdotal evidence suggests that “the Scott Plateau may be a breeding ground for sperm whales and beaked whales.”⁸⁵ This is significant because Woodside’s proposed Browse Project is directly adjacent to the Scott Plateau (see **Figure 4**).

Woodside states that “based on the available information, it is considered unlikely that the sperm whales will be present in large numbers within the Project Area”.⁸⁷ It recognises that “transient individuals may occur especially in the areas of greatest water depth which occur off the west side of Scott Reef”;⁸⁸ however, the company has not undertaken a species-specific impact assessment for sperm whales - despite their listing as ‘vulnerable’ and ‘migratory’. Like many areas of the ocean, this area has not been extensively researched and more dedicated sperm whale surveys are needed to better understand sperm whale distributions and habitat use in the region. Sperm whales are listed as globally vulnerable, and so it is important that all areas of their distribution are well researched before new offshore gas and oil projects push them into further decline.

Figure 4

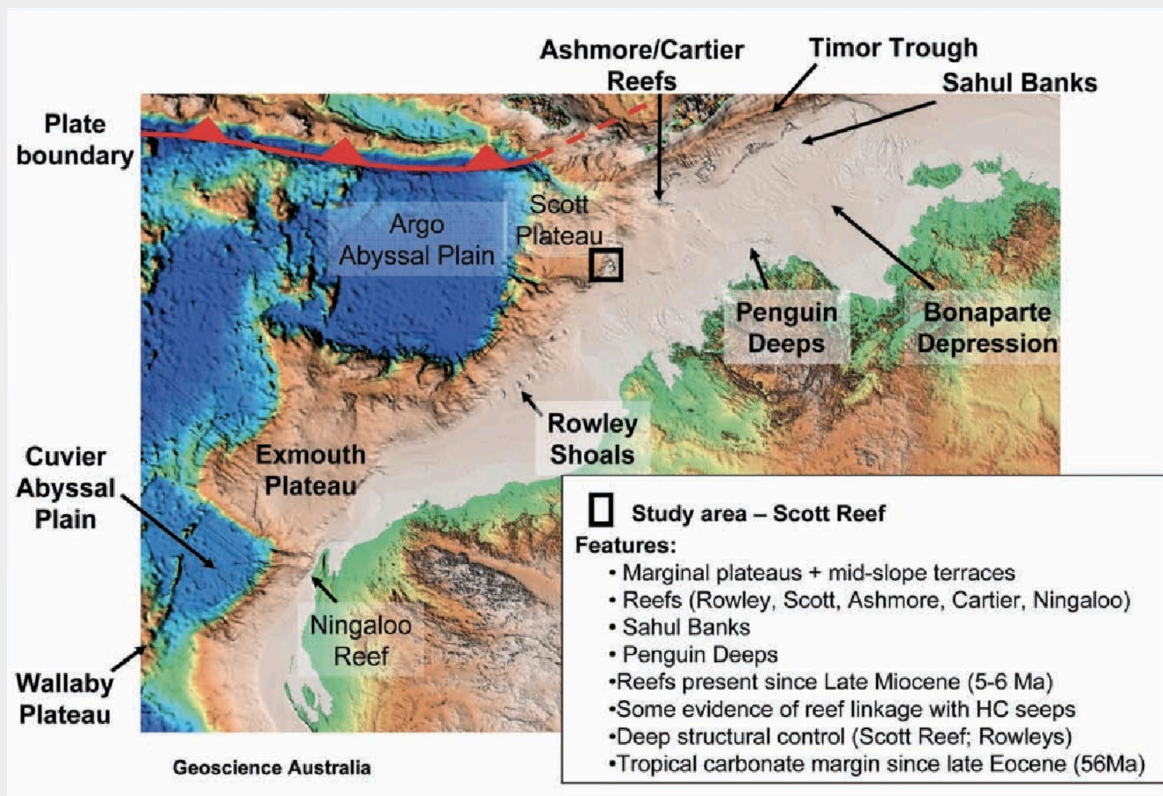


Figure 4 shows the location of Scott Reef (which is within the Browse Project Area) in relation to Scott Plateau and the Argo Abyssal Plain where sperm whales may use underwater canyons for migration and foraging.⁸⁶



Fin whales

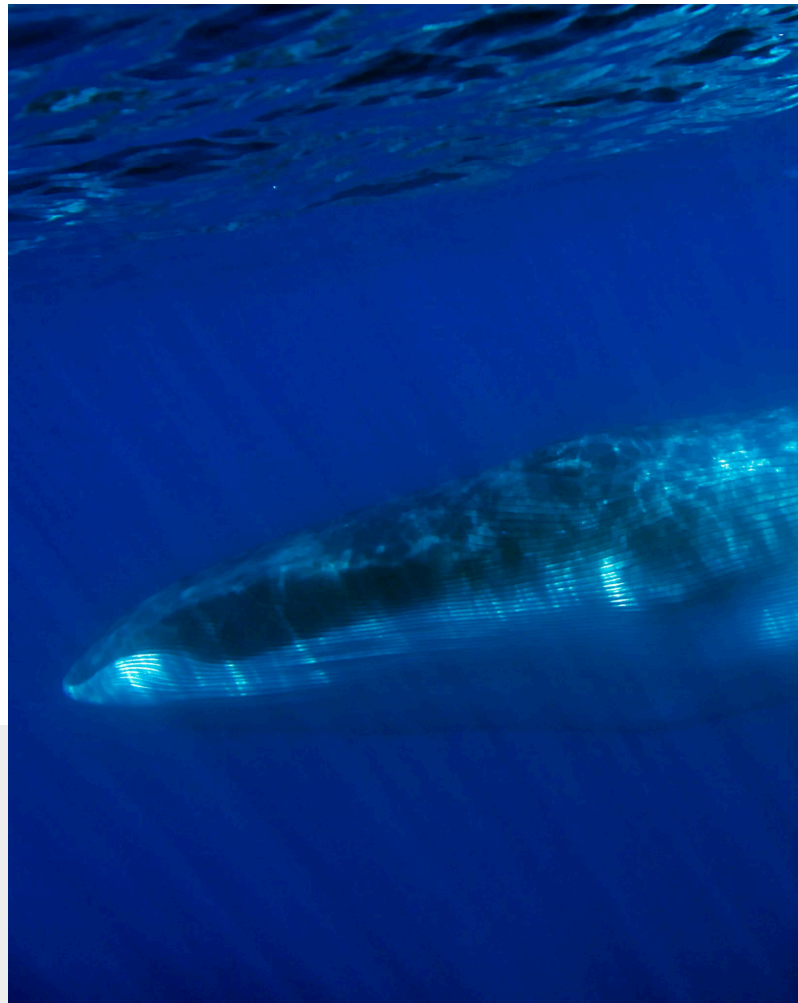
(*Balaenoptera physalus*)

Fin Whales are listed as **'Vulnerable'** and **'Migratory'** under the EPBC Act.⁸⁹

Listed as **'Vulnerable'** according to the IUCN Red List of Threatened Species (last assessed in February 2018).⁹⁰

A fin whale at Pelagos Sanctuary for Mediterranean Marine Mammals

© Paul Hilton



Like many baleen whales, fin whales were hunted exhaustively by the whaling industry during the mid 20th century. Reliable population estimates of fin whales in Australian waters are not currently available; however, worldwide the species is known to be distributed widely in both hemispheres between latitudes 20-75°S.⁹¹ Fin whales are known as the 'greyhounds of the sea' because of their fast swimming speeds of up to 45 kilometres per hour.⁹²

In Western Australian waters, fin whales have been detected vocalising off Rottnest Trench/Perth Canyon between January and April.⁹³ A recent study by marine scientists used passive acoustic monitoring as a tool to identify the migratory movements of fin whales in Australian waters. On the west coast, the earliest arrival of these animals occurred at Cape Leeuwin in April, and between May and October the whales migrated along the WA coastline to the Perth Canyon, which likely acts as a way-station for feeding.⁹⁴ Some whales were found to continue migrating as far north as Dampier."⁹⁵

Fin whales vocalise at low frequency cetaceans like other baleen whales, and commonly produce sounds around 20Hz.⁹⁶ These sounds are thought to be detectable up to a distance of 525 miles (or 844 kilometres) if projecting within the deep sound channel⁹⁷ (a layer of water approximately 1 kilometre deep where the speed of sound is at a minimum and thus may travel for long distances).⁹⁸

In Australia, the conservation guidance for fin whales is incomplete and still under development due to a lack of scientific understanding about their habitat and behaviour. For example, the current 'threat abatement and recovery' advice from the Australian Government for the fin whales is out of date (published in 2015) and contains nothing specific about anthropogenic noise or vessel disturbance. It states that, "once the spatial and temporal distribution (including biologically important areas) of fin whales is further defined", it will be necessary to "assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion and coastal development)" on the species.⁹⁹ The task of "develop[ing] a national vessel strike strategy that investigates the risk of vessel strikes on fin whales and identifies potential mitigation measures" also remains incomplete.¹⁰⁰

At Woodside's Scarborough site, the company claims that the nearshore Scarborough Project Area is unlikely to overlap with a significant habitat for fin whales, but recognises the likely presence of fin whales in the Offshore Project Area.¹⁰¹ Fin whales are particularly at risk of injury and death by ship strike, with more fin whales hit by ships worldwide than any other species.



Fin whale off Cuverville Island © Esther Horvath



Sei whales

(*Balaenoptera borealis*)

Listed as **'Endangered'** according to the *WA Biodiversity Conservation Act 2016*.¹⁰²

Listed as **'Vulnerable'** and **'Migratory'** according to the *EPBC Act*.¹⁰³

Listed as **'Endangered'** on the IUCN Red List of Threatened Species (last assessed June 2018).¹⁰⁴



Sei whale (*Balaenoptera borealis*) and calf in Portugal
© Doug Perrine / SeaPics.com

Sei whales are large migratory baleen whales that communicate through 'downsweep' calls in the very low-frequency range, even lower than right whales and humpback whales according to some studies.¹⁰⁵ Marine biologists suggest that the sei whale call can reach up to 15-20 kilometres away and are sometimes used as a "contact call" to "coordinate activities such as feeding or breeding".¹⁰⁶

Reliable population estimates for sei whales do not currently exist, and due to the severe reduction in their population during mid-to-late century whaling alongside rather low reproduction rates (one offspring every 2-3 years), it is thought that population recovery may be very slow.¹⁰⁷ However, the species is known to have a wide distribution, living in tropical, temperate and subpolar waters across the Atlantic, Indian and Pacific Oceans.¹⁰⁸ It is entirely plausible that sei whales occur in the Offshore Project Area of Scarborough and Browse given their wide lateral distribution and that they are known to breed in tropical and subtropical waters.¹⁰⁹

Like the fin whale, the conservation advice for the sei whale has not been updated since 2015 and is underdeveloped due to gaps in the scientific literature regarding sei whale distribution and behaviour. Consequently, the 'threat and abatement advice' states that "once the spatial and temporal distribution (including biologically important areas) of sei whale is further defined", it will be necessary to "assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion and coastal development)" on the species.¹¹⁰

Sei whales and Scarborough:

Woodside claims that the Scarborough Project Area is "unlikely to represent an important habitat for this species" given the "large, oceanic distribution of the sei whale, and the absence of defined migration pathways or foraging areas".¹¹¹

However, given the lack of scientific data on sei whale distribution wherein their movement is considered "unpredictable and not well documented",¹¹² Woodside cannot be sure that this species will avoid being impacted by the Scarborough project whether that is by noise pollution, vessel strikes or ecotoxicological effects, or a combination thereof.

Sei whales and Browse:

In relation to its Browse project further north, Woodside claims that "due to this species' preference for deep oceanic waters, it is considered unlikely that the sei whale will be present in large numbers within the Project Area".¹¹³ The Browse Development Area is, however, 270 kilometres offshore and, according to Woodside, in water depths of approximately 400 metres to 1000 metres.¹¹⁴ Furthermore, the water depths are much greater than claimed, as the Browse Project Area overlaps with canyons linking the Argo Abyssal Plain with the Scott Plateau.¹¹⁵ These canyons are known to be between 2000-3000 metres deep.¹¹⁶ The company also downplays potential impacts on sei whales by stating that only "transient individuals" may occur within the Project Area.¹¹⁷ This is beside the point, as sei whales typically travel as individuals, pairs or in small pods of three.¹¹⁸

Once again, Woodside cannot be certain that sei whales are unlikely to be encountered as their local distribution and movement patterns are not well documented or understood.



Antarctic minke whales

(*Balaenoptera bonaerensis*)

Listed as **'Migratory'** under the EPBC Act.¹¹⁹

Listed as **'Near Threatened'** according to the IUCN's Red List of Threatened Species (last assessed January 2018).¹²⁰

An antarctic minke whale (*Balaenoptera bonaerensis*) in Antarctica © Frankie Gamble



Antarctic minke whales are low frequency baleen whales that are known to produce a unique vocalisation referred to as the “bio-duck” sound, a quacking call which has been recorded in the Antarctic and off the coast of Western Australia.¹²¹ The Antarctic minke whale has been extensively hunted in the late 20th- and 21st century under the pretence of scientific research, and this has been justified by the unproven theory that minke whales are experiencing a “population boom” that is negatively impacting on other baleen whales through increased competition for food resources.¹²² Using DNA testing, Stanford University researchers have been able to determine that the population is not booming as evident by the relatively few ‘silent mutations’ that would be expected to increase at predictable rates as a population grows.¹²³

Antarctic minke whales have been observed as far north as 21°S along the east coast of Australia (equivalent to Karratha on the west coast).¹²⁴ It is thought that the species follows a similar migration on the coast of Western Australia, migrating up to subtropical waters and as far north as the tropical waters in 20S to feed, breed and possibly calve (see **Figure 5**).¹²⁵

Figure 5

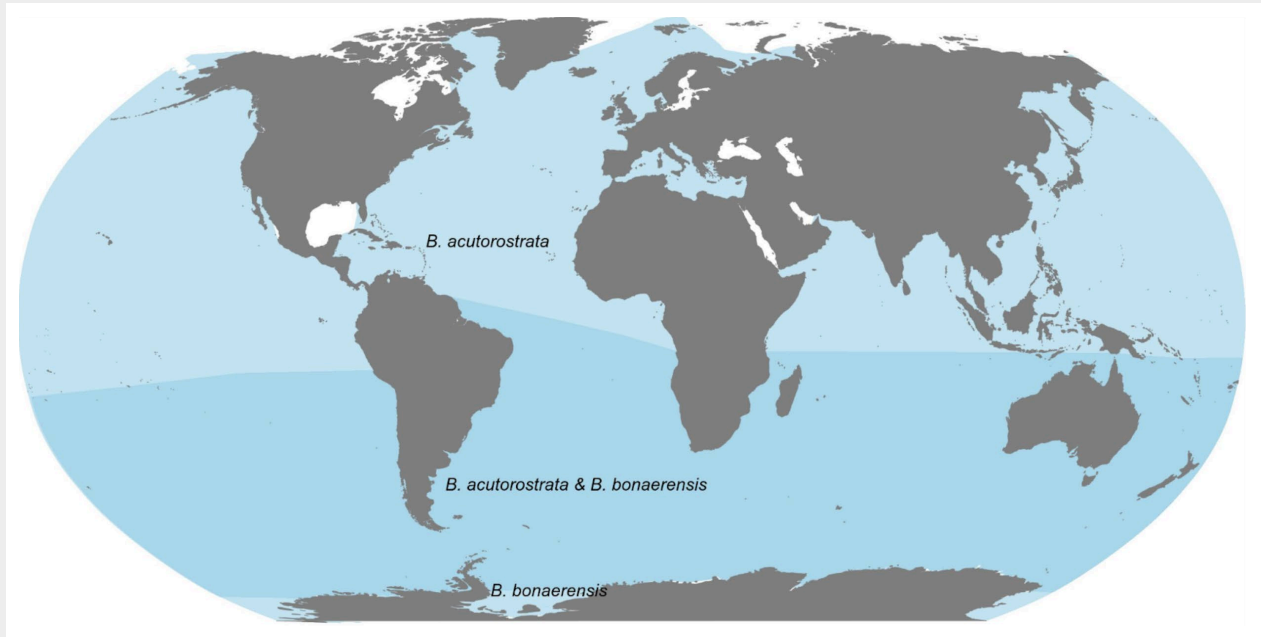


Figure 5 shows the distribution of the Antarctic Minke Whale (*Balaenoptera bonaerensis*), with the northernmost waters of Australia within the species' native habitat.¹²⁶

Underwater noise recordings from the Browse Development Area included calls from minke and dwarf minke whales. On a noise logger deployed to the south-east of South Scott Reef, “calls were detected for a few days each year in 2006 to 2008 between July and October.”¹²⁷ According to Woodside’s planning documents, it is considered likely that the Antarctic minke whale will occur in the project areas of both Scarborough and Browse.¹²⁸

Antarctic minke whales are known for their curiosity and have a habit of approaching boats, “coming from afar to cross the bow or run with the vessel”.¹²⁹ This may increase their vulnerability to anthropogenic pressures such as vessel strikes, particularly if it brings them closer to the project vessels used in the offshore oil and gas industry.

Antarctic minke whales and Scarborough:

A systematic impact assessment for Antarctic minke whales has not been carried out for the Scarborough project. Woodside’s justification for this is that the distribution of the species is “large” and there is “an absence of defined migration pathways” in the Project Area.¹³⁰ Woodside states that, “while individuals may occur [in the Project Area], they are unlikely to do so in large numbers or be undertaking a behaviour critical to their

survival”¹³¹ These statements are not based on any available data, and are assumptions. This does not mean that Antarctic minke whales will not be impacted by the project, especially as they are known to migrate to tropical waters to breed in the winter.¹³² Given the breeding grounds of Antarctic minke whales are largely unknown in Australian waters, Woodside cannot confidently assert that the Scarborough Project will not impact upon this species.

Antarctic minke whales and Browse:

Woodside’s draft EIS/ERD for Browse recognises that Antarctic minke whales are likely to occur in the Project Area; however, it states that there “are no key sites of aggregation or of known significance for these species within the EMBA”¹³³

Again, Woodside uses the lack of scientific understanding about the species, their distribution and breeding grounds, as evidence the project will not cause harm. However, not enough is known about Antarctic minke whales to ascertain the possible impacts the Browse project will have on the species if it were to go ahead, in particular from noise pollution, vessel strikes and ecotoxicological effects.



Antarctic minke whale surfacing, Antarctic Peninsula © Graeme / Adobe Stock



FIVE KEY RISKS TO THREATENED WHALES FROM WOODSIDE'S BURRUP HUB

1.

Seismic Surveys

Whales and other cetaceans rely on noise to communicate and feed, and are inherently noise-sensitive animals. From socialising to navigating and foraging, all cetaceans rely on their auditory functions at all times. Though it is not known the full-extent to which cetaceans are impacted by noise-related trauma, an ever growing body of research suggests that anthropogenic acoustic interference may seriously endanger the health and life of many different species of cetaceans.¹³⁴ Moreover, examinations of cetaceans involved in past mass-stranding events have allowed researchers to draw direct links between their fatalities and timely subsea anthropogenic acoustic events, such as military sonar use.¹³⁵

The airguns used in seismic surveys are one of the loudest sounds in the ocean, second only to military sonar.¹³⁶

In the waters along the Western Australian coast, where numerous threatened and migratory cetaceans co-occur with the expanding oil and gas industry, seismic operations pose a severe risk to these marine mammals. Seismic testing adds to the multiple other threats whales face, creating a particularly noisy environment. In instances where the auditory organs of individual whales have shown permanent signs of damage, studies have concluded that these changes have been directly responsible for the untimely demise of these individuals. Even in instances where the auditory trauma may be transient, and the cetacean experiences what is termed as a 'temporary threshold shift', this may render the animal unable to navigate, feed, communicate, and may also prove fatal.¹³⁷

The potential impacts of seismic surveys range in severity and include behavioural responses, masking or interference, stress and hormonal change, hearing impairment (whether temporary or permanent) and even death.

Potential impacts of seismic surveys on whales

BEHAVIOURAL RESPONSE

A disturbance of the cetacean's natural habitat. These may be displacement, avoidance, attraction, increased erratic or unpredictable movements. The type of disturbance and extent of disturbance is species and situationally specific.

MASKING OR INTERFERENCE

An interference with the animals ability to echolocate, navigate, communicate, and/or find food sources.

STRESS AND HORMONAL CHANGES

Upon repeated exposure, marine mammals may become overwhelmed and stressed, this may cause injury or death, but also has the potential for longer term problems for gestating females which may pass on hormones to the foetus.

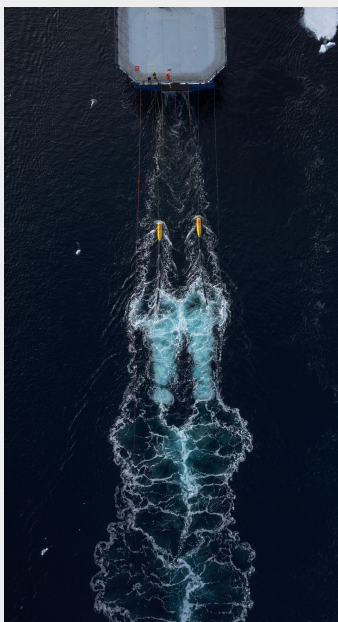
HEARING IMPAIRMENT

Temporary threshold (TTS) and permanent threshold shifts (PTS) can be extremely serious, and can cause temporary or permanent damage to the cetacean, in each case, an injury or fatality is possible.

INJURY OR DEATH

Alongside PTS, tissue damage caused from high-intensity sound at close range can cause bleeding, confusion, and death. As was the case in 2021 in China, where melon-headed whales live-stranded with severe hearing loss.¹³⁸

Seismic Blasting off North-East Greenland © Christian Åslund



Woodside Energy plans to undertake a seismic survey for its Scarborough project as early as Quarter 3 of 2022 if it receives the necessary approvals. The seismic survey will last 80 days and emit seismic pulses from an airgun over an Active Source Area of 5650 square kilometres.¹³⁹ These seismic pulses will be emitted every 5 seconds during day and night over the 80 day surveying period.¹⁴⁰

Woodside's Browse project is not as far along in its development compared to Scarborough; however, the company's draft EIS/ERD does indicate an intention to conduct seismic surveys for the project.¹⁴¹ No further details are provided.

2.

Operational Noise

Seismic surveys mark only the beginning of the noise pollution created by offshore gas extraction, and Woodside's Burrup Hub is no exception. There are numerous sources of noise pollution, which will have both independent and cumulative impacts on marine mammals.

Pile driving is required to install offshore project infrastructure into bedrock to support these heavy structures. While Woodside intends to use 'suction piling' methods for Scarborough and Browse, it does not rule out using 'impact piling'. Impact piling entails the use of large hydraulic hammers to repeatedly strike the pile (approximately once per second) to drive it deeper into the seafloor until the bedrock is reached. Impact piling produces "intense, broadband impulsive sounds that can propagate many kilometres from the impact location".¹⁴² It is recorded that as many as 3000-5000 blows of the hammer can be required per pile.¹⁴³ Depending on the distance between cetaceans and the noise source, pile driving has been found to have a range of impacts on cetaceans and other marine mammals - including PTS, TTS and behavioural changes.¹⁴⁴ While cetaceans are not the most sensitive marine mammals to pile driving, noise exposure thresholds for PTS and TTS can be surpassed if close enough to the noise source, which is considered to be within 100-300 metres.¹⁴⁵

In its Scarborough Offshore Project Proposal, Woodside commits to avoiding impact piling during the peak migration periods for pygmy blue whales (May-June and November-December).¹⁴⁶ However, it makes no commitment to avoid impacting upon other threatened and migratory or resident whale species who are known to occur in the area at different times of the year.

Vertical Seismic Profiling (VSP)¹⁴⁷ of the well locations at Scarborough and Browse will be an additional source of noise that poses risks to cetaceans. Vertical seismic profiling involves the lowering of one or more hydrophones into a well, and the emission of seismic pulses, with the aim of obtaining accurate data about the well's depth and other geological factors.¹⁴⁸ The impact ranges from vertical seismic profiling are smaller than with regular seismic surveys; however, the sounds of the

airguns used for VSP “are no doubt capable of disturbing behaviour of marine mammals”.¹⁴⁹ According to Woodside’s Browse project proposal, permanent threshold shift is predicted for low frequency cetaceans within 200 metres of the VSP, while temporary threshold shift is predicted within 1.69 kilometres at the Torosa gas reservoir.¹⁵⁰ Woodside claims that auditory injury (PTS) would only happen if whales “remained stationary in that range for the entire period of VSP”.¹⁵¹ The company does not provide any information regarding the duration of each bout of VSP and, as such, it is difficult to assess this claim against known whale behaviour.

A further source of noise pollution at Browse is the transfer of stored condensate on the Floating Production Storage and Offloading (FPSO) vessels onto condensate tankers.¹⁵² This activity will take place for approximately 30 hours every 2-4 weeks, producing continuous noise over that time.¹⁵³ Behavioural responses from cetaceans are predicted within 8.89 kilometres from the transfer activities, according to Woodside’s own modelling.¹⁵⁴

These activities in the Project Area often take place concurrently with drilling, and as such it is necessary to consider the impacts of cumulative noise. Alarmingly, when assessing the cumulative noise from condensate transfer with the drilling activity from the Mobile Offshore Drilling Unit, Woodside’s own modelling for Browse indicates that “noise levels of 120 dB (the marine mammal behavioural response threshold) are predicted to reach to the reef edge of North and South Scott Reef, and within the channel between North and South Scott Reef.”¹⁵⁵ This marine mammal behavioural response to continuous noise is expected within an area of 481.9 square kilometres around Scott Reef - of that, 274.6 square kilometres overlaps with pygmy blue whale possible foraging area.¹⁵⁶ Woodside appears to be in contravention of the *Conservation Management Plan for the Blue Whale*, which states that “anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging area.”¹⁵⁷

Seismic Blasting off North-East Greenland © Christian Åslund



3.

Ecotoxicological Effects

Anthropogenic pollutants in marine environments can pose a devastating ecotoxicological threat to many organisms across several trophic levels. In the offshore oil and gas industry, toxic pollutants may originate from routine operations like dredging, drilling, waste disposal and fire-fighting training.¹⁵⁸ Or, they may arise from accident events and malpractice, such as unplanned spills and the abandonment of infrastructure containing heavy metals and harmful plastics.

For whales, the impacts of anthropogenic pollutants account for many direct and indirect health impacts - some severe. From effects on food availability through to physiological impacts on internal bodily processes and reproductive abilities, the health of whales and cetaceans around the world is being massively affected by the activities of humans.

Polycyclic aromatic hydrocarbons (PAHs) are a class of organic chemicals that occur naturally in commonly exploited fossil fuels such as coal, oil, and gas.¹⁵⁹ The 'lipophilic' nature of these chemicals means they persist and concentrate in fatty tissues, and can be identified and studied in such tissue as they bioaccumulate up the food chain through each successive predator in both terrestrial and marine animals.¹⁶⁰ In relation to cetaceans, data collected over a number of decades has been able to provide a foundational base for understanding how environmental pollutants like PAHs may decrease cetaceans' immune function while increasing their vulnerability to infectious diseases.¹⁶¹

In environments where PAHs may be spilled or incidentally released during industrial operations, these chemicals may find their way into local whale populations through food-chain bioaccumulation during foraging and feeding.¹⁶²

Once this persistent organic pollutant has entered the environment it makes its way into smaller organisms that exist on lower trophic levels like krill, phytoplankton, and fish, before being consumed by larger predators like baleen and toothed whales. Similar persistent organic pollutants have been found in the fatty tissues of different deceased whale species around the world.¹⁶³

Although it has long been understood that exposure to PAHs and other persistent organic pollutants (POPs) have been associated with endocrine disruption, carcinogenicity, and altered reproductive ability in humans, various studies have begun to document similar health impacts in whales and marine mammals more broadly.¹⁶⁴ Moreover, as these toxins can be transferred from mother to calf pre- or post-natum, they have a serious ability to impact the growth and survival of offspring.¹⁶⁵

Persistent organic pollutants are common in the spillage and routine operational waste produced by offshore oil and gas industry operations. Through the direct ingestion of microplastics, or prey that contain one or a number of these POPs, not only can the health of individual whales be gravely compromised, but so too can the health and viability of their offspring be diminished as well.¹⁶⁶ These pollutants can, therefore, have serious population-level consequences for cetacean species, particularly as many species are still undergoing recovery from previous exploitation with long generation times and low fecundity.

4.

Vessel Strikes

Vessel strikes account for a large portion of cetacean injuries and deaths worldwide.¹⁶⁷ As such, they pose a serious threat to the longevity of many threatened and migratory whale populations. Inconsistent reporting is also a looming issue. Many instances of strikes and collisions go unnoticed and thus unreported.¹⁶⁸ This may perhaps be due to the size of some large vessels in relation to various species of whales. Although a lack of crucial whale collision data hinders a comprehensive understanding of the issue, the International Whaling Commission (IWC) has implemented a strategic plan to help better understand collisions while further aiming to prevent future mortalities.¹⁶⁹

The problem of vessel strikes is often compounded in areas deemed high risk where there is a common co-occurrence of whales and commercial vessels.¹⁷⁰ Therefore, in areas where there is high industry presence of offshore oil and gas operators the likelihood and frequency of vessel strikes on cetaceans should be thoroughly assessed.

Although research into vessel collisions with cetaceans has revealed that a number of factors such as species type, location, season, and vessel type may influence the likelihood of strikes - it appears as though speed is the anthropogenic factor that is both most determinant and perhaps also the easiest to mitigate against.¹⁷¹ While the type and size of the vessel had far less of an impact on likelihood of collision, the size of the vessel may influence the crew's ability to recognise that a strike has occurred, thus perhaps lowering the likelihood of it being reported.

With respect to baleen whales, it was found that the likelihood of a severe or lethal vessel collision increases significantly when vessels exceed 10-14 knots.¹⁷² The source of probable vessel-related threats from the oil and gas industry come from both Fast Crew Transfer Vessels, and in-transit dredging vessels. Capable of travelling as fast as 50 knots, Fast Crew Transfer Vessels are permitted by Woodside to travel at 30 knots,¹⁷³ while in-transit dredging vessels may travel between 12-16 knots when enroute to areas of operation.¹⁷⁴

Off the coast of Western Australia, where humpback, fin, and sometimes southern right whales socialise, forage, and migrate with their young, their species-specific habits put them at a great risk of vessel collision.¹⁷⁵ This increased risk is due to the whales being either at a state of rest, or otherwise unaware of ship presence,¹⁷⁶ and poses yet another challenge for commercial operators working in these environments during seasons when these whales are abundant or active near the project sites.

In the North Atlantic Ocean along the east coast of the United States, where right whales are common, and in some areas where up to one in ten humpback whales have been struck by vessels, the US government implemented 10-knot speed limits for vessels longer than 20 metres during high-risk seasons for whale activity.¹⁷⁷ Steps like these are one way that governments and industries can work together to ensure a reduced impact on cetaceans in areas of commercial operation.

Historically in North America a significant percentage of stranded whales have been found with lesions consistent with ship propellers or with collision marks on their bodies.¹⁷⁸ Similarly, off the coast of Australia, stranding data from the early 1900s through to the present day reveals similar injury-related trends.¹⁷⁹



9.7 metre dead whale found wedged on bow of tanker in Kurashiki City © Newsflash/Australscope

5.

Climate Change

The health of the largest animals on the planet and the health of the climate are interconnected. Cetaceans occupy higher trophic levels within marine ecosystems and due to their large body size, longevity and behaviour this group is vital for healthy marine ecosystem functioning.¹⁸⁰ The large whales act as nutrient recyclers by bringing minerals and substances like iron, phosphorus, and nitrogen to the surface, creating the perfect conditions for phytoplankton and small marine invertebrates to flourish.¹⁸¹ Many whales, for example humpback whales, migrate over large distances, sometimes ocean basins, cycling nutrients from one location to another. The deep diving whales, for example sperm whales, forage at depths for squid, bringing these nutrients to the surface as they defecate.

Studies have shown that in Antarctica, Southern Ocean sperm whales bring iron to surface waters providing essential nutrients that stimulate krill production and downstream carbon sequestration.¹⁸² These studies suggest that the recovery of great whale populations across our oceans can help to mitigate climate change.

This nutrient cycling process is known by some as the 'whale pump'. By pumping minerals to the surface whales are directly able to help phytoplankton bloom and form the base of the marine food webs.¹⁸³ Further, it is estimated that if global populations of phytoplankton were to increase by a mere 1%, this increase in photosynthesis would capture hundreds of millions of additional tonnes of CO₂ per year.¹⁸⁴ Given this direct link between carbon sequestration and whales, it should be logical that population recovery and species conservation are of the utmost priority.

Unfortunately, the pressures of climate change have compounded the various threats and hazards that face whale populations today.¹⁸⁵ For species like blue whales, whose global populations were reduced by an estimated 97% due to the grossly exploitative 20th century whaling practices¹⁸⁶ - it is difficult to imagine a full recovery for these peaceful giants.

Dampier Pluto Gas Plant in Western Australia © Alex Westover



At each polar region, climate change is affecting ecosystems at a terrifying pace¹⁸⁷ In key Southern Ocean foraging grounds, widespread shifts in ecosystem health as a result of climate change are warming oceans, shifting ice concentrations, and consequently reducing or dispersing krill and copepods - the two primary food sources for baleen whales.¹⁸⁸ A lower availability of concentrated prey forces whales to travel greater distances for less food.¹⁸⁹

This larger dispersion of prey necessitates a greater energy expenditure for individual whales while not necessarily guaranteeing the replenishment of those expended calories.¹⁹² In nursing mothers, this may further lead to malnourished offspring that are unfortunately more prone to predation, sickness, or strandings.¹⁹¹

These types of climate-related shifts in ecosystem health directly correlate with altered behaviour, and mean that whales may stay in certain foraging grounds for longer periods, or might travel outside of previously recognised migration and foraging pathways in order to find more food.¹⁹² Blue whale monitoring conducted by Charles Darwin University researchers off the coast of Timor-Leste last year found some whales very malnourished and in poor health.¹⁹³ Although it is normal for whales to lose weight in tropical waters and while they migrate southwards, researchers were shocked at the advanced state of malnutrition, “[i]n some animals, their ribs, vertebrae and backbones were very prominent and visible.”¹⁹⁴

Humpback whale in Antarctica
© Christian Åslund



Woodside's Burrup Hub is the most climate polluting project currently proposed in Australia, and will emit 6.1 billion tonnes of cumulative CO₂ equivalent (CO₂-e) emissions over the project's lifetime.¹⁹⁵ It is even more polluting than Waratah Coal's massive Galilee coal and rail project, which would emit a substantial 2.9 billion tonnes of CO₂-e over the mine's lifespan.¹⁹⁶ The growing threat of climate change has a direct impact on the health and longevity of many species of whales. As such, if Woodside's Burrup Hub goes ahead, it would be a major contributor to climate change and in part responsible for the impacts of warming oceans and polar ice melt on threatened and migratory whale species.

CONCLUSION

Woodside Energy's massive proposed offshore gas project, the Burrup Hub, places several threatened and migratory whale species at risk of behavioural changes, injury and even death. These whale species include pygmy blue whales, Antarctic blue whales, humpback whales, sperm whales, fin whales, sei whales and Antarctic minke whales. This project could seriously harm the chances of recovery and long term population growth for some of these already severely depleted species.

Inherent with any offshore oil and gas operations come the menacing risks posed by both seismic and operational noise. With respect to Woodside's Burrup Hub, deafening seismic surveys and profiling, in addition to the piercing sounds of pile-driving, are an example of just a few of the dangerous acoustic events that will take place. Whales critically depend on sound in all aspects of their life. Thus, the noise-related threats posed by Woodside's large-scale gas operations pose a serious risk to whale health and species longevity.

The ecotoxicological threats posed by Woodside's activities are also significant. From the immediate effects of a hydrocarbon spill to the leaching of chemicals, a variety of persistent chemical pollutants are at risk of gravely injuring and disrupting whales and cetaceans more broadly.

On top of this, vessel collisions are now one of the main causes of whale injury and death across the world, increasing with expanded offshore oil and gas operations. In high risk offshore environments where oil and gas operators frequently use large and high speed vessels, the deadly risk of collisions is difficult to mitigate against without the implementation of much lower speed limits than Woodside has planned.

Finally, with regards to climate change, anthropogenic global warming caused by the burning of fossil fuels is heating oceans, depleting crucial sea-ice cover and massively disrupting the dispersion and availability of vital food for whales. As changes in the health of the climate are further reflected in the health of the ocean, whales and their offspring will suffer from malnutrition and sickness. Signs of this are already present in many coastal oceans globally, and in some populations off the coast of Western Australia. Whales shape and maintain marine ecosystems and the climate through the nutrients they recycle,

and the blooms in climate-cooling phytoplankton that these bring. A healthy climate cannot exist without whales, and Woodside's highly-polluting Burrup Hub poses a direct threat to both.

Threatened and migratory whale species must be protected and conserved. Greenpeace Australia Pacific holds that these majestic, intelligent and social marine mammals are placed at unacceptable levels of risk due to the seismic surveys, operational noise pollution, ecotoxicological pollution, increased vessel traffic and the large contribution to global warming that the Burrup Hub project entails.



Newborn humpbacks taking their first breaths in Ningaloo reef, Western Australia © Alex Westove

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