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North Kimberley Landscape Conservation Initiative: monitoring and evaluation

Ecosystem Science

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Context

This project is a biodiversity monitoring and evaluation program to inform adaptive management of fire and cattle in the north Kimberley. The adaptive management program that forms the Landscape Conservation Initiative (LCI) of the Kimberley Science and Conservation Strategy commenced in 2011 in response to perceived threats by cattle and fire to biodiversity conservation in the north Kimberley. This initiative is based on the hypothesis that large numbers of introduced herbivores and the impacts of current fire regimes are associated with declines of critical-weight-range mammals, contraction and degradation of rainforest patches, and degradation of vegetation structure and habitat condition in savannas. This monitoring and evaluation program will provide a report card on performance of landscape management initiatives in the north Kimberley, particularly prescribed burning and cattle culling, in maintaining and improving biodiversity status.

Aims

- Inform management of biodiversity status in representative areas after prescribed burning and cattle control programs have been applied.
- Provide warning when landscape ecological thresholds have been reached, for example decline of mammals to below 2% capture rate, or decline of mean shrub projected ground cover to <2%.
- Compare biodiversity outcomes in intensively managed and unmanaged areas so that the effectiveness of management interventions in maintaining and improving conservation values can be evaluated.

Progress

- This project is now in its sixth year. A total of 92 sites have been surveyed for mammals and vegetation at least once and 112 sites for vegetation only. Ten rainforest sites have been surveyed at least once. Sites at Mirima National Park, Mitchell River National Park, King Leopold Range National Park, Prince Regent National Park, Drysdale River National Park, Bachsten Creek and Mount Elizabethhad all been sampled at least twice.
- Data from monitoring sites, combined with spatial data, confirm that mammal distribution patterns are strongly influenced by vegetation cover, cattle impacts and fire regime particularly the frequency of late dry season fires. An inverse relationship between the amount of surrounding country burnt, ground layer vegetation cover and mammal abundance confirms the importance of prescribed burning to conserve vegetation cover needed by mammals.
- At the regional scale, monitoring shows that most Kimberley mammal species recorded historically are still present and that abundance and richness values are well above threshold values seen in the Northern Territory where mammal populations have collapsed. King Edward River, Drysdale River and Mount Elizabeth have the lowest mammal abundance/richness and are localities of greatest conservation concern.
- Mammal abundance and richness has increased at the Mitchell Plateau compared with earlier surveys. Mammal species have recolonised habitats and become more abundant with implementation of LCI initiatives since 2008, including greater use of planned burning early in the dry season and introduction of a cattle culling program.
- Surveys at Mirima have revealed a declining mammal abundance trend since 2012 when much of the Park was burnt by a large wildfire. Mammal abundance remains low despite sufficient time for re-establishment of mature vegetation structure.

Management implications

- There is strong evidence that cattle have negative influences on critical weight range mammals, including threatened species such as *Conilurus penicillatus*. Culling programs should be maintained and expanded in important conservation reserves.
- There is statistical evidence that the LCI has shifted the fire regime in the North Kimberley from dominance by late dry season bushfires to a situation where equal proportions of the country are burnt during the early and later periods of the dry season. Monitoring and evaluation data suggest that this has benefited threatened mammal assemblages, or at least is not detrimental to them, and provides evidence that current fire management practices in the North Kimberley should be maintained to enhance conservation values.
- Lower mammal abundance and diversity at inland sites in conjunction with higher cattle and fire frequency indicates that prescribed burning and cattle culling initiatives should be expanded into these areas as a matter of priority.

Future directions

- Monitoring and evaluation will continue so that the effectiveness of management interventions can be evaluated in the longer term.
- With some sites now having five or more years of repeated survey, the project is in a position to use repeated measures analysis to examine factors influencing mammal abundance and richness between years. This will be undertaken using a statistical modelling approach following the 2016 monitoring season which finishes at the end of September.
- Collaborative monitoring programs will be expanded to incorporate adjoining areas on pastoral lease and indigenous-owned land to provide comparative data on mammal populations and vegetation condition where cattle populations remain high and fire regimes are not managed.
- A collaborative project with Charles Darwin University studying the abundance and habitat requirements of arboreal mammals in the North Kimberley will commence in 2016/2017. This project will investigate why some arboreal mammals are more restricted than many terrestrial mammals in the region, and the role that fire regimes have in determining the density of tree cavities for nesting habitat as a mechanism influencing the abundance of arboreal mammals