CHAPTER 3.2 HINTERLAND PLAIN, COASTAL HILLS AND RANGES

STATE OF REGION REPORT 2013

INLAND BIODIVERSITY

SUMMARY

Between the coastal zone and the Clark Connors Range lie extensive plains of alluvial flats, intruded in parts by coastal and near coastal hills and ranges. Most notable are Mt Funnel (largely within Cape Palmerston National Park), Ben Mohr, Mt Kinchant, Mt Martin, Mt Vince, Mt De Moleyns, and Mt Toby within the Pioneer Valley (most of which are National Parks or State Forests), Mt Blackwood, Mt Jukes, Mt Mandurana, Mt Adder (Pioneer Peaks National Park), Cape Hillsborough, Cape Gloucester, and the Tonga and Condor Ranges. The Whitsunday area is dominated by two coastal ranges; Conway and Dryander, whose rainforest clad massifs comprise several flat top ridges, formed on gently inclined late-stage rhyolite lavas (Willmott, 2006).

These features overlie the Debella, Proserpine-Sarina lowlands and Whitsunday subregions of the central Queensland coast bioregion (Image 1). The Debella sub-region consists mostly of sandy plains of limited productivity, and rainfall that is lower than the remainder of the region. This area is used almost exclusively for beef cattle grazing. Conway and Dryander Ranges, and associated alluvial flats form the Whitsunday sub-region. Most of this area is rugged and mountainous and receives high rainfall. Cannon Valley lies between the two ranges and is dominated by sugar cane production, and growing urban and rural residential development.

The much larger balance of the region overlies the Proserpine to Sarina coastal lowlands. This area receives high rainfall (declining in the south), is generally fertile, and is mostly developed for sugar cane production and beef cattle grazing.

The region's forest asset is a combination of existing remnant and regrowth native forests on both Crown-owned and privately-owned land, in addition to Crown and privately-owned planted forests that are helping to restore and increase the asset.

National parks, state forests and unallocated state land make up the majority of the region's Crown native forest. Crown-owned plantations consist of pine species and were established in the region between 60 to 30 years ago and also recent planted hardwood plantations. Privately-owned forest plantations have been a slowly growing part of the landscape for last 25 years.

"A major reason for seeking sustainable environmental solutions is to maintain the benefits that come to humans from nature and its components. The term "Ecosystem Services" has been coined to describe these benefits. Ecosystem services include provision of clean air and water, natural fertilisation and nutrient cycling in soils, mitigation of climate, pollination of plants including crops, control of pests, provision of genetic resources, production of goods like food, fuel and fibre, maintenance of cultural and social values, and others."

The Nature and Value of Australia's Ecosystem Services: A Framework for Sustainable Environmental Solutions, Cork & Shelton (2000; 151)

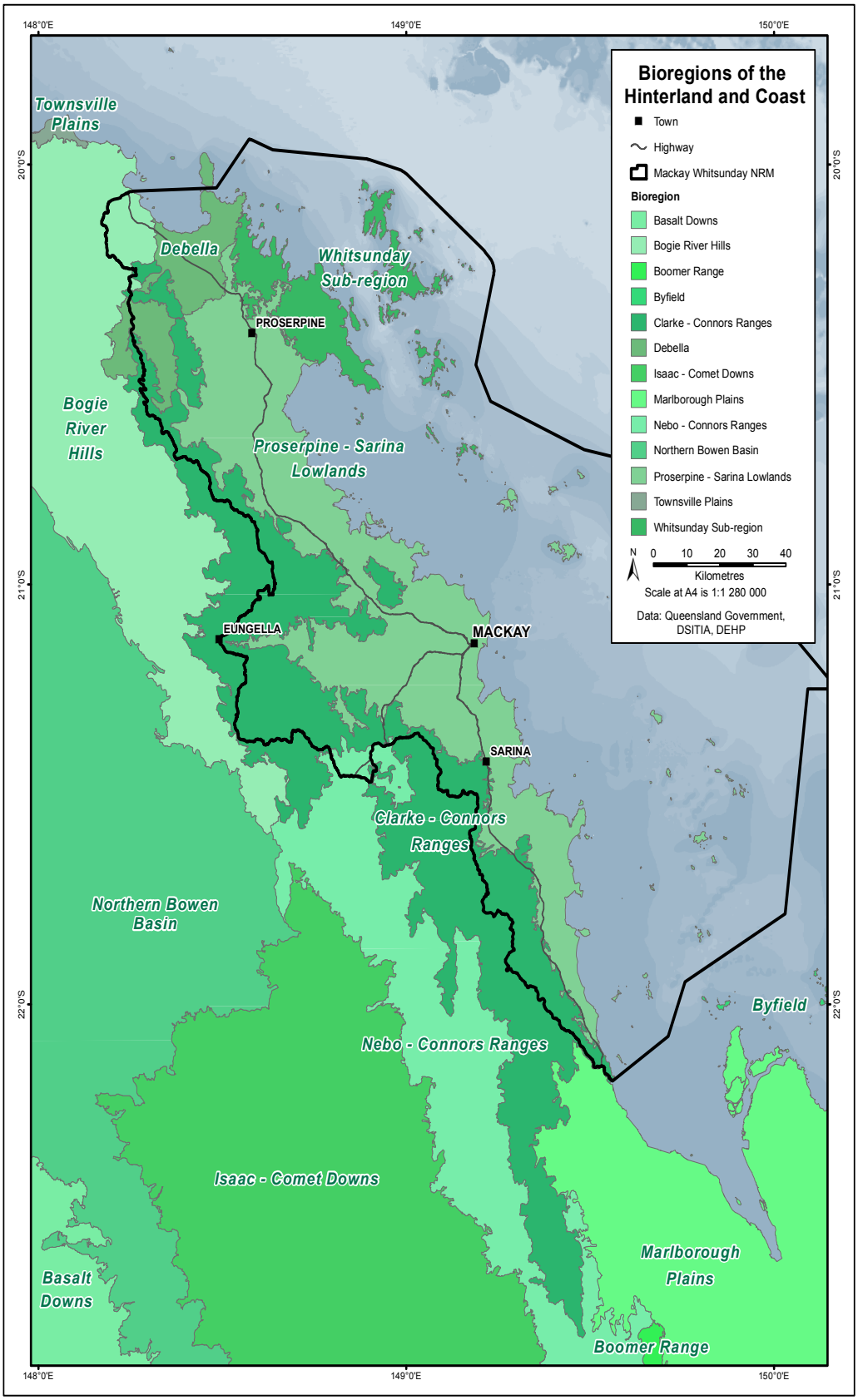


Figure 1 Central Queensland Sub-Region

VALUES AND SERVICES

Recreation and Tourism

Hinterland plains, coastal hills and ranges represent significant recreational and tourism opportunities with National Parks and other protected areas providing a range of experiences such as remote area bush walking, camping and mountain biking along the 'Whitsunday Great Walk', and shorter coastal walks within the Conway Range. The larger part of the 'Mackay Highlands Great Walk' commences in the region and finishes at Homevale National Park. Cape Hillsborough National Park provides easy access to natural areas for the region's communities, and is used as an outdoor classroom by many primary and secondary schools.

A private resort and council operated park are located in the middle Cape Hillsborough National providing easy access and accommodation within meters of the National Park. Cape Palmerston National Park, although only a short drive from Mackay and Sarina, provides a remote area experience for visitors in almost completely natural surroundings.

Biodiversity

The hinterland plain, coastal hills and ranges support outstanding biodiversity. The portion of the region that lies within the central Queensland coast bioregion contains 39 regional ecosystems (REDD, 2007). The summit of Mt Dryander is covered by 486ha of an endemic rainforest ecosystem and both the Conway and Dryander Ranges support large areas of other, highly diverse rainforest communities. These ranges are similar to the Clarke Connors Range in that they contain features of both the Wet Tropics and southeast Queensland rainforests.

Figure 2 The Proserpine rock wallaby is endemic to the Whitsunday ranges and a small area of the Clarke Range

The Dryander and Conway Ranges, along with Pioneer Peaks and other near coastal hills and mountains, support a suite of endemic species including leaf-tail geckoes (Phyllurus ossa ossa, P. isis, P. championae) and plants e.g. Whitsunday bottle tree (Brachychiton compactus), Mt Blackwood Holly (Graptophyllum illicifolium), Ornate-fruited Neisosperma (Neisosperma kilneri) and Actephila championiae (no common name) (Wildnet, 2007).

Recent research (Couper and Hoskin, 2013) revealed that Phyllurus ossa is represented in the region by three sub-species; P. ossa ossa occurring on hills and mountains near Mackay; P. ossa hobsoni which only occurs on Mt Dryander and the Conway Range; and P. ossa tamoya subsp. nov., which was only recently discovered on Whitsunday Island. This highlights the need for further research in understanding the natural assets of the region.

Also notable is the nationally endangered northern quoll (Dasyurus hallucatus), which is estimated to have large and stable populations within the hinterland and associated hills (Dinwoodie, unpublished data). Because quoll populations in other regions continue to decline, this area may be a stronghold for the species, which continues to persist alongside cane toads.

Other threatened species present in these areas include the Proserpine rock wallaby (Petrogale persephone), rufous owl (Ninox rufa), and coastal sheath-tail bat (Taphozous australis), although many others are present.

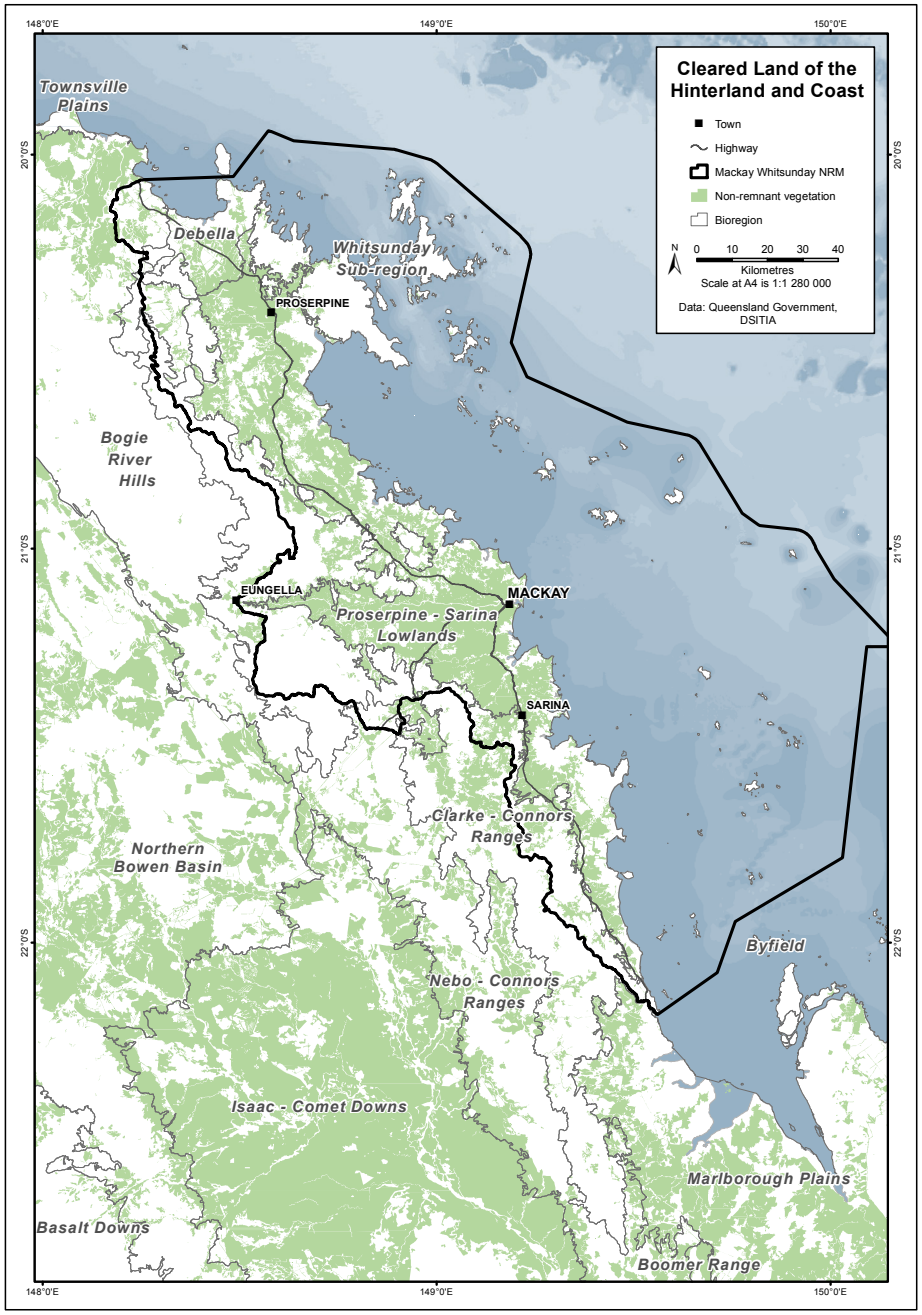


Figure 2 Non remnant vegetation in MWI region

Forests and Forestry

Native forests are naturally occurring vegetation communities or regional ecosystems containing some form of tree cover. Native forests have multiple values and form an important part of the region's biodiversity and production assets. They provide a range of commercial products such as timber and honey, and an array of ecosystem services that include clean air and water, and carbon sequestration.

Planted forests or plantations are defined as planted forest areas that include block plantings, shelterbelts, tree lines, and revegetation (e.g. riparian). Plantation forestry can deliver a range of other benefits to the region and is one of the best examples of productive land use that can achieve triple bottom line benefits – economic, environmental and social/cultural.

PRESSURES AND THREATS

Land Clearing

The most significant pressure to have acted upon the hinterland plain was land clearing associated with development of the sugar cane industry and to a lesser extent beef cattle grazing.

Although vegetation clearing restrictions have been in place for some time, the Vegetation Management Act has been revised including the ability of landholders to clear high value vegetation (including regional ecosystems considered 'endangered', 'of concern' or 'least concern' and regrowth that has not been cleared since 31 December 1989). Arguably there could be environmental benefits to the changes by simplifying and streamlining the process for landholders to reduce, for example, thickening of native vegetation.

Rural residential development and the push of urban expansion into hills, particularly at Airlie Beach and Shute Harbor continue to be a threat to habitats, with secondary impacts including predation on native species by domestic pets and invasive spread of garden plant species.

Invasive Species

The condition of remnant vegetation can decline as a result of invasion by exotic plants which modify habitats, displace native species, alter fuel characteristics and thus also alter prevailing fire regimes. This is a significant pressure to native and endangered species, the majority of which inhabit fire sensitive habitats and are threatened by inappropriate fire management. Key species include exotic grasses particularly Guinea grass (Megathyrsus maximus), grader grass (Themeda quadrivalvis) and thatch grass (Hyparrhenia rufa).

Herbaceous weeds such as sickle pod (Senna obtusifolia), Singapore daisy (Sphagneticola trilobata), and tobacco weed (Elephantopus mollis) can significantly modify ground layer vegetation. Shrubs such as lantana (Lantana camara), and some trees (e.g. penny leaf Dalbergia sisso and Java plum Syzigium cumini) also readily displace native species and are prolific in some areas of remnant vegetation.

"Domestic and feral cats spread Toxoplasmosis gondii which has been known to cause blindness and death in these rock-wallabies. There are few data available on predation or the effects of toxoplasmosis on the mortality rate in Petrogale persephone populations. However, given the extensive areas of development adjacent to P. persephone habitat and the recorded incidents of death due to toxoplasmosis it is believed they form a serious threat."

National recovery plan for the Proserpine rock-wallaby Petrogale persephone, DERM (2010, 10)

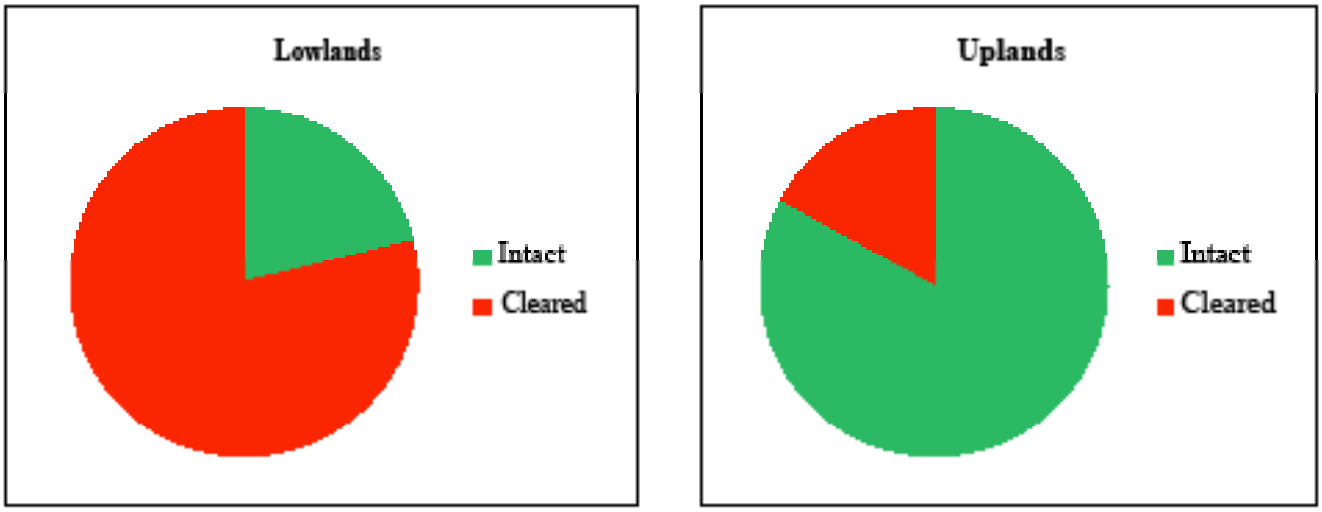
Feral pigs are prevalent across the hinterland plain, coastal hills and ranges and significantly impact biodiversity and agricultural assets. Wild dogs also inhabit most landscapes in this area and periodically have significant social, economic and environmental impacts. Although more rarely observed because of their cryptic habits, both feral cats and foxes are common across the region. Both species have a high impact, for example in predating directly on native species (Dickman, 1996).

Feral cats also pose a threat to both through transmission of disease such as toxoplasmosis (DEW, 2007) and sarcosporidiosis, which can be transmitted to native animals, domestic livestock and humans. Dogs and foxes also contribute to disease in kangaroos and wallabies through the spread of hydatids, which is one of a number of threatening processes impacting the Proserpine rock-wallaby (DERM, 2010)

Current priorities for pest control, outlining priority species in different landscapes has been identified within the Regional Pest Management Plan (Mackay Regional Pest Management Group, 2011).

CONDITION AND TRENDS

Approximately 75% of the hinterland plain has been cleared of native vegetation compared to less than 25% of upland areas (Figure 3). 15% of vegetation that occurred on alluvial and sand plains is left remaining. Of the thirteen regional ecosystems that occur in these areas, 11 are endangered, and 12 have either no or little protection within conservation reserves (Table 1).



compared to uplands areas within the region.

The ecological impacts of remnant vegetation fragmentation are less clear as few region specific studies have been undertaken (Ball, 2007). However, Anon (2005) provides a comprehensive assessment of the region using broader concepts of landscape ecology including identification of key conservation areas, and of important corridors at different scales. This analysis demonstrates that most remaining linkages among remnant vegetation occurs in upland areas, although several riparian zones provide potentially important links through the ranges to the hinterland plain and coastal zone.

There are no comprehensive assessments of vegetation or habitat condition within the region. As a result, the impacts of exotic plants and of feral animals remains poorly understood. Significant advances have however been made in recording and analysing prevailing fire regimes and developing best practice guidelines. It is now possible to map at a regional scale the way in which fire management is being applied. This is important because fire is a major ecosystem driver, and will have a significant influence on the distribution and abundance of many weeds. However, lack of other data prevents a strategic region-wide approach to identifying important areas for investment.

Threatened species are more sensitive to the impacts of changed land-use, and therefore act as indicators of the condition of habitat, and for the health of other populations. It follows that if ecosystems (i.e. habitats) are managed to facilitate the recovery of these species, then other components of that ecosystem may also benefit.

Regional Ecosystem	Description	Biodiversity Status	Reservation Status
8.3.2	Broad leaved paperbark woodland often with emergent eucalypts and grassy/herbaceous ground layer, on seasonally inundated alluvial plains with impeded drainage	Endangered	Low
8.3.3	Weeping paperbark ± river oak open forest to woodland, fringing watercourses	Of Concern	Low
8.3.4	Freshwater wetlands with permanent water	Endangered	Low
8.3.5	Clarkson's bloodwood + swamp mahogany + poler gum woodland, or poler gum woodland on alluvial plains	Endangered	Low
8.3.6	Blue gum, pink bloodwood and swamp mahogany (or Moreton Bay ash dominant) open forest on alluvial levees and lower terraces	Endangered	Low
8.3.11	Broad leaved paperbark (dominated by an undescribed species) closed forest to woodland in broad drainage areas (wetlands)	Endangered	None
8.3.12	Grassland on alluvial and old marine plains	Endangered	None
8.3.13	Blue gum and/or Moreton Bay ash and/or paperbark open woodland to open forest on alluvial and old marine plains, often adjacent to estuarine areas	Endangered	Low
8.5.1	Clarkson's bloodwood open forest on Tertiary sand plains including small areas of shale. Includes low rises with pink bloodwood open forest, ± broad leaved paperbark ± rainforest species open forest	Endangered	None
8.5.2	Broad leaved paperbark ± bull oak, or Broad leaved paperbark woodland on Tertiary sand plains	Endangered	None
8.5.3	Ironbark ± ghost gum ± Clarkson's bloodwood, ± poler gum ± broad leaved paperbark woodland on broad low rises and gently sloping Tertiary sand plains	Endangered	Low
8.5.5	Queensland peppermint and/or Clarkson's bloodwood woodland ± *Eucalyptus* sp. (Jimboomba A. R. Bean 7772) usually with a lower tree layer of paperbarks on Tertiary sand plains	Endangered	None
8.5.6	Broad leaved paperbark and black oak woodland with Eucalyptus species, on Tertiary sand plains	Of Concern	High

Table 3.2.1 Biodiversity and reservation status of regional ecosystems on alluvial and sand plains

GOVERNANCE

Many of the coastal ranges and hills are protected within National Parks or State Forests. National Parks are to be managed in accordance with the Nature Conservation Act 1992, with management responsibility sitting with Queensland Parks and Wildlife Service. The management principles provided by this act are: A National Park is to be managed to:

- Provide, to the greatest possible extent, for the permanent preservation of the area's natural condition and the protection of the area's cultural resources and values; and
- Present the area's cultural and natural resources and their values; and
- Ensure that the only use of the area is nature-based and ecologically sustainable.

The key principle to be observed in the management of State forests is the permanent reservation of such areas for the purpose of producing timber and associated products in perpetuity and of protecting a watershed therein.

Prior to 2006 privately-owned forest plantations in the region have generally been established in association with State/Commonwealth Government sponsored programs – Forest Plot Scheme, CRRP, Tree Assistance Scheme, WAPIS & NHT. It is estimated that there are 500+ plantations in the region of between 0.25 Ha to 25 Ha in size, which equates to approximately 500 ha. Species types vary broadly from eucalypt or pine monoculture plantations through to mixed plantings of 20+ rainforest / cabinet species.

There are also provisions within the Nature Conservation Act for declaration of Nature Refuges over private land through negotiation of Conservation Agreements. Once gazetted, Nature Refuge status is binding on Successors in Title and therefore conserved in perpetuity.

Some land on the hinterland plain, coastal hills or ranges, is leased under the provisions of the Land Act for cattle grazing. Conditions of these leases include both general requirements for 'Duty of Care' and also specific management requirements.

The Vegetation Management Act (VMA) regulates broad scale tree clearing; apart from small scale requirements for management purposes e.g. for fire breaks or fence lines. From 1 July 2013, the VMA was amended to allow for the sustainable vegetation management activities to occur to support the development of high-value agriculture to assist in the growth of the agricultural industry and contribute to the government's goal of doubling Queensland's food production by 2040. Reef watercourse protections will continue to ensure that these ecosystems maintain the condition of the land and uphold the state's commitments under the Reef Water Quality Plan, with applications possibly required to offset the impact of activities through revegetation of other areas. The regulation of clearing of high-value regrowth vegetation will be removed towards the end of 2013 from freehold and Indigenous land. Such reforms provide landholders with the ability to undertake vegetation management activities such as fodder harvesting, encroachment, necessary environmental clearing and vegetation thinning without the need for government involvement or assessment.

This will be a key forum within which ongoing sustainability of natural resources will be negotiated. The same provisions do not apply in urban areas although endangered regional ecosystems are still protected. However, the 'endangered' status used by the VMA is calculated only by the extent of a regional ecosystem left remaining, not the condition of remaining examples. Thus a regional ecosystem which has a biodiversity planning status of 'endangered'

may still be cleared in urban areas if its VMA status is only 'of concern'. In order to protect areas of high biodiversity value (e.g. threatened species habitat) Essential Habitat Mapping can be prepared and gazetted by provisions of the VMA. This mapping then regulates any further clearing of that habitat regardless of what regional ecosystem(s) is present or its conservation status.

Legislative power to enforce the control of pest plants and animals lies with Local Authorities, and with DNRW. All landholders have legal requirements to make efforts to control pests on their land.

INDICATORS

An indicator of ecosystem health may be the extent to which key conservation areas are protected within conservation reserves and Nature Refuges and the extent of remnant vegetation otherwise managed by landholders for its conservation value.

Active and evidential management of remnant vegetation for its nature conservation value by improved pest and fire management and opportunities to begin to further understand habitat condition, the affects of pests and fire, and management needs across the region.

In addition is the extent of endangered regional ecosystems, key corridors and/or threatened species habitat (i.e. key conservation areas) protected by either State sponsored conservation reserves and/or by Nature Refuges is increased significantly.

Further Essential Habitat mapping would have to be prepared for key threatened species (which are also key indicator species), known to persist adjacent to or in areas which may be subject to urban expansion, in order that key habitat areas are protected.

Such priority threatened species include northern quoll, coastal sheath-tail bat, and rufous owl.

REFERENCES

Department of Environment and Water (DEW), 2007. Threat Abatement Plan for Predation by Feral Cats Biodiversity Group Environment Australia

Department of Environment and Resource Management (DERM) 2010, National recovery plan for the Proserpine rock-wallaby Petrogale persephone. Report to Department of Sustainability, Environment, Water, Population and Communities, Canberra. Queensland

Cork, S.J, and Shelton, D. 2000. The Nature and Value of Australia's Ecosystem Services: A Framework for Sustainable Environmental Solutions in Sustainable Environmental Solutions for Industry and Government Proceedings of the 3rd Queensland Environmental Conference, May 2000, Queensland Chamber of Commerce and Industry, pp151-159.

Couper, P., and Hoskin, C, J. 2013. Two new subspecies of the leaf tailed gecko Phyllurus ossa (Lacertilia: Carphodactylidae) from mid-eastern Queensland, Australia. Zootaxa i3664(4):537-553.

Dickman, C.R., 1996, Overview of the Impacts of Feral Cats on Australian Native Fauna, Institute of Wildlife Research and School of Biological Sciences University of Sydney, Prepared for the Australian Nature Conservation Agency.

Eldridge DJ and Freudenberger D (2005) Ecosystem wicks: Woodland trees enhance water infiltration in a fragmented agricultural landscape in eastern Australia. Austral Ecology 30(3): 336-347.

Graham, S., Wilson.B.R., and Reid, N., 2004 Scattered paddock trees, litter chemistry and surface soil properties in pastures of the New England Tablelands, NSW. Australian Journal of Soil Research, 42: 905-912.

Lovett, S., and Price, P., 2001. Managing riparian lands in the sugar industry: A guide to principles and practices. Sugar Research & Development Corporation/ Land and Water Australia. Brisbane.

Nolan, B. & Johnson, P. 2000. Proserpine Rock-wallaby (Petrogale persephone) Recovery Plan 2000-2004. Available at http://www.environment.gov.au/resource/national-recovery-plan-proserpine-rock-wallaby-petrogale-persephone Last accessed 14 April 2014.

McIntyre, S., McIvor, J.G. and Heard, K.M. 2002. Managing and conserving grassy woodlands. CSIRO Publishing. Victoria. Collingwood.

REDD. 2007. Regional Ecosystem Description Database. Environmental Protection Agency. Queensland.

Mackay Regional Pest Management Group, 2011, Regional Pest Management Strategy Mackay, Whitsunday and Isaac (2011-2014), Unknown publisher.

Wildnet. 2007. Wildlife database of the Environmental Protection Agency/ Queensland Parks and Wildlife Service. Queensland. Brisbane.

Willmott W. 2006 Rocks and landscapes of the national parks of central Queensland. Geological Society of Australia, Queensland Division

Wilson, B. R., 2002 Influence of scattered paddock trees on surface soil properties: a study on the Northern Tablelands of NSW. Ecological Management & Restoration, 3: 211-219.

Wilson, B.R., and Lemon, J., 2004 Native Grassland Soils: How do they compare with cropping and native woodland soils? In: Proceedings of the 19th Annual Conference of the Grassland Society of NSW, Gunnedah, NSW. 28th-29th July, 2004. Grassland Society of NSW Inc., Orange, NSW.