To: Mr Rob Hansen, Committee Secretary, Agriculture and Environment Committee, aec@parliamentqld.gov.au

From Author: Cindy Eiritz [redacted]
Strategic Development Manager on behalf of Healthy Soils Australia,
www.healthysoils.com.au

Re: Healthy Soils Australia **Supplementary Submission** to your Nature Conservation (Special Wildlife Reserves) and Other Legislation Amendment Bill 2017

Dear Mr Hansen,

We greatly appreciate you allowing a one day extension to enable us to package some more useful information together for you.

Sincere apologies for our not hearing about your important work earlier.

We have looked and considered extensively what is the most concise, most useful information to share with you. Our conclusion is to alert you to a Queensland case study, a Queensland ecological grazing system and a Queensland scientific study. These provide evidence as to why ecological grazing should be allowed in all state-owned protected areas, forest reserves and state forests, and existing private protected areas (such as nature refuges). We completely agree with your Bill that continuous set stock grazing is not compatible and should not be allowed.

Myself and our Ecologist would greatly appreciate an opportunity to answer questions, collate more research and/or brief you further. Apologies again for not having had more time to bring this vitally important information to you. And like I said we'd love to do more work condensing the science and practice for your ease.

Warmest regards
Cindy

Enclosures:
1. From Degraded Property to Environmental Offset
2. Cell Grazing – An Ecological Management Tool
3. Specific Queensland Research Supporting Ecological Grazing

ENCLOSURE 1 : FROM DEGRADED PROPERTY TO ENVIRONMENTAL OFFSET

Queenslanders Shane and Shan Joyce took over operation of degraded Central Queensland property, Dukes Plains, 1982. In turning it into an ecologically and financially viable pastoral operation, they restored, regenerated and revitalised it so well that 21 years later it was sold as an environmental offset to fund their retirement.

"*ORIGIN'S Australia Pacific liquid natural gas (LNG) venture has snapped up cattle station Dukes Plain, near Theodore in Central Queensland ... The 7900-hectare property will be used by the liquefied natural gas venture to offset the environmental impacts of its export project, which includes gas wells, pipelines and processing plants...*

Mr Joyce said. "I am 63 now and it's time for me to extract ... to get our funds out of the land means we can set ourselves up for retirement."(1)

The following narrative journey is an excerpt from the Dukes Plains case study in environmental NGO Soils for Life's report *Innovations for Regenerative Landscape Management*. Soils for Life is founded and chaired by Australia's former Governor General, Major General The Honourable Michael Jeffery. Their work includes learning from those who are successfully practising regenerative landscape management (2) and encouraging wide adoption of these practices (3)

"Over the years they adopted new management practices: ceasing the use of fire, retaining timber and valuing regrowth, prioritising pasture diversity and native pastures, and employing low production costs and inputs..." In 1993 they commenced a transition to the exciting ecological production technique called cell grazing. Cell grazing is an ecological grazing system developed by Queensland educator Terry McCosker and his company Resources Consulting Services (4)(5). It's principles are at Enclosure 2 (6) of this supplementary submission. Shane and Sharn believe that "mixing their own and other peoples' experiences has helped them in their successes and in achieving their vision for the landscape at Dukes Plains." Here is their story.

Excerpt from Soils for Life Regenerative Agriculture Case Study (7)

"Shane Joyce shakes his head in response to the previous vegetation management practices and how they are today costing him money.

"*Through the 1950s and 1960s the brigalow and softwood scrubs were pulled with bulldozers, let lie for a couple of years, then burned and aerially seeded with a mixture of grasses. Subsequent timber regrowth was dealt with through burning and mechanical means from the 1970s. With fuel price rises and commodity price declines, by 1982 the cost of maintaining the pasture was beginning to outstrip the grazing return.*"

Management practices changed, fire ceased being used on the property in 1977 and regeneration was allowed to occur naturally. Some strip removal of regrowth was performed in 1988 - corridors were blade ploughed for 120 metres with 30 metre shelterbelts, and later narrower corridors of six to seven metres with same sized shelterbelts on another part of the property. Original intentions were to undertake further clearing and thinning, however this was never performed, particularly once production rates were observed.

"*Areas of natural revegetation with around 40% canopy cover are yielding nearly 40% greater return than those areas that were completely cleared. Counter to the long held views that the land needed to be cleared to provide more pasture for grazing, the trees are instead providing protection to the pastures and soils, allowing for much better growth and increased fodder for the cattle. Water loss through evaporation is better controlled, and the trees – notably the narrower corridors more so than the wide ones – protect the pastures from wind and frost damage. Increased diversity in grasses is also evident.*"

Shane points out where up to 50% of previously cleared land on *Dukes Plain* has now retained regrowth. He estimates that around a 40% canopy cover appears to be optimal in the brigalow landscape, and natural thinning seems to be occurring.

He also points out that previous management practices had pastures which were developing into monocultures of buffel grass (*Cenchrus ciliaris*), and native grasses were being dominated by unpalatable species such as white spear-grass (*Aristida leptopoda*), wiregrass (*Aristida calycigna*) and yabilla grass (*Panicum queenslandicum*). "Grass diversity, particularly native, increased quite quickly after establishment of cell grazing. Native grasses which emerged and rapidly increased include curly Mitchell (*Astrebla lappacea*), hoop Mitchell (*Astrebla elymoides*), kangaroo (*Themeda triandra*), flinders (*Iseilema membranaceum*), satin top (*Eulalia aurea*), Queensland blue (*Dichanthium sericeum*) and sorghum almum."

As a result the 'monoculture' species decreased, though there seems to be a natural increase and decrease in the predominance of all species over time, with native grasses growing into introduced pastures and vice-versa. When asked about the mix of native grasses into improved pastures, Shane says that it is harder for native grasses to dominate as they have longer rest and regeneration requirements as well as unpalatable stages of growth. "Production does not always support the predominance of natives, for example kangaroo grass is the first to emerge in spring, and hence is eaten first. However, the regular movement of stock – which can also be manipulated and controlled with selected rotation – allows for animal transfer of grass seed to desired areas and some influence on pasture variety." The cow tractors help again.

The Joyces use no chemical interventions and are not attempting to remove any particular species from their pastures as greater resilience is obtained through biodiversity. Also, over time cattle grazing preferences have been observed to change. Native legumes also multiplied naturally with cell grazing, and the leguminous shrub *Leucaena leucocephala* has also been randomly introduced to enhance animal protein supply. Protected for a couple of years until they are established, these shrubs are a favoured fodder for the cattle, which quickly strip the leaves in their couple of days in the paddocks.


Left: Pasture grasses growing under eucalypt. Right: Recently grazed grass under brigalow

Cell grazing, more fertile soils and vegetation protection has also allowed for grasses to grow right up to trees in both the brigalow and eucalypt. Some areas of high animal traffic are still bare, but this too is constantly improving.

A single strand electric fence easily contains the cattle which wait patiently to be moved to the next paddock.

Overall, recovery periods with cell grazing provide for root development and better and continuous ground cover (which, as previously mentioned, equates to increased rainfall infiltration and water holding capacity). Pasture root systems are visible down 1.7 metres.

Shane is insistent that maintaining a minimum pasture height and having sufficient leaf allows grasses to grow from sunlight energy rather than from root reserves so pastures are more resilient and recover quickly with minimum impact on the root system.

Stock have become used to being handled as a consequence of the grazing strategies. Despite only being held by a single wire electric fence, the stock do not try to push through fences as the grass is not always greener on the other side, and regardless, they know they're going to be moved in a day or two, so are always content.

"Diversity in pastures of both native and introduced species is extensive. There is an increase in leguminous shrubs and forbs across the paddocks. Ground cover has increased and regeneration is occurring naturally. In areas where trees numbers are high (too many stems per hectare). a natural self thinning appears to be occurring.

Vegetation linkages are severely limited to the north and east by clearing of surrounding properties, however linkages to south and west are strong due to the topography, which has limited clearing. The area which had received wide strip clearing in the 1980s showed greater biodiversity than the narrow corridors, but this was due to its maintaining connection with surrounding remnant vegetation, whereas the other area had been previously disconnected. Across the property increased diversity and population of birds has been observed over time. Regrowth areas provide wildlife corridors to the undeveloped ridge country and habitat for many more bird species, including significant numbers of small birds due to regeneration of small prickly shrubs which provide habitat that used to be burned.

Earthworms, spiders, ant and other insect numbers and types have increased. The vegetation has also provided the ideal habitat for the orb weaving spiders"

ENCLOSURE 2 : CELL GRAZING – AN ECOLOGICAL MANAGEMENT TOOL

"Cell Grazing is ... the result of continuous and ongoing development overseas and in Australia since the 1940's. Cell grazing occurs when grazing management meets .. (certain) principles. The system is defined by principles rather than rules because it needs to be continually adapted to the individual circumstances. The following principles have been developed … over the last 25 years based on experience in Australia, South Africa and the USA. The principles have evolved based on the experience of thousands of graziers on three continents. (6) (These principles are) :

1. **PLAN, MONITOR and MANAGE GRAZING.**
1. Establish a grazing management plan where graze period is calculated based on rest period and number of paddocks resting, corrected for paddock area and inherent carrying capacity of each paddock.
2. Monitor grazing period, cycle length, rest period, paddock yield, decision making and stocking rate using a Grazing Chart or equivalent.
3. Plan for events such as drought, fire and flood and act on the plan. Eg. choose a date (known as a Critical Rain date) where destocking will commence if seasonal rains are lower or later than expected.

2. **PLANTS NEED ADEQUATE REST.**
1. Rest Period is a function of plant growth rate.
2. Ensuring each paddock has adequate water and fence infrastructure to water and control large mobs.
3. Manage grazing to maximise pasture growth and provide sufficient rest so as to promote greater root development and desirable pasture species.

3. **STOCKING RATE is adjusted to match CARRYING CAPACITY.**
1. Carrying Capacity (ground up SUPPLY) is the amount of feed produced.
2. Stocking Rate (top down DEMAND) is the number of standard animal units used to consume the Carrying Capacity.
3. Use a Grazing Chart or equivalent to plan and monitor both Stocking Rate and Carrying Capacity.
4. Manage stock to avoid overstocking.
5. Monitor herd structure, class and productivity.

4. **MANAGE LIVESTOCK EFFECTIVELY.**
1. Ensure sufficient water quantity and quality.
2. Minimise the distance animals have to walk to feed.
3. Monitor and manage animal health and nutrition and provide supplementation as required.
4. Use low stress stock handling techniques for animal welfare and productivity.
5. Optimise timing and duration of reproduction to match seasonal feed supply and demand.
6. Match Stocking Rate to Carrying Capacity to optimize production.
7. Don't over rest plants so as to avoid lignification which will result in lower productivity.
8. Avoid grazing when pasture yield is low to avoid low production.
9. Maintain low utilization rates at each graze to avoid low production.

5. **APPLY MAXIMUM STOCK DENSITY for minimum time.**
1. Increased stock density is achieved by having high paddock numbers per herd.
2. The higher the stock density (eg optimums are 60 head of cattle per ha or 450 sheep per ha), the shorter the graze period will be.

6. **MANAGE FOR BIODIVERSITY TO IMPROVE ECOSYSTEM SERVICES.**
1. Cell Grazing is fundamentally based on improving Ecosystem health and Services.
2. Improving energy flow from sunlight, improving the water cycle and soil health will lead to an increase in biodiversity, soil carbon and ecosystem services.
3. Maximise number of desirable pasture species, including trees and shrubs and diversity of all subterranean elements. (6)

ENCLOSURE 3 – SPECIFIC QLD RESEARCH SUPPORTING ECOLOGICAL GRAZING

Wetland Care Australia's Draft Report findings: Developing the Use of Grazing as a Riparian and Wetland Management Tool in the Lower Burdekin, (2004) provides really valuable insights. Unfortunately, I haven't been able to locate their final report in my compressed timeframe but I will keep looking.

The project is in relation to wetlands, but the findings are also relevant "also in open woodland vegetation types". Here are the main pertinent points:

- "Controlled grazing offers the only viable means of landscape scale control of these grass weeds." "...biodiversity costs of excluding grazing from national parks that contain naturalised pasture grassess.." "Cattle grazed riparian zone on Castelanelli's Lagoon shows effective control of exotic pastures, active recruitment of overstorey trees, and limited weed promotion."

- "In grazed areas the impacts of fire on vegetation structure appeared less with lower levels of mature tree death and active recruitment present in the grazed areas." "... demonstrated the effectiveness of grazing for reducing fuel loads and associated fire intensity" "The fact that wetland plant diversity has come back so successfully with the reintroduction of grazing..."

- "The key management implication that emerges from the grazing exclusion trials is that exclusion of grazing is not an environmentally sound option..."

- " Beyond total exclusion of grazing, the other end of the spectrum – permanent grazing pressure also results in poor outcomes for wetland communities including a loss of plant diversity and reduced recruitment of overstorey tree species ...The balance lies in sufficient grazing pressure to manage exotic pasture growth and sufficient spelling to maintain wetland vegetation." "In the absence of grazing it has become infested with exotic pasture grasses". "While it could be argued that invasion of exotic pasture grasses are the primary cause of these impacts, most exotic grasses ... have been in the lower Burdekin landscape for many decades and it is land use change i.e. the exclusion of grazing from wetland and riparian areas rather than new weed infestation events that have resulted in observed impacts. "

- "...challenges the conventional wisdom that exclusion of grazing from wetlands and riparian areas is optimal for biodiversity conservation."

- "Some of the greatest habitat loss observed in conjunction with exotic pasture grass infestation occurs through the occurrence of hot burns resulting from high fuel loads in ungrazed areas. Single events have been observed to kill large stands of mature overstorey trees. This occurs in typically fire sensitive riparian vegetation communities but also in open woodland vegetation types in which fire is a natural and dominant evolutionary factor." "Intense fires are also observed to further promote the growth of pyrophytic (fire loving) species such as Guinea Grass and hence increase subsequent season fuel loads by reducing tree cover and associated competition. This is in contrast to established annual burning practices which are often undertaken notionally for 'reducing fuel loads'." " ...controlled grazing is the most viable means of control and has ecological benefits over other approaches."

- "Under Qld legislation grazing is an incompatible land use with National Parks..."

- "Findings of this project demonstrate that there are greater risks to biodiversity associated with the total exclusion of grazing than with the maintenance of controlled grazing regimes in wetland and riparian areas of the seasonal dry tropics where exotic pasture species are widely naturalised. Incorporation of appropriate grazing regimes in the management of floodplain and riparian conservation reserves is a pre requisite to the maintenance of biodiversity values."

- "... greater risks to wetland and riparian biodiversity associated with grazing exclusion than grazing..."

- "... the highest priorities for protecting nature conservation values in the lower Burdekin is the reintroduction of grazing to habitat remnants infested by exotic pasture species. For maximum environmental benefit grazing needs to be managed specifically for environmental outcomes and conducted in conjunction with fire regime management."

- "... use of controlled grazing offers an economically viable means of protecting revegetation sites ..." "One of the key findings of this project has been the prospect of developing 'extensive' revegetation techniques using grazing to promote natural vegetation succession ..."

- " This projects finding's show that under a regime of controlled grazing the condition state of most lower Burdekin riparian vegetation communities will be improved or maintained to a better condition and associated ecosystem functioning than in the absence of grazing."

- "In the case of National Parks there is an identified need for changes to Statutory based management provisions to enable the use of grazing as a management tool." "Ultimately there is a whole field of potential ecological management applications associated with the use of controlled grazing..." "... specifically apply it (controlled grazing) as an ecological management tool for the ecological recovery of landscapes. This is an exciting direction for grazing based research to pursue and offers the prospect of landscape scale management tools for protecting, managing and restoring Australia's biodiversity."

References:

1. http://www.farmweekly.com.au/news/agriculture/property/general-news/origin-snares-qld-cattle-station/2678814.aspx
http://www.soilsforlife.org.au/regenerative-landscape-management
2. http://www.soilsforlife.org.au/change.html
3. McCosker, T (2000), *Cell Grazing – the First 10 Years in Australia*, *Tropical Grasslands*, (2000), Vol 34, 207-218
4. www.rcsaustralia.com.au/
5. Carbon Link. Soil Carbon. Cell Grazing. [Online] http://carbonlink.com.au/soil-carbon/cell-grazing/
6. Soils for Life. Regenerative Agriculture Case Studies. Dukes Plains. [Online] http://www.soilsforlife.org.au/cs-dukes-plain
7. Developing the Use of Grazing as a Riparian and Wetland Management Tool in the Lower Burdekin. s.l. : WetlandCare Australia. Vol. Draft Report Project Findings to Date, December 2004

… apologies for not having references correctly formatted, I have run out of time :(