

AIR *Ecology*

~ *Words* ALAN DEANS ~

DEEP & meaningful

Marine biologists and oil companies pool resources to explore the ocean's depths – with surprising results.



SEALING FATE
Fur seals soaking up the sun on an oil rig; a rig in Australian waters (opposite).

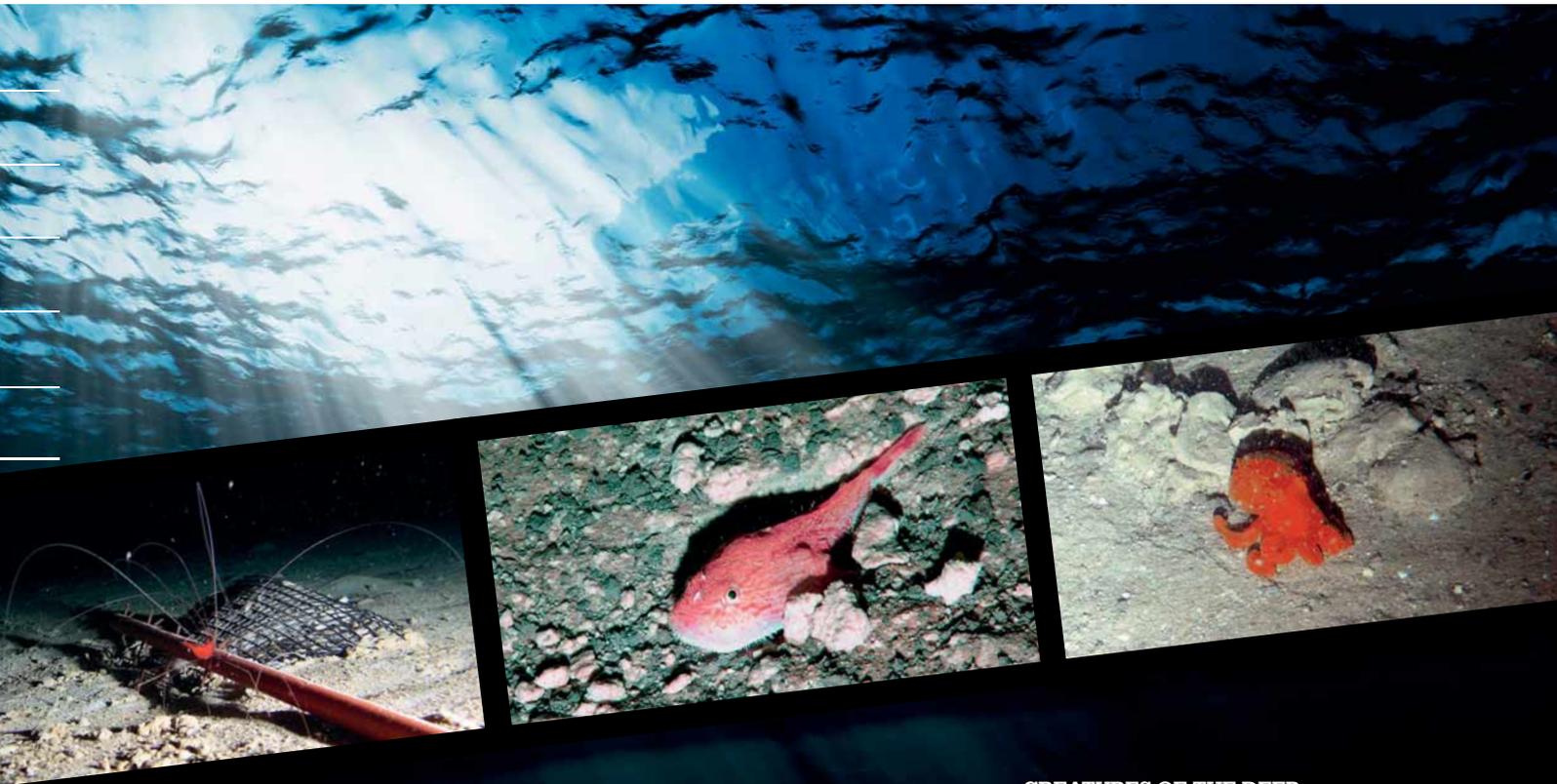
IN AN AMBITIOUS EXPERIMENT that pairs naturally sceptical academics with gung-ho oil corporations, university research teams are undertaking the first extensive and long-term scientific studies into the ecology within Australia's deepwater boundaries, ranging from several kilometres up to hundreds of kilometres offshore. The mysteries of Australia's final frontier are painstakingly being revealed by a combination of intensely inquisitive minds, technology and government research grants. The results so far have astonished many. Hundreds of new species have been identified and await documentation.

"Weird" doesn't start to describe many of them. Armies of sea urchins are a favourite of project leader marine biologist Adele Pile. "There are massive herds," she says. "We are familiar with the ones in shallow water that eat kelp and are a problem in Tasmania; these ones have 30cm-long spines and are carnivores. They will eat each other. We have seen a giant pincushion of them, about

30m by 40m, moving across the sea floor eating everything in their path. You wouldn't want to get in their way."

Gigantism favours the deep, as any Jules Verne reader knows. However, Danielle Skropeta, one of the team leaders working with Pile, doesn't volunteer a Verne-style giant squid as her pet, although one has been filmed. For her, it's the creature that grabbed a bacon bait and wouldn't let go. "It was an isopod, the cockroaches of the sea. This one was larger than a football, with legs and claws." It was up to 30 times the size of its shallow-water cousins. Skropeta also nominates an as-yet unclassified and unnamed white fish that walks on long fins. "We saw it get attacked by a shark and then run on its fins to safety under a sub-sea [oil] structure."

Not all of the discoveries have a science-fiction edge. Reefs of multicoloured sponges have been studied at depths of 150m in the Bass Strait, among which can be found seahorses and seals foraging for fish. Fur seals often sun >



CREATURES OF THE DEEP

Left to right: long-legged spider shrimp, pink frogmouth, benthooctopus; the underside of an isopod (opposite).

themselves on the nearby oil platforms. Deep sightings have been made of marlin and off the west coast of Australia grey nurse sharks cruise. These fearsome-looking creatures are endangered on the east coast, but now there is hope that sizeable populations may survive in New South Wales and Queensland, in waters yet to be explored.

Inevitably this raises questions about how vulnerable such ecosystems are to incursions by oil drillers, or other interferences such as fishing. For the time being, however, the project relies on access to the oil industry's boats and rigs and, critically, to its deep-seeking Remotely Operating Vehicles (ROVs), which provide the scientists with new insights into the deep (up to 200m – far beyond the limit of scuba divers). Typically, these expensive gadgets sit idle on the surface for half their life, waiting for maintenance or breakdown work. That gives plenty of time for scientists to probe with the ROVs' remote-controlled arms, claws, lights and cameras within a radius of about 200m of any rig.

Mark McCallum, deputy CEO of the Australian Petroleum Production and Exploration Association (APPEA), says his members are backing the work because they need to understand more about our oceans, even if there is a risk that the scientific findings won't be to their liking. "We can use the knowledge to better plan, time and execute our projects with lower environmental impact," he says. Regulation on where and when drilling can take place and what remedial work needs to be done by oil companies when the well runs dry is tougher now than ever before. The rules now require every piece of equipment – wellheads, piping, pumps and rigs – to be removed. It's an expensive exercise and some, including the scientists, accept that it may not be needed in all cases.

Internationally, equipment can be left in place or dumped nearby if there is little chance of damage to sea life. Occasionally platforms stay in place for fishing or have an afterlife as light beacons. One of Adele Pile's group sits on

a government panel that is reviewing Australia's removal policy. There is an opinion that biodiversity could benefit if equipment stays. Rusty steel structures provide reef-like environments where previously none may have existed, attracting algae, corals, sponges and fish in prolific numbers. Entire new food chains can form where previously the sea floor was sandy and lifeless.

The research project is being run by SEA SERPENT, the South-East Asian arm of a global group called Scientific & Environmental ROV Partnership using Existing INdustrial Technology. It draws on scientists from Sydney University, University of Technology Sydney, University of WA and University of Wollongong. There is also a chemist on deck because there is a good chance of discovering compounds that could revolutionise medicine.

The project, says Pile, is not undertaking applied science for companies, be they oil or drug companies. "We are into blue-sky science. A collaborative effort like this is the only way that we can do it. We are about discovery and understanding how ecosystems function and what organisms down there do."

Team members say there has been no interference with their work. At times they are even taken to secret oil well locations, demonstrating a high level of trust from the oil industry. But a greater freedom is their right to publish their findings, not having them secreted in a corporate archive. The results are already spread around the academic world so that intensive studies can be pursued by other researchers. More companies are signing up to SEA SERPENT, some Australian, but others from the US and Europe. For the project's first five years, the focus has been on the Indian Ocean off WA and the Southern Ocean and Bass Strait off Victoria, South Australia and Tasmania.



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The oil industry is currently laying plans to reach into the seas off the Northern Territory and NSW.

Whale research was of importance in all of those waters to scientists and oil drillers alike long before the current project began. Not only are many species depleted, but areas that are prospective for oil frequently coincide with migratory routes. Rob McCauley has undertaken whale counts for 15 years. He has also studied the impact of seismic surveys – when loud airguns are fired so the resulting soundwaves penetrate the earth's structure and bounce back to provide maps of where likely oil accumulations lie. His findings showed that whales can suffer hearing damage. Tight restrictions now apply to the use of airguns.

McCauley has broadened his work lately to include the deployment of sophisticated sound-monitoring devices that record whale songs. "There is a lot we don't know about whales, but now we can pick up data on their migratory patterns. Sounds of Bryde's whales have been recorded for years, but until recently we did not know what the noises were. We now know that Bryde's are everywhere. The trouble has been that you can't see them easily on the surface because they are thin and narrow."

Fishery research is a major part of the work because exclusion zones are imposed around oil rigs. While not designated as such, oil-production areas are safe breeding grounds for fish and there is a belief that sanctuaries should be created to ensure fishing is excluded long after the oil has dried up. SEA SERPENT's fish expert David Booth wants the issue to be studied in greater detail.

"It is still unknown what is down there with regards to fish populations," he says. "When a company is told to remove old well caps, for instance, they are removing goodies that have biodiverse interest. If they could stay >



STALK THE PLANKTON
Slimline members of the rorqual family, Bryde's whales (*Balaenoptera edeni*) are hard to spot.

there, it might help foster whole populations of fish. We are seeing sharks and plenty of large fish like snapper.” Fish larvae are constantly moving, making them hard to count. When ROVs go down with their lights, the larvae stop swimming and can be studied in detail.

While the biologists in the group are counting fish and taking photos, Danielle Skropeta is gathering samples of the chemicals that sea creatures emit. Invertebrates and micro-organisms often squirt noxious fluids, as a squid does its ink, for protection. “Sponges, corals and anemones are powerhouses of chemicals,” Skropeta says. “Already 60 per cent of the drugs in use today come from nature, things like aspirin, morphine and penicillin. Who knows what we might find in the deep seas where we are discovering so many new creatures.” New anti-cancer compounds have been synthesised from the poison of sea squirts, as has pain medication many times more powerful than morphine from a variety of mussel shell.

While the initial results of this work are fascinating to outsiders, the cloistered world of marine biology is also delivering its verdict. Young scientists are rushing to take part. Whereas once the drawcard was the idyllic life of sunny coral atolls on the Great Barrier Reef, now it is the murky depths they seek.

Adele Pile counts 40-50 scientists in her group, including students. Asked what drew her, Skropeta answers that the work is logistically difficult and prohibitively expensive, but the deep sea is where the discoveries are being made. “Now that we have funding, it has become a long-term project for me.”

David Booth says his job involves a lot of spadework because it is hard to ask sophisticated questions when he doesn't know the names of the fish he is seeing. “The negative thing is that it's all pioneering. The positive thing is that it's all pioneering. No-one else is doing it, so when you get results, it will be a world first.” ❖