Using expert knowledge to develop management actions for Tasmanian lowland native grasslands under climate change

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Introduction

Climate change projections for Tasmania suggest that the climate in 2070 will be warmer than present, with increasingly variable seasonal rainfall (Grose *et al.* 2010). Results from climate change modelling suggest that grassland communities may not exist over their current range in the future (Prober *et al.* 2012). Lowland temperate natural grasslands have been greatly reduced in areal extent since European settlement in the early 1800s. Two 'Lowland temperate native grassland' communities are listed as critically endangered under the Environment Protection and Biodiversity Conservation Act (1999): *Themeda triandra* grasslands and *Poa labillardieri* grasslands. Careful landscape planning for current and potential future grassland habitat is desirable to reduce negative impacts of climate change on natural grasslands.

Experts were gathered at a two-day workshop to discuss potential management options for Tasmanian ecosystems at a range of spatial and temporal scales. This paper reports on the discussion of adaptation actions to allow for the long-term survival of natural grasslands species.

Methods

Sixty experts from research and management agencies and from private enterprise (*e.g.* farmers, other land managers, agricultural and natural resource extension agencies) were invited to a workshop, developed by Nicholas Macgregor for Natural England. Participants self-selected into groups focusing on particular dominant ecosystems. The groups were taken through a five step workshop approach over two days to determine the following for each ecosystem:

- What are the climate change impacts of the greatest concern?
- What are the challenges of setting conservation goals in a changing climate?
- What are the knowledge gaps?
- What possible management actions are required?
- What are the barriers and opportunities to adaptation?

Responses were tabulated and experts were asked to provide levels of confidence for their potential management actions.

Results

Potential impacts of climate change on lowland natural grasslands

Participants acknowledged the limited information available to them on the impact of climate change on lowland natural grasslands (*e.g.* Hovenden and Williams 2010, Prober *et al.* 2012). The group discussed likely effects on individual organisms and species, the interaction between species and changes to communities and assemblages and changes to ecosystem structure and function. Direct effects included the physiological tolerance of species, to changes in temperature and changes in competitive ability (*e.g.* weed invasion) while indirect effects such as land use changes due to agricultural intensification and urban expansion were also noted.

What are the challenges of setting conservation goals in a changing climate?

Ecosystem-specific objectives to manage for climate change were identified:

- Making current populations and assemblages more able to cope with change;
- Facilitating/managing species movements;
- Managing interactions between species; and
- Reducing exposure to direct physical threats and protecting against extreme events.

Knowledge gaps included information about the ecology of grasslands, the effectiveness of management actions, monitoring (what, how and when) and developing new management approaches, including accepting 'novel' systems.

What possible management actions are required?

Participants agreed that there was a lack of information on likely tipping points. However targeted monitoring was suggested to inform possible modifications to conservation goals and management approaches in the future, particularly monitoring of: (1) Shifts in competitive relationships among grass species; (2) Increases in woody vegetation; (3) Changes in livestock production in extensive grazing lands; and (4) Climate weather forecasts, *e.g.* El Niño/La Niña (to help determine pasture growth rates)

Most high conservation value natural pastures occur on private land; therefore other factors are also important when planning for climate adaptation options, including potential changes in land use, particularly agricultural intensification, and current legislative requirements.

Prioritising actions over space and time

At the individual site level, potential actions included better management including the use of 'Friends of' groups to undertake activities such as weed management. At the catchment scale, passive activities included accepting tree decline in grassy woodlands to increase the extent of grasslands. Active activities included providing diverse habitats such as logs and rocks as habitat for a range of grassland plants and animals. At the bioregional scale the group thought that the focus should be on protecting the biggest and best remnants. None of these proposed actions are novel.

Further into the future (up to 2050) fewer options were identified, including restoration of degraded grasslands and changing fire regimes to reduce the impact of future fires, particularly during summer months. Beyond 2050, no options were identified.

Conclusion

Adaptation options need to be place-specific and need to take into consideration factors other than simply ecology and climate; administrative arrangements, available policy instruments, and the role of other sectors present in particular sites and regions. None of the ecosystem-based groups presented management options that could be easily implemented now. However the identification of refugia was a high priority and costing of adaptation strategies was also important. The grassland group recognised potential difficulties with demand for competing land uses into the future. While novel actions were not identified, the workshop process allowed us to map our current management options, with respect to being able to manage for the conservation of grasslands into the future.

References

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