

UNCONVENTIONAL SHALE GAS FRACKING SUBMISSION

My first introduction to the concept of unconventional shale gas fracking was in November 2012 when the “West Australian” published a WA governmental proposal to grant petroleum exploration permits under Section 29 Native Title Act 1993 (Commonwealth) in the Perth Basin. The permits covered the mainland, islands, and ocean to the north and south of Jurien Bay. Twenty four areas were subject to the application and included Lancelin, Edwards, Wedge, Green, Whittell, Butler, Cervantes, Favourite, Sandland, Fisherman, Lipfert, Milligan and Snag Islands, part of Boulanger Island, North Ronsard, Ronsard, South Ronsard and Red Rocks and part of Inner 7 Foot Rocks.

Norwest Energy NL was one of the companies seeking an exploration permit stretching from Lancelin to just north of Green Head, including Beekeepers Nature Reserve in its entirety (bordering the Lake Logue-Indoon system – a wetland listed on the Register of the National Estate which gave it automatic protection under the EPBC Act), about a third of Lesueur National Park and Drovers Cave National Park, a portion of Leda Nature Reserve, Nambung National Park in its entirety, two thirds of Wanagarren Nature Reserve and half of Nilgen Nature Reserve.

According to the “Dept. of Environment & Conservation Resource Condition Report for a significant Western Australian Wetland- Lake Logue - 2008”, *the Lake Logue Nature Reserve was gazetted for the purpose of conserving flora and fauna. Its location in relation to the Tamala Limestone karst of Beekeepers Nature Reserve makes it important to significant stygofauna and troglofaunal communities that occur in the area*”.

With the need for careful management of Australia’s groundwater resources now recognised and acknowledged, this submission concerns subterranean aquatic stygofauna - a specialised group of invertebrates (*“the little things that run the world”*, Edward Wilson, University Research Professor Emeritus, Harvard) which live within groundwater ecosystems, adapted to living in permanent darkness. Rarely more than 5mm long, blind, with no body pigment and highly developed sensory structures, they play a crucial role in the biological filtration system of aquifers; exchanging water, nutrients, organic matter and organisms between groundwater and the surface, as well as being predictors for water quality. The ecological health of many rivers is reliant on their exchange with groundwater, and stable ecosystems depend upon their existence. Aquatic ecosystems in karstic (limestone) cave environments (also fissured rock such as granite, and porous rock like alluvium), often with interconnected voids, are the habitat of stygofauna which are highly sensitive to disturbances to their environment. Karst limestone, fractures and gravels are important for the survival of rare and localised stygofauna. If one locality is wiped out, it is unlikely that they will be replaced.

Being groundwater dependent, changes in groundwater quantity and quality can severely affect stygofauna, however for the last century we have unknowingly been pumping groundwater for domestic, agricultural and industrial use. (*“...we have paid little attention to what happens to the aquifers and their living animals, with no realisation that pumping activities may actually destroy the creatures’ habitat”* - Professor Simmons, National Centre for Groundwater Research & Training).

A Woodada Deep-01 hydraulic fracture stimulation operation located in the Lake Logue Nature Reserve in the Mid West, was drilled in April 2012, with five aquifers - Yarragadee, Cattamarra, Eneabba, Lesueur and a superficial aquifer - all connected by major faults - in the vicinity.

Public and private sector water abstraction and dewatering of aquifers for mining below water tables are major threats to stygofauna (*Stygofauna communities of north-west Western Australia* <http://www.environment.gov.au>) A 2012 WA Environmental Protection Authority report states that “*knowledge of habitat requirements and distributions for many subterranean species remains poor.*” They are sensitive to excavation of rock; groundwater extraction re-injection; changed surface topography; alterations to groundwater quality including waste water; introduction of toxins or radiation; salinization due to pit voids or intrusion; vegetation clearing. As early as 1950, the importance of stygofauna in WA was recognised, and they were protected under the WA Wildlife Conservation Act, the Conservation & Land Management Act 1987, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

In her Thesis “*Are Stygofauna Really Protected in Western Australia?*” Sarah Elizabeth Goater BSc(Env)Hons. UWA – addressed the question of how well the regulatory framework in WA is designed to protect stygofauna. The current scientific paradigm of the early 1990s was applied to her study in the north west of WA because of international recognition of its stygofauna. Her case-study findings from Exmouth indicated that while legislative tools are in place to meet the overall objective of stygofauna protection, the regulatory framework to administer them combined with a dearth of local knowledge of stygofauna biology hinders effective protective measures from being realised. She found that regulatory mechanisms to protect stygofauna indirectly via protection of the groundwater resources upon which they depend are limited because of focused application of large-scale projects, as opposed to a state-wide or catchment-scale approach .

Goater concluded that the current regulatory frameworks aimed at conserving stygofauna in WA and the groundwater resources they depend upon do not provide adequately for their protection and environmental commitments to “protect and maintain” stygofauna populations could not be met using traditional sampling methods and monitoring data. She reported that little consideration was given to competing priorities between environmental laws for the protection of stygofauna and the promotion of groundwater resources developments for human consumption.

Australia is now regarded as one of the world’s hotspots for subterranean biodiversity, with an estimated 4,000 different species dating back to Gondwana and Pangaea 200 million years ago. Their ability to disperse and recolonise areas where groundwater ecosystems have been impacted is limited. According to Professors Craig Simmons and Peter Cook of the National Centre for Groundwater Research and Training, and Professor Bill Humphreys, Senior Curator Biospeleology (subterranean biology) @ Terrestrial Zoology, 750 species entirely new to science have been discovered in the last fifteen years in the Kimberley, Pilbara and Yilgarn.

With shale gas fracking requiring deeper water pumping than that required for coal seam gas and a conservative estimate from the Australian gas industry re water usage providing a figure of 11 million litres per frack, multiple fracks are usually required. “*Contamination of freshwater aquifers can occur due to accidental leakage of brines or chemically modified fluids during shale gas drilling or production; through well failure, via leakage along faults, or by diffusion through over-pressured seals.*” (Dr. Colin Hunt, 2013 “Securing Australia’s Future” report from the Australian Council of Learned Academies). Dr Hunt concluded that shale gas production costs in Australia are likely to be significantly higher than those in North America, and that “*most environmental impact assessments were deficient in their analysis of how a project would contribute to cumulative environmental impacts of water use and disposal associated with gas and coal mining*”.

Most Midwest WA towns’ water supplies are supplied by schemes operated by the Water Corporation, with their source mainly from bores. The long term ecological and economic future

cannot be served by aggressive pumping for water hungry shale gas fracking, especially with a steadily falling rainfall trend due to accelerating climate change. Everything is connected. With groundwater making up 97% of all the available fresh water on the planet and accounting for 40% of humanity's total water supply, West Australians together with everyone on this planet are in for a rough ride ahead. If we are unable to protect *"the little things that run the world"*, there is no hope for our future as a species.

SUBMISSION IMAGES

The following images were taken at Lake Logue Nature Reserve in 2011.

The final two images were taken in the Mid-West in 2010 - abandoned site.













Recommended reading:

<http://www.derrickjensen.org/2016/08/top-10-ways-to-destroy-all-the-water-on-earth>

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