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Conference Proceedings – Speaker Transcript

Lessons from the Past: Learning how to Manage Highland Native Grasses in Tasmania

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Link to Slides

Firstly I'd like to pay my respects to the Aboriginal elders past and present, both here in Gadigal country but also in my home state of Tasmania. The more I work in conservation the more I realise that all of the landscapes I work in are cultural landscapes and how they are now is a reflection of how they were managed in the past.

The premise of my talk is this: the Tasmanian Land Conservancy were lucky enough to buy one of the best condition highland grasslands in Tasmania in 2007, following a 180 year history of European stock grazing and burning. Numerous studies have proven that stock grazing is damaging in highland areas, but our grasslands are in excellent condition despite 180 years of it. So, how do we manage to maintain the grasslands in good condition? Has the grazing and burning been beneficial, or just one or not the other, or is it just luck that the area is still in good condition?

Tasmania's highland grasslands (Slide 2) range from 600 to 900 metres altitude and support numerous different vegetation communities, including some that are rare and endangered. Highland grasslands support many threatened flora and fauna species, including many that are grassland dependent.

Like most grasslands, Tasmania's highland grasslands have evolved with disturbance from native animal grazing and/or burning, and disturbance is required to maintain their condition. Despite this, there are very few studies that identify the optimum disturbance regime. There are many studies that tell us what not to do, don't graze too much stock, don't burn too often, don't graze or burn at all, but there's little to no research telling us what to do.

Our study site is the Vale of Belvoir (Slide 3), which supports a 1200 hectare highland grassland ~20 kilometres from Cradle Mountain, in Tasmania's central north. The grassland is interspersed with

sedgeland, wetlands and forest, and overlies a complex geology including basalt, limestone and Ordovician sediments.

The Vale of Belvoir supports five threatened fauna species, including two grassland dependent species: the nationally endangered ptunarra brown butterfly (*Oreixenica ptunarra*) and the state-listed vulnerable tussock skink. There are also nine threatened flora species, all of which occur in the grasslands. One of these, alpine candles (*Stackhousia pulvinaris*), in Tasmania only occurs at the Vale of Belvoir, while the largest known population of hoary sunray (*Leucochrysum albicans* subsp. *albicans*) occurs at the Vale of Belvoir.

To successfully manage the highland grasslands at the Vale of Belvoir, we need to understand its past management (Slide 4). There are extensive written records and physical evidence of Aboriginal occupation in the area, whose management practices included grassland burning.

From around the 1850s, Europeans began to bring small numbers of cattle up to the Vale of Belvoir for summer grazing. In the 1890s, the Williams family purchased the freehold land at the Vale of Belvoir, and grazed their cattle their each summer until 2007. The Williams family also burnt the grassland at the end of winter, to maximise green pick for the stock. The stocking rate has always historically been low – for the period that we have accurate stocking records (2000 – 2017), the annual stocking rate has been the equivalent of <1 DSE (Dry Sheep Equivalent) per hectare.

We can also learn from the condition and management regimes of other highland grasslands (Slide 5). At Waldheim, grasslands were grazed by cattle following a similar management regime as the Vale of Belvoir up until the 1950s – with low intensity stock grazing and late-winter burning. Both grazing and burning ceased in the 1950s when the area was reserved as part of the Cradle Mountain National Park. Today, these grasslands have very low species diversity and have been invaded by sedges, shrubs and trees.

The grasslands at St Patricks Plains, on the other hand, have been grazed intensively and burnt frequently from early settlement to the 1980s. Kirkpatrick and Bridle noted that these grasslands were in poor condition, with sheet erosion and weed invasion.

So, at the Vale of Belvoir, we have grasslands that are in good condition (Slide 6), despite 180 years of low intensity summer cattle grazing and regular burning. How do we manage it?

With an objective of maintaining the condition of the conservation values and threatened species populations, we needed to further understand the effect that the cattle and burning regimes were having on the grassland condition. We allowed stock grazing to continue under a grazing lease that allowed changes based on impacts to the conservation values. Cattle were fenced out of the wetlands because of the clear evidence of their impacts in these areas. We also developed a fire management strategy in partnership with two expert fire ecologists, with this strategy having an emphasis on learning.

Having now done two burns, we have been monitoring the outcomes of all combinations of grazing and burning, to determine the changes and assess which options are effective and also practical.

A burn in October 2012 (Slide 8) included an area of grasslands that were unintentionally fenced from cattle in 2008, while protecting an important wetland site from cattle impacts. This area allowed us to investigate the variation with time, from varying fire and grazing management regimes.

Monitoring was conducted in January 2016 (Slide 9), with botanists undertaking 2 m line intercept transects on either side of the cattle proof fence. Data collected included presence/absence of each vascular plant species, percent cover of major plant growth forms (i.e. grasses, other graminoids, shrubs and herbs), and whether the site was grazed, or ungrazed, burnt or unburnt, or unknown.

The results (Slide 10) from data analysis tells us that average species richness is higher in areas grazed by cattle, when data is grouped according to burn status. These results were strongly statistically significant (P value <0.05). In addition, the lowest average species richness occurred in the areas that were neither grazed nor burnt, and that's really important. That tells us if we don't graze or burn that it's likely that species richness will decrease.

Looking at the effect of burning on community composition (Slide 11 & 12), our analyses show us that burnt areas are most similar to other burnt areas, and unburnt areas are most similar to other unburnt areas. This is seen as clustering of the points in the multidimensional scaling graph. Further analysis of the data tells us that burnt areas are more likely to have grass and herb species, while unburnt areas are more likely to have sedge species. That suggests that if we don't burn we're more likely to end up with a sedgeland, rather than species rich grasslands.

Looking at the same data again, but grouping them according to whether they'd been grazed or ungrazed by stock, there is no clustering evident (Slides 13 & 14). This suggests that the community composition of the grassland is unlikely to change with or without the current stock grazing regime.

However, we also need to understand the interactions between grazing and burning (Slide 15). The graph on the left shows only the burnt sites, revealing a loose clustering of points into grazed and ungrazed areas. This tells us that burning and grazing will produce an effect slightly different to burning and not grazing, but that if we don't burn we will probably get the same effect from grazing or not grazing.

Our analyses of the vegetation cover data (Slide 16) showed several statistically significant results. This suggest that grazing may be having a positive effect on reducing shrub invasion, and burning is likely to have a positive effect on increasing species richness, as the majority of the species diversity in a grassland comes from the herb species that grow in-between the tussocks.

What lessons have we learnt (Slide 17 & 18)? We've learnt that the Vale of Belvoir is likely to be the result of a cultural landscape. The management regimes sustained by the Williams family and the Aboriginal people before them are likely to have played a significant part in the continued presence of grassland-dependent species, like the ptunarra brown butterfly and alpine candles. Their management practices have likely also positively influenced the condition of the grasslands and that we see there now.

What we have learnt is that without any managed disturbance, such as stock grazing or burning, species richness will decrease. That's unequivocal from our data so far. We also know that burning is likely to maintain grassland condition and high species diversity without cattle grazing. This is important because we aren't farmers and we don't have a need to graze cattle. Questions that we are yet to answer include how often we need to burn and whether or not we can effectively resource the optimal burn program. We still don't know how much time is required between burns to get the best condition grasslands, and we don't know how the seasonality of burning will affect the condition of the grasslands. These are questions that we're still looking to answer, so we'll continue monitoring our management until we find out.

That is the end of my presentation (Slide 19). I'd like to acknowledge:

- the Williams and Charleston family who've owned it for 180 years and have shared so much of their knowledge with me and the Tasmanian Land Conservancy;
- Cradle Coast NRM, who helped fund this project;
- Volunteers for their hard work in collecting data in very challenging weather, and;
- My colleagues, Mark Hovenden, Louise Gilfedder and John Davies for their time and dedication to this project.

Questions from audience

Question: I just wondered about native herbivores, and whether your fencing excluded them?

Denna: No. The reason we didn't do that was because we had no intention of excluding native herbivores, and so we didn't really need to know what happened if they were excluded.

Question: Do you think you'll get to the point where you'll take off stock completely and allow native herbivores?

Denna: Yes, definitely, based on our current data. We know that cattle impact negatively on other conservation values at the Vale, so if we can manage to maintain the grasslands in good condition without them, then we'd do that.

Question: Do you know if historically the cattle grazed on the native grass species at the site or if feed had to be brought in?

Denna: No, the cattle have only ever grazed on what's there. Feed has never been brought in. Access until the 1980s was only on foot or horseback for the last 4 km away, so it was impossible to bring in feed, and there was really no need to as the grasslands are so productive in summer.

Question: Do you know if there were other grazer species prior to cattle?

Denna: Yes, there's plenty of macropods there, there's the full suite of Tasmanian herbivores there, masses of wombats, lots of pademelons, wallabies and lots of native rats and mice. There is a lot of grazing pressure from native animals, whether or not it's the same as what there was pre-European arrival I don't know.

Question: I'm an ecologist and I'm just puzzled about the lower intensity grazing thing. You've just mentioned the macropods that were there pre-European, and presumably that's what was happening when the indigenous cultural burning was happening. So what's changed do you think, why is there a need to use stock to do that grazing now?

Denna: What I think has happened is that the frequency of fire has decreased between indigenous and European management, and this removal of biomass by fire has been replaced by cows eating the grass. So the cows are probably not replacing native grazing, but replacing at least some of the removal of biomass by fire. But what I'm anticipating is that after we take the cows off, fuel levels will increase faster, allowing burning to be more frequent. So that's part of our project as well, looking at the changes in fuel load with or without stock grazing, and seeing how that affects our ability to burn and the frequency with which we can or need to burn.