

Strong partnerships, credible science and transparency are the key elements of our approach to environmental management.

We have a long history of collaborating with research and educational institutions to assist us in understanding the environments in which we operate, evaluate potential impacts and make sound decisions based on the best scientific knowledge. This allows us, along with governments and regulators, to responsibly conduct our business.

Transparency is central to our approach. Gathering scientific data in collaboration with our partners assists us to make the right decisions on environmental management. Sharing this data means we can increase environmental understanding and knowledge across the broader community. We therefore encourage our environmental partners to share the outcomes and knowledge of our collaborative science programs through presentations, publications and books.

For more than 20 years, we have been co-funding scientific studies to learn more about the environments we interface with and how they respond to human impacts. Below are the environmental peer-reviewed scientific publications from our science partners we have funded.

## Coral Reefs

With many of our activities adjacent to coral reefs, we've chosen to collaborate with some of the world's leading research organisations to understand how these reef environments function.

Bessel-Browne, P, Negri, AP, Fisher, R, Clode, PL, Duckworth, A & Jones, R 2017, 'Impacts of turbidity on corals: The relative importance of light limitations and suspended sediments', *Marine Pollution Bulletin*, vol. 117, pp. 161-170.

Flores F, Hoogenboom, MO, Smith LD, Cooper, TF, Abrego, D, & Negri AP 2012, 'Chronic exposure of corals to fine sediments: lethal and sub-lethal impacts', *PloS One*, vol. 7, pp. 377-395.

Gilmour, JP, Smith, LD, Heyward AJ, Baird AH, & Pratchett MS 2013, 'Recovery of an isolated Coral Reef System following severe disturbance', *Science*, vol. 340, pp. 69-71.

Halford, AR, & Caley, MJ 2009, 'Towards an understanding of resilience in isolated coral reefs' *Global Change Biology*, vol. 15, pp. 3031-3045.

Heyward, A, Colquhoun, J, Cripps, E, McCorry, D, Stowar, M, Radford, B, Miller, K, Miller, I & Battershill, C 2018, 'No evidence of damage to the soft tissue or skeletal integrity of mesophotic corals exposed to a 3D marine seismic survey', *Marine Pollution Bulletin*, vol. 129, pp. 8-13.

McCauley, RD, Fewtrell, J, Duncan, AJ, Jenner, C, Jenner, M-N, Penrose, JD, Prince, RI, Adhitya, A, Murdoch, J & McCabe, K 2000, 'Marine seismic surveys – a study of environmental implications', *APPEA Journal*, vol. 2000, pp. 692-706.



Miller, IR, & E, Cripp 2013, 'Three Dimensional marine seismic survey has no measurable effect on species richness or abundance of coral reef associated fish community', *Marine Pollution Bulletin*, vol. 77, pp. 63-70.

Oppen, V, JH, M, Bongaerts, P, Underwood, JN, Peplow, LM, & Cooper, TF 2011, 'The role of deep reefs in shallow reef recovery: an assessment of vertical connectivity in a brooding coral from west and east Australia', *Molecular ecology*, vol. 20, pp. 1647-1660.

Underwood, JN, Richards, ZT, Miller, KJ, Puotinen, ML & Gilmour, JP 2018, 'Genetic signatures through space, time and multiple disturbances in a ubiquitous brooding coral', *Molecular Ecology*, vol 27, pp 1586-1602.

Underwood, JN 2009, 'Genetic diversity and divergence among coastal and offshore reefs in a hard coral depend on geographic discontinuity and oceanic currents', *Evolutionary Applications*, vol. 2, pp. 222-233.

## Dredging

Dredging is required to maintain our and Australia's shipping activities. Woodside are part of the Western Australian Museum Science Institution (WAMSI) Dredging Science Node developed to address key areas of uncertainty in the prediction and management of the impacts of dredging.

Dredging Science Node, WAMSI: <https://www.wamsi.org.au/dsn-research-articles>

Scientific  
Publications

200+

Journal  
Citations

4000+

Years of  
research

20+

### Cetaceans

Our operations are within areas where cetaceans pass through on their annual migrations. We collaborate with scientists enabling them to conduct research, and better understand these journeys.

Dunlop, RA, Noad, MJ, McCauley, RD, Kniest, E, Slade, R, Paton, D & Cato DH 2017, 'The behavioural response of migrating humpback whales to a full seismic airgun array', Royal Society Publishing, vol. 284.

Dunlop, RA, Noad, MJ, McCauley, RD, Kniest E, Slade, R, Paton, D, & Cato, DH 2016, 'Response of humpback whales (*Megaptera novaeangliae*) to ramp-up of a small experimental air gun array', Marine Pollution Bulletin, vol. 3, pp. 72-83.

Hodgson, A, Kelly, N & Peel, D 2017, 'Unmanned aerial vehicles for surveying marine fauna: assessing detection probability', Ecological Applications, vol. 27, pp. 1253-1267.

Hodgson, A, Kelly, N & Peel, D 2013, 'Unmanned Aerial Vehicles (UAVs) for Surveying Marine Fauna: A Dugong Case Study', PLoS ONE, vol. 8, no. 11.

### Decommissioning

In order to understand the impact of leaving infrastructure in-situ as opposed to removing it from the marine environment, Woodside has commissioned scientific studies to better understand and assess fish diversity and abundance on our existing offshore infrastructure.

This science will help inform decommissioning strategy decision making for industry and regulators.

Bond, T, Langlois, TJ, Partridge, JC, Birt, MJ, Malseed, BE, Smith, LD & McLean, DL 2018, 'Diel shifts and habitat associations of fish assemblages on a subsea pipeline', Fisheries Research, vol. 206, pp. 220-234.

Bond, T, Partridge, JC, Taylor, MD, Langlois, TJ, Malseed, BE, Smith, LD & McLean, DL 2018, 'Fish associated with a subsea pipeline and adjacent seafloor of the North-West Shelf of Western Australia', Marine Environmental Research, vol. 141, pp. 53-65.

McLean, DL, Partridge, JC, Bond, T, Birt, MJ, Bornt, KR & Langlois, TJ 2017, 'Using industry ROV videos to assess fish associations with subsea pipelines', Continental Shelf Research, vol. 141, pp. 76-97.

McLean, DL, Taylor, MD, Partridge, JC, Gibbons, B, Langlois, TJ, Malseed, BE, Smith LD & Bond, T 2018, 'Fish and habitats on wellhead infrastructure on the north west shelf of Western Australia', Continental Shelf Research, vol. 164, pp. 10-27.

### Noise

Understanding impacts of noise allows us to better manage and minimise potential impacts.

Erbe, C, McCauley, R, McPherson, C, & Gavrilov, A 2013, 'Underwater noise from offshore oil production vessels', Journal of Acoustical Society of America, vol. 133, pp. 466-470.

Woodside Energy Limited 2008, 'Browse Maxima 3D MSS Monitoring Program - Impacts of Seismic Airgun Noise' Information Sheet 1-4.



### Dampier Archipelago

DiBattista, JD, Travers, MJ, Moore, GI, Evans, RD, Newman SJ, Feng, M, Moyle, SD, Gorton, RJ, Saunders, T & Bery, O 2017, 'Seascape genomics reveals fine-scale patterns of dispersal for reef fish along the ecologically divergent coast of Northwestern Australia', Molecular Ecology, vol. 26, no. 22, pp. 6206-6223.

Kathryn McMahon, K, Evan, RD, van Dijk, K, Hernawan, U, Kendrick, G, Lavery, P, Lowe, R, Puotinen, M & Waycott, M 2017, 'Disturbance, not latitude, is an important driver of clonality in tropical seagrasses', Frontiers in Plant Science, vol. 8, pp. no. 2006.

