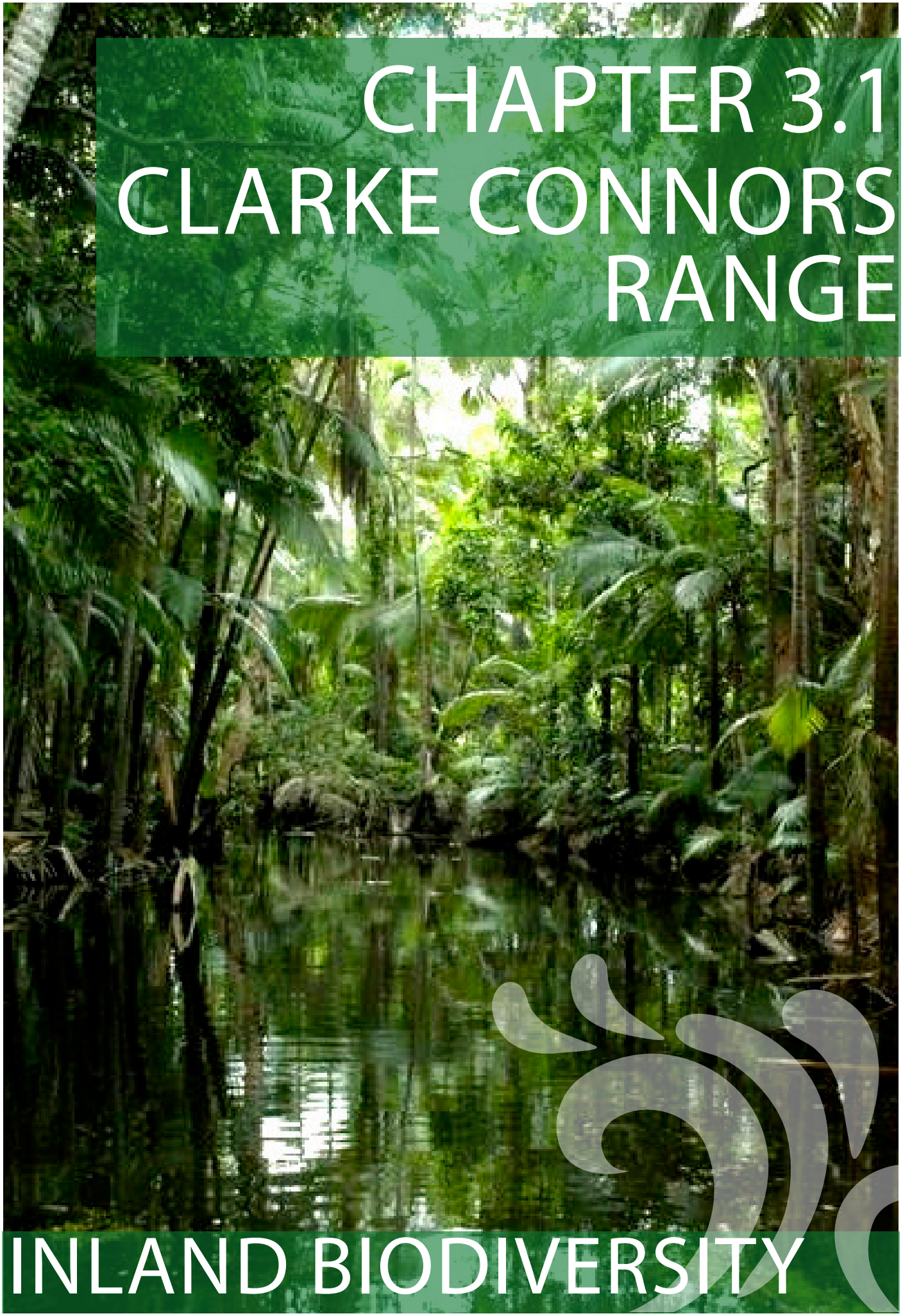

CHAPTER 3.1
CLARKE CONNORS RANGE

INLAND BIODIVERSITY

Clarke Connors Range

SUMMARY

The Clarke Connors Range extends 300km along the western boundary of the Mackay Whitsunday Region to a width of 50km, and reaches an altitude of 1267m on Mt Dalrymple near Eungella Township (Image 1). This area is listed on the Register of the National Estate by the Australian Heritage Commission Act (1975-1990), and is one of the largest wilderness areas in Queensland with outstanding natural values.

The range forms the Clarke Connors Range subregion of the Central Queensland Coast Bioregion, which lies adjacent to the Brigalow Belt Bioregion to the west, north and south, and the Sarina to Proserpine Lowlands subregion of the Central Queensland Coast to the east. In this respect it is an area of highly significant environmental gradients, and a wildlife corridor of State significance. The range forms the watershed that feeds the three major Rivers in the region (Proserpine, O'Connell and Pioneer), in addition to holding headwaters of the Burdekin and Fitzroy Rivers.

Much of the biophysical diversity of the range can be attributed to its geological makeup and climatic variability. Average annual rainfall varies from about 1600 mm per annum decreasing to about 1200 mm in the south and to 1000 mm to the west. Granodiorite and similar rocks form much of the range and thus most of the soils present are relatively low in fertility. However, areas of phosphorous rich basalt result in fertile soils associated with the Crediton farming area, just south of Eungella. Intrusive andesite forms stunning landscape features in the uplands of Homevale National Park notably; Diamond Cliffs, the Marling Spikes and Sydney Heads. Granitic geology of the Mt Beatrice and Mt Catherine mountain pair results in rugged, rocky outcropping while smaller areas of sedimentary rocks (Carmilla Beds) form rocky and scree slopes along areas at the eastern slope of the range.

The dominant land use of the range is beef cattle grazing and nature conservation. A substantial part of the range lies within protected areas or State Forests. Notably these include Eungella and Homevale National Parks, Andromache Conservation Park, Proserpine, Cathu, Gamma, Crediton, Mia Mia, Epsom, Kelvin, Connors, Koumala and West Hill State Forests and/or Forest Reserves. In addition, a number of smaller areas of freehold land have been gazetted as Nature Refuges via voluntary conservation agreements.

Historically some smaller areas contributed to native hardwood, although over the past decade that practice has declined. However, recent changes to Governance in Queensland indicate that some areas such as Crediton State Forest will again be made available to logging. Pine plantation forestry has principally occurred in Cathu State Forest, however that has largely been removed as storm damage rendered the timber unproductive. Other land uses have included dairying, limited horticulture, hobby farming, and ecotourism, however these are largely static or in decline. Four dams; Peter Faust, Eungella, Teemburra and Kinchant lie within or closely adjacent to the range.

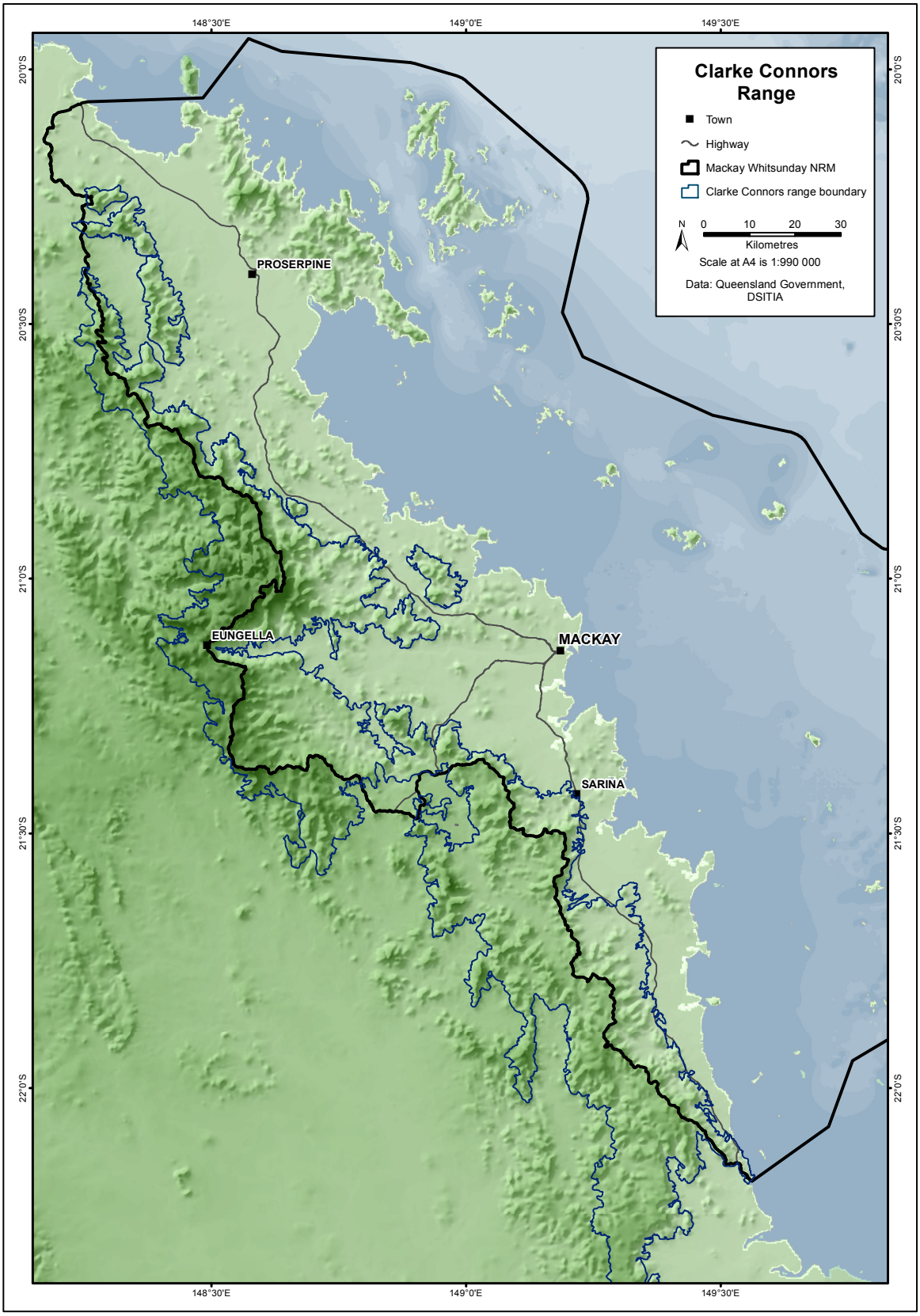

Figure 1 Geography of the Clarke Connors Range

VALUES AND SERVICES

Tourism

In 2012, the Mackay region hosted over 745,000 domestic visitors of which 165,000 were on holiday (Tourism and Events Queensland 2012a). Of the 43,000 international visitors to Mackay region, 26,000 were on holiday (Tourism and Events Queensland 2012b). Compared to previous statistics, these data suggest that holiday tourism is declining within the region, although business travel remains strong. Nevertheless, previous surveys (Anon, 2003) found that a very large proportion of visitors were attracted to the region's natural values, including those of key Clarke Connors Range visitor nodes (Image 2). Although detailed financial analysis of the value of ecotourism on the range is unknown, data highlight a strong but declining economic importance to the region.

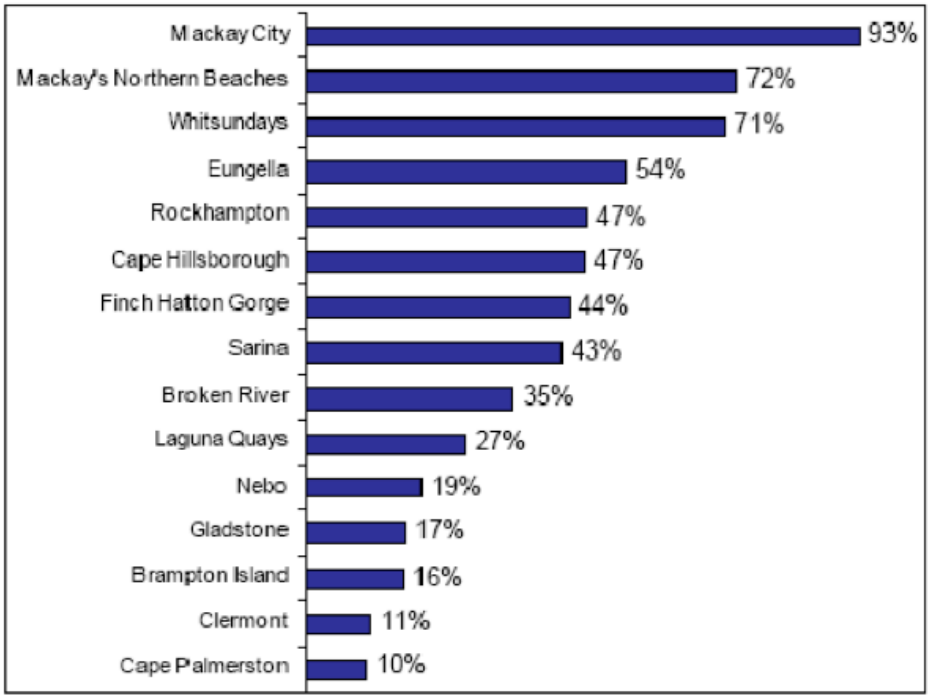

Figure 2 Major tourist destinations in the Mackay Region (reproduced from Anon, 2003).

Of the visitors to the Mackay region in 2002/03, many had particular interests in natural history. 27% of all Mackay region visitors went platypus watching, and 11% went bird watching (e.g. appproximately 189,000 and 77,000 visitors respectively).

Agriculture and Forestry

The majority of the Clarke Connors Range is State owned land which is leased for beef cattle grazing based on native pastures, although some areas have been sown with legumes to improve productivity (Bishop 2007). Improved pasture, namely buffel grass (Cenchrus ciliaris), is focused in the west of the Ranges. Native pasture grazing systems have the advantages of potentially maintaining ecosystem diversity, and have low maintenance requirements however, they are not able to sustain heavy grazing pressure and are prone to invasion by weedy grasses and broad-leaved weeds if over-grazed (Bishop, 2007).

Plantations of both native hoop pine (Araucaria cunninghamiana) and of exotic Caribbean pine (Pinus caribaea) are present in Cathu and Mia Mia State Forests although the commercial value of these is low compared to other plantation areas held by Forest Plantations Queensland. Native hardwood logging from the range is no longer a major industry in the region, however this may again grow under current governance arrangements for State owned

Fire plays an important role throughout most of the rangelands. Together with control of animal stocking rates, it is the major tool available for land management in the rangelands and can meet a range of land management objectives. It can help maximise biodiversity, protect fire sensitive habitats and culturally significant sites, manage woody weeds, and increase pastoral productivity.

"Strategic burning and wet season spelling in eucalypt land types can help manage woody regrowth and maintain native pasture seed banks… A fire (post early storms) every 2 to 4 years will encourage regeneration of black spear grass and will reduce woody weed thickening. It will also maintain the grass-legume balance". Bishop, 2007; 9-10.

Biodiversity Values

""(The) Clarke Range is the only (area in the) region with wet sclerophyll forest, and it has the largest area of rainforest as well and the largest suite of endemic animals. A concentration of endemic rainforest plants occurs towards the coast, on the Whitsunday Islands and adjacent coast, with species such as Gossia pubiflora and Brachychiton compactus growing in small patches of dry rainforest. Orographic rain from the east probably ensured their survival during the peak of aridity in the last glacial maximum, hence their coastal location". Low, 2011; 122.

The Clarke Connors Range has outstanding biodiversity values, being an area of overlap between tropical and subtropical influences, in addition to being a centre of endemism. The range supports three species of endemic frogs including; the endangered (assumed extinct locally) northern gastric brooder (Rheobatrachus vitellinus); Eungella day frog, Taudactylus eungellensis; and the rare tinker frog (Taudactylus liemi). It also provides important habitat for the vulnerable tusked frog (Adelotus brevis) and the rare whirring treefrog (Litoria revelata). One species of endemic and charismatic leaf-tailed gecko occurs on the range (Phyllurus nepthys), in addition to a recently discovered skink Saproscincus eungellensis (Sadlier et al. 2005) which is only known from high altitude (>700m) rainforest areas. A further two species of skinks are found only in central coastal Queensland rainforests; Eulamprus amplus and Eulamprus luteilateralis.

The mammal fauna of the Clarke Connors Range is rich and includes the threatened southern subspecies of the yellow bellied glider (Petaurus australis australis) and the northern sub species (Petaurus australis unnamed subsp), which is listed as vulnerable under the EPBC and National Capital Authority (NCA). It has not been confirmed whether the identity of the yellow-bellied glider at Eungella/Crediton is the 'vulnerable' northern or common southern sub species, or maybe another sub species.

The Range also supports a distinct sub-species of the swamp rat (Rattus lutreolus), as it is not commonly represented within central Queensland (Ball & Benison in prep, 2007). The common rock rat (Zyzomys argurus) has also been found on the range, almost 300km south of its previously recorded range (Dinwoodie, unpub data).

Recently, genetic screening of a dasyurid marsupial has identified a new species named the buff-footed antechinus (A. mysticus) (Baker, 2012). Furthermore, what was thought to be Antechinus flavipes within the Clarke Connors Range is actually either a combination of the new species and A. flavipes or solely the newly described species (A. mysticus).

The Clarke Connors Range supports what appears to be a large population of the nationally endangered northern quoll or native cat (Dasyurus hallucatus) a species which has suffered widespread decline elsewhere (DEW, 2005), especially recently across the top end of the species range (Northern Territory and Western Australia) as the cane toad expands into these areas.

24 regional ecosystems are represented on the Clarke Connors Range including open woodlands on alluvial plain, tall wet sclerophyll open forests, grasslands, rainforests and vine thickets, shrub land and heath land. This ecosystem level diversity is noted within Table 7.1. The range is notable in that relatively little vegetation clearing has taken place and large areas of most regional ecosystems remain structurally intact. These ecosystems provide habitat for a large suite (>40) of rare and/or threatened plants, many with highly restricted distributions. These include rainforest inhabitants but also importantly, a range of species which are more often found along ecotone (transitional) areas between different habitats, which illustrates the importance of these areas. A full review of rare, threatened and endemic fauna and flora occurring on the Clarke Connors Range can be found in Kitchener (1999).

Climate and Connectivity

The Clarke Connors Range has a climate which differs from the balance of the region, being both cooler and receiving greater rainfall (Images 3 and 4). The most reliable climate change scenarios (50th percentile) suggest that both temperature and rainfall change will be similar across the region although finer scale modelling implies that coastal and mountainous areas will differ somewhat.

The range could be viewed as a climate change refugia (Low, 2011), as it is likely to continue to be relatively wetter and cooler than elsewhere in the Mackay Whitsunday regions, and the broader central Queensland coast region. This is particularly important as this broader region is separated from the Wet Tropics and southeast Queensland rainforests by dry tropical belts; which will not offer refuge to central eastern Queensland's more wet adapted ecosystems, fauna and flora. In this respect, the Clarke Connors Range could be expected to provide an island of critical habitat within an increasingly hot and arid coastal zone. Whether this refugia is adequate to avoid species extinction in the longer term is unknown.

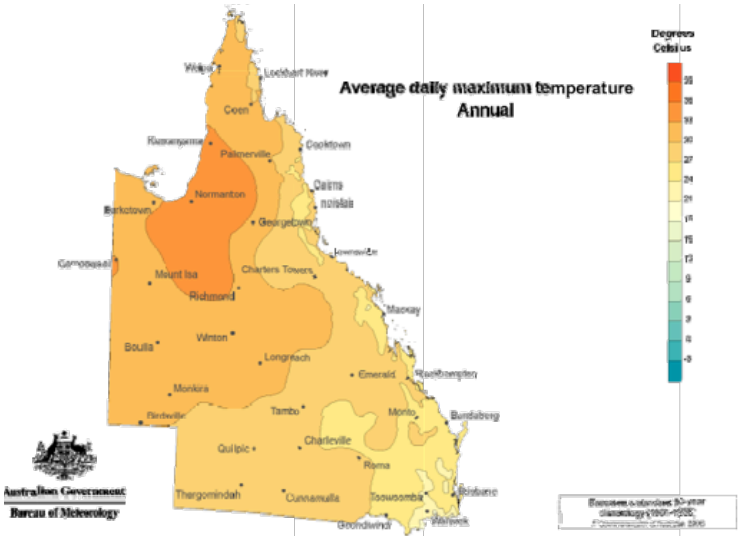

Figure 3 Average daily temperatures

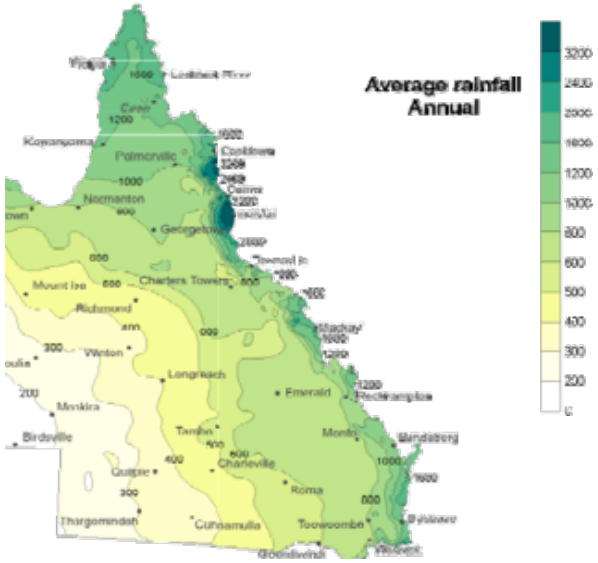

Figure 4 Average annual rainfall

Genetic comparisons among populations of the rainforest inhabiting leaf-tail gecko Phyllurus ossa suggest that rainforests in the region contracted during the Pleistocene period (~ 10,000+ years ago), isolating some populations, but has expanded again during subsequent warming periods (Stuart Fox et al., 2001). Former connectivity between for example the Conway & Dryander Ranges and the Mt Ossa rainforests is confirmed by presence of P. Ossa at these locations. However, other areas in the range support different species suggesting that previous climate change isolated these areas for some time e.g. P. Isis occurs on Pioneer Peaks, P. nepthys on the Clarke Connors Range, and P. championae only occurs in drier areas on the south of the Clarke Connors Range. These observations are significant in demonstrating that within available habitat this rainforest genus not only survived during climate change, but may have demonstrated a capacity to adapt and speciate.

Distribution patterns of other fauna on the range offer further insights to connectivity between northern and south eastern Queensland rainforests. Several bird species are present within south eastern rainforest, the wet tropics and Clarke Connors Range rainforests e.g. powerful owl and regent bowerbird, suggesting that these rainforests were once connected. However, the Clarke Connors Range rainforests have been isolated for sufficient time for at least one bird to have speciated. The Eungella honeyeater (Bolemoreus hindwoodi), listed as 'near threatened', was first described as a distinct species in 1983 and is endemic to the range area (Longmore and Boles, 1983). Rainforest birds have varying capacities to move between the three major rainforested areas in Queensland i.e. across dry tropical Burdekin and St Lawrence areas (Joseph et al., 1993). The Clarke Connors Range also supports at least 120 other birds including populations of the vulnerable glossy black-cockatoo (Calyptorhynchus lathami), and rufous owl (Ninox rufa queenslandica). These species are not restricted to the range; instead this area forms an important core refuge, and movement corridor.

As with other fauna, the distribution of invertebrates on the Clarke Connors Range largely reflects historical rainforest biogeography. For example, the range area (along with the Whitsunday Ranges) is an overlap zone between the wet tropics and south east Queensland rainforests, and a level of endemism has developed (Stanisic, 1994). Permanent invertebrate and plant survey sites were established by Griffith University in early 2013, which will be part of a larger elevational study throughout Australia. These sites are at various elevations (400 – 1200 m above sea level) within Eungella National Park and will serve as baseline data and to monitor future impacts of climate change.

PRESSURES AND THREATS

Inappropriate fire, weeds and overgrazing are the most significant threats to ecosystem health and are often closely related. Feral animals, primarily feral pigs degrade some habitats, particularly moist rainforested gullies and palm swamps. Tree damage caused by tropical cyclone Ului in March 2010 has contributed to weed invasion, higher fire risk due to accumulated fuel loads and subsequent degradation of habitat with some trees aged several hundred years old still recovering. Dieback is evident in stands of flooded gums, which may be susceptible to root rot fungi (Phytophthora spp.) due to the stress caused by the cyclone and also as a result of changes to hydrology.

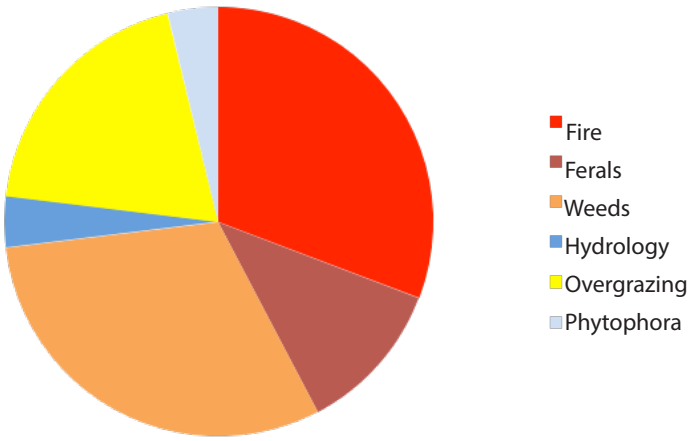

Figure 5 Relative significance of major threats to the 24 regional ecosystems supported by the ranges

Fire

Fire sensitive communities within the Clarke Connors Range include rainforests, vine thickets, vine forests, and some riparian communities. These communities do not require fire for regeneration as it may irreversibly alter the species composition and structure of the community. Introducing buffer zones around fire sensitive communities is advised to ensure that the margins of the community are not scorched, which can lead to a reduction in fire sensitive communities and invasion by exotic plants.

Too frequent fire in fire adapted communities leads to simplification of the community by reducing the floristic and structural diversity of the ground and mid strata. However, fire that is too infrequent can lead to loss of fire dependent species as mature individuals senesce while the next generation of individuals are either not produced or are unable to establish. Many fire adapted species will tolerate a range of fire intensities whereas others have quite specific fire intensity requirements. A fire regime that fails to take these requirements into account can alter the relative abundance of different species in a community, and has the potential to lead to local extinctions.

Allowing litter and fallen logs to accumulate over large areas in fire tolerant forests and grasslands provides essential habitat for ground dwelling fauna. Also key is ensuring variation in the structural complexity of the mid strata between forested patches and within each vegetation community to allow for a diversity of habitats. Mature trees, particularly those with hollows, are also critical habitat for many species. The role of fire in creating and maintaining tree hollows is complex and varies with vegetation community and climatic zone. In general, however, fire that is too frequent, intense and widespread causes the destruction of old trees that contain hollows. It takes many years (100 years or more for many eucalypts) for these to be replaced.

Too frequent and/or extensive burning in the fire adapted communities, particularly when there is little soil moisture, removes litter (such as fallen leaves, branches and logs) from the ground faster than it can be replaced, inhibits the development of a complex midstratum, increases the risk of losing habitat trees and leads to an over representation of habitat in an early successional phase.

Ferals

Feral pigs are prevalent along the Range, however they do have marked seasonal movement patterns. Core habitat areas include wetter palm forests and swamps and riparian areas (Ball, unpublished data). Feral pigs compete for resources with native animals, directly predate on and compete with native animals, transmit disease and degrade habitats (Department Environment and Heritage, 2013) (see Figure 7.6).

Figure 6 Gut contents of a feral pig with large numbers of native frogs. Photo courtesy of Barry Nolan, Queensland Parks and Wildlife Service.

Weeds

The Range is prone to weed infestation notably from rat's tail grasses (Sporobolus spp.), thatch grass (Hyparrhenia rufa) and grader grass (Themeda quadrivalvis), lantana (Lantana camara), sickle pod (Senna obtusifolia) and other broadleaved weeds (DAFF, 2006).

Other weeds within the region include a large selection of the pyrophitic (fire loving) grasses, sometimes known as the high biomass grasses including Guinea, hamil, molasses, para, elephant, hymenachne, aleman, and Indian couch. While some of these grasses improve pasture, outside of these areas they can become weedy and increase fire intensity and spread displacing native vegetation and changing vegetation structure. Such grasses are promoted by fire but in rare cases fire can assist in their management (e.g. molasses and para grass). Pyrophytic grasses tend to occur as a result of disturbance and spread along firelines and utility easements.

There is potential for rag weed (Parthenium hysterophorus) becoming more prevalent as a result of transport of seeds from western areas, where this species is currently a major environmental and economic pest. Rag weed was identified in Crediton State Forest in 2010, thought to have been transported from Homevale National Park where it is known to be prevalent.

Water Quality

Water quality in Broken River is an important consideration given its habitat value to the platypus population. Algal blooms and high faecal coli forms continue to impact on the waterway health with declining water quality in the Broken River catchment threatening the tourism values of the area. E. coli contamination in Broken River has been at levels considered unsafe for swimming by the EPA for several years. These riparian areas are also inherently biodiverse and improved water quality will assist in maintaining those values. Paradoxically, platypus thrive in high nutrient waters with this poor water quality not appearing to negatively impact the local population so a management dilemma is presented, because to improve water quality risks potentially losing the platypus population and associated economic gains from tourism.

CONDITION AND TRENDS

Biodiversity

Few regional ecosystems within the range are considered endangered compared to other areas within the region. However, ongoing threats to habitat condition results in only 10 ecosystems being considered as being of no conservation concern at present (Image 7). In addition, 15 of the 24 ecosystems present have only low representation within protected areas.

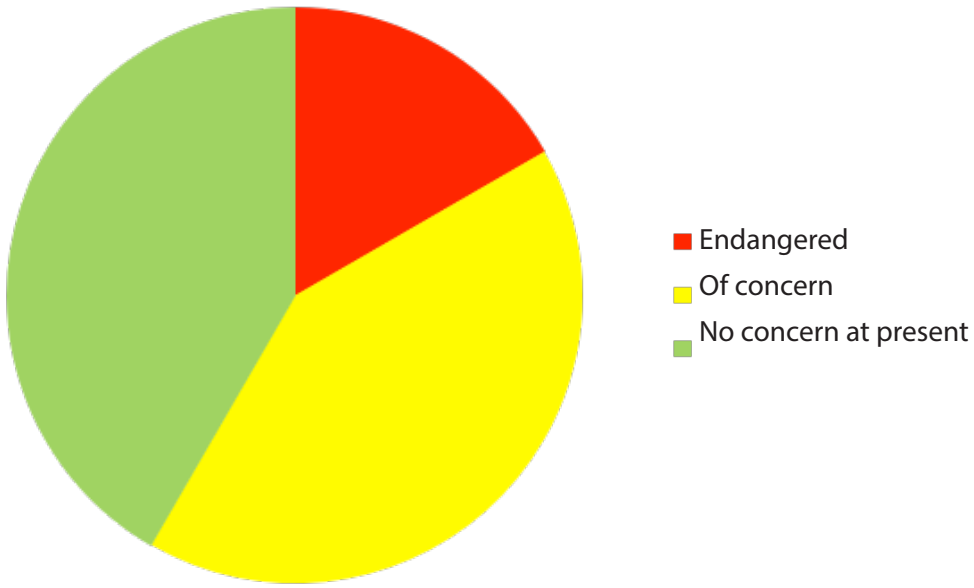

Figure 7 Conservation status of the range's regional ecosystems.

Fire

Fire is a key factor influencing the Central Queensland Coast bioregion, effecting both biodiversity and general resource condition. Effects of fire include the distribution and abundance of invasive plant species, vegetation thickening, pasture vigour and composition and the overall economic return of primary production. At the landscape scale fire can be both a valuable tool and a threatening process. The delineation between tool and threat is related to the purpose and strategy of using or not using fire in a particular landscape or land use.

Four important factors to consider when planning for fire management are:

1. Fire Frequency – how often should an area be burned;
2. Fire intensity – how hot does the fire need to be;
3. Season – what time of year will usually provide the desired conditions for a planned burn;
4. Burning mosaic – the percentage of ground cover remaining unburned after a fire.

Other important factors to consider are fuel loads, wind speed, humidity, fuel curing, slope and aspect. The guidelines are not intended to account for all circumstances. Seasonal, yearly and even daily conditions can vary dramatically. Draft guidelines and tools have also been developed that allow fire managers to estimate the carbon emissions likely to result from any given fire prescription and thus opportunities to minimize the green house gas emissions.

The use of fire as a management tool is usually guided by development of 'fire regimes' designed to protect property, control woody weeds such as lantana, invigorate pastures or produce green feed to assist in mustering cattle, protect fire sensitive habitats, manipulate habitats to maximise biodiversity, or for the specific management needs of a particular species (Bushfire Consortium, 2012).

Fire Management Guidelines for the Mackay Whitsunday region have been developed for 12 landscape types including those on the Clarke Connors Range (Bushfires Consortium, 2012), which represent best practice models for achieving conservation, production and wildfire mitigation objectives.

The State of the Region Report in 2007 identified large-scale wildfires during the previous 10 years (1999, 2001, 2004 and 2006). Investigation of the causal factors behind these large-scale wildfires identified a range of issues such as:

- The cane industry's move to green cane and trash blanket had reduced the opportunity to burn next to cane lands and increased the risk of fire events;
- Changing demographics in land use, with rural residential expansion occurring and a decline in cane farming. The diminishing profits in cane also saw an expansion in timber plantations and influx of people in mining industries who had no understanding of the role of fire in land management;
- El Nino weather years causing longer than usual dry periods and bad fire weather days; and
- Reduction of available people in the grazing industry due to the rapid expansion of the mining industry and greater incomes mining offered.

Since 2007 comprehensive fire scar mapping has been prepared annually for 250 land managers and 5 rural fire brigades within the catchment to assist in fire management planning, and to reduce critical threats to Environment Protection and Biodiversity Conservation Act (1999) listed flora and fauna including 1000 ha of Semi-evergreen Vine Thicket.

These data allow a review of fire regimes across a large geographical area and can guide investment to improved fire management in line with the guidelines. This process was commenced because of the observation that much of the fire that influenced the range prior to 2007 was inappropriate, included extensive wildfires in 1999, 2001, 2004 and 2006, and also highlighted that many areas of the range have gone long unburnt. This situation could possibly be made worse by a climate change resulting in higher temperatures and lower rainfall.

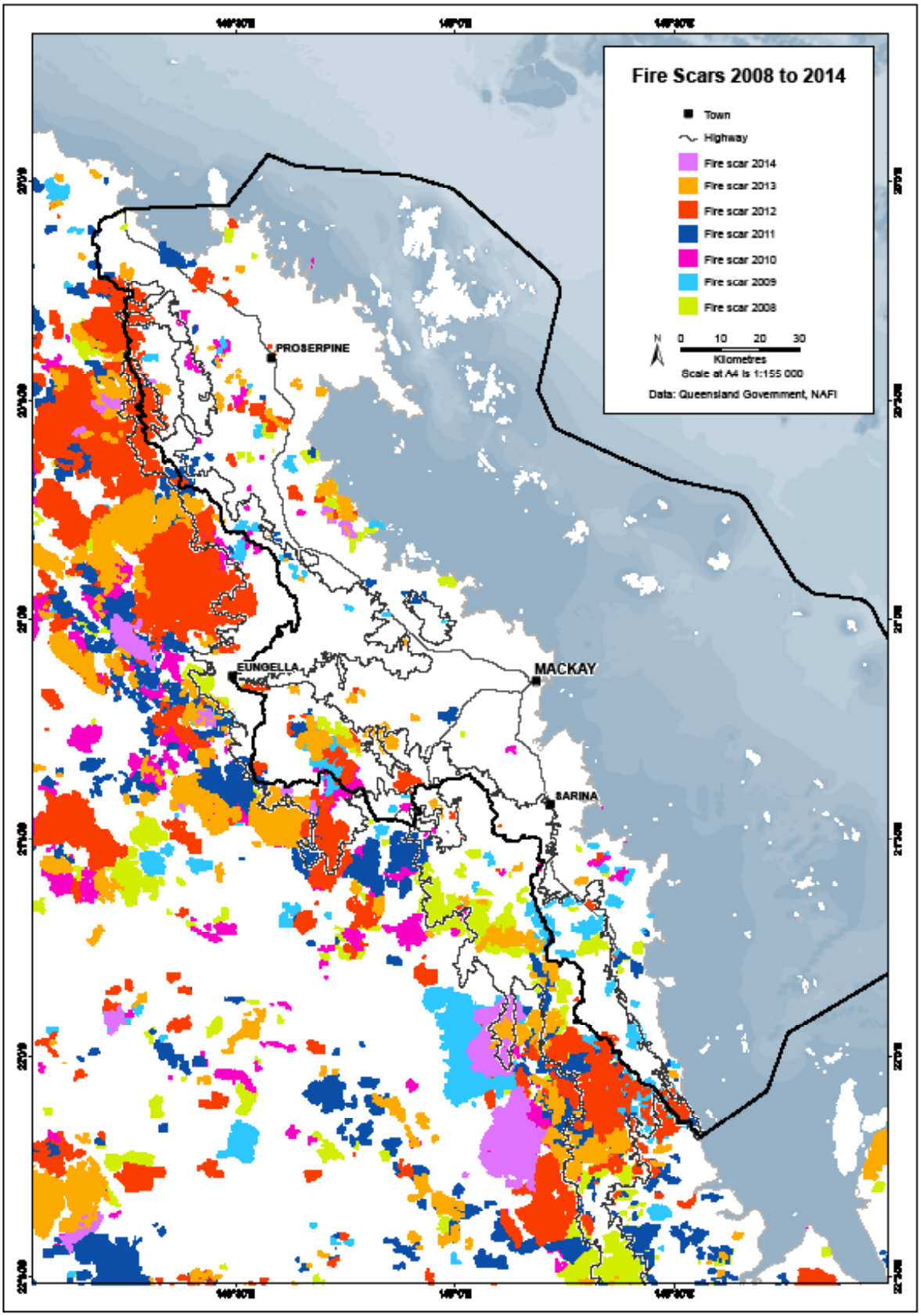

Figure 8 Fire scars in and around the region 2008-present

Land Management Practice

While existing land management practices continue to result in degradation of water quality in some areas, notably Broken River, significant progress has been made through investment programs in 2008 and 2009 to reduce pollution of the river.

The development of guidelines to manage specific issues such as lantana, rubber vine and threated species such as the northern quoll has also occurred since 2007 (Reef Catchments, 2009a, 2009b, 2009c, 2009d). Lantana is common and widespread throughout the catchment which is a significant economic pest causing considerable loss of pasture productivity, and has large impacts on biodiversity through habitat degradation (Tran et al 2008). Fire remains the only economic way in which to control lantana across such broad landscapes (ARMCANZ, 2000)

The management of weeds is not monitored however it is expected that the extent of weed distribution and movement patterns throughout the range persists, in particular for key problem species such as grader grass.

Likewise, the management of feral pigs along the range is not feasible to gauge. One of the most significant threats is the spread of disease such as chytridiomycosis, a fungal disease which infects and kills frogs including the endangered Eungella day frog; and phytophthora (Phytophthora cinnamomi), a root rot fungi which can cause dieback of all forest types. Both these diseases are known to be present on the range and further spread is of concern.

The region contains other vertebrates that could decline from climate change, because they reach their northern limits on the Central Queensland Coast and have high water requirements, for example the vulnerable tusked frog (Adelotus brevis), rare whirring treefrog (Litoria revelata), the great barred-frog (Mixophyes fasciolatus) and the swamp rat (Rattus lutreolus). Two wallum fish, the ornate sunfish (Rhadinocentrus ornatus) and the vulnerable honey blue-eye (Pseudomugil mellis), are each represented by a small outlying population in a separate wetland around Shoalwater Bay, far distant the main populations found from Fraser Island southwards, suggesting fortuitous survival in response to past climate change and a high vulnerability to future change. All of these species can be expected to survive in South-east Queensland. Lowe (2011; 126)

GOVERNANCE

Much of the range is protected within National Parks or State Forests. National Parks are to be managed in accordance with the Nature Conservation Act 1992. The management principles provided by this act are 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 foremost 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.

Management responsibility for National Parks and State Forests lies with the Queensland Parks and Wildlife Service. A small area of Cathu State Forest is under the control of Forest Plantation Queensland for purposes of managing exotic and hoop pine plantations.

An overarching plan for the management of National Parks and State Forests on the range has been prepared: Planning for the Future: A strategic plan for the protection and presentation of parks and forests in the Mackay Highlands. This plan generally recommends that most State Forest areas associated with the Eungella area be managed more for their conservation values and that conversion to National Park tenure is appropriate.

Most of the remaining land on the range 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 such as pest plant and animal control.

INDICATORS

Future fire management activities as measured by remote sensing and on ground mapping, can be compared to the Clarke Connors Range fire management guidelines and a report carding process established. Further indicators, both relating to biodiversity and cattle production can be used in key, representative areas as direct measures of the results of changed fire regimes.

The presence and activity of feral pigs and other feral animals can be determined through a range of monitoring programs which incorporate social, economic and environmental factors.

The distribution and movement patterns of other pests such as weeds, and microbial pests such as (Phytophthora cinnamomi), and chytridiomycosis can be directly surveyed and mapped.

Water quality improvements can be directly measured using existing guidelines.

The establishment of replicable monitoring and support for research projects within the range will determine if biodiversity values have been maintained. This includes broad baseline monitoring such as recently established by Griffith University to monitor Climate Change responses; and species targeted projects, either threatened species or indicator species to indicate ecosystem function (e.g. northern quolls, yellow-bellied gliders, swamp rats, Eungella honeyeater, endemic frog species etc).

REFERENCES

ARMCANZ. 2000. Agriculture & Resource Management Council of Australia & New Zealand, Australian & New Zealand Environment & Conservation Council and Forestry Ministers, (2000)

Anonymous . 2003. Tourism Queensland: Whitsundays Visitor Survey Final Report. Report prepared by the Tourism Queensland Research Department.

Baker, A. 2012. Finding a new mammal species. Wildlife Australia Magazine. Pp 12-14. www.wildlife-australia.org.

Ball, D. and Benison, K. (2007) Records of the swamp rat, Rattus lutreolus, Gray, 1841 (Rodentia: Muridae) in mid eastern Queensland including taxonomy and observations of habitat use. In prep.

Bishop, H. (2007) Pastures: Mackay Whitsunday Region, A guide for developing productive and sustainable pasture-fed grazing systems. Department of Primary Industries and Fisheries, QLD Gov

Bushfire Consortium (2012) The Clarke Connors Range Fire Management Guidelines. Reef Catchments,

Department of Environment and Heritage (2013) Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs. Advice to the Minister for Environment and Heritage from the Threatened Species Scientific Committee on a public nomination of a Key Threatening Process under the Environment Protection and Biodiversity Conservation Act 1999. http://www.environment.gov.au/biodiversity/threatened/ktp/feralpigs.html Last accessed June 2013.

Department of Environment and Water (2005) Nomination of the northern quoll (Dasyurus hallucatus) for inclusion in the Environmental Protection and Biodiversity Conservation Act. Canberra

Joseph, L., C. MORITZ, et al. (1993). "A mitochondrial DNA perspective on the historical biogeography of mideastern Queensland rainforest birds." Memoirs of Qld Museum 34: 201-214.

Kitchener,T. (1999) Connors Clarke Range Resources Report. Prepared for the Department of Natural Resources and the Environmental Protection Agency. Mackay

Longmore, N.W., and Boles, B.E., 1983 Description and systematics of the Eungella Honeyeater Meliphaga hindwoodi. A new species of Honeyeater from Central Eastern Queensland, Australia Emu 83(2) 59 - 65 Published: 1983

Low T. (2011) Climate Change and Terrestrial Biodiversity in Queensland. Department of Environment and Resource Management, Queensland Government, Brisbane. Available at http://www.friendlyfireaustralia.com.au/downloads/resources/tim-low-report.pdf Last accessed 17 April 2014.

Melzer, R. & Clarke, J. 2003. Queensland Parks and Wildlife Service Fire Management System. Environmental Protection Agency. Brisbane.

Queensland Herbarium (2013) Regional Ecosystem Fire Guidelines (February 2013) (Queensland Department of Science, Information Technology, Innovation and the Arts: Brisbane).

Reef Catchments (2009a) Clarke Connors Range Bushfire Consortium Fire Management Guidelines.

Reef Catchments (2009b) Fire Management Guidelines for Rubber Vine: Rubber Vine Infestation.

Reef Catchments (2009c) Fire Management Guidelines for Lantana: Lantana Infestation.

Reef Catchments (2009d) Fire Management Guidelines for Northern Quoll: Northern Quoll Habitat

Sadlier R, Couper P, Colgan D, Vanderduys E and Rickard E (2005). A New Species of Scincid Lizard, Saproscincus eungellensis, from Mid-Eastern Queensland. Memoirs of the Queensland Museum 51(2): 559-71.

Stanisic, J. 1994. The distribution patterns of species diversity of land snails in eatern Australia. Memoirs of the Queensland Museum 36 (1) : 207-214.

Stuart-Fox, D.M., C.J. Schneider, C. Moritz & P.J. Couper, 2001. Comparative phylogeography of three rainforest-restricted lizards from mid-eastern Queensland. Australian Journal of Zoology 49(2): 119–127.

Tourism and Events Queensland (2012a) Mackay Regional Snapshot. Available at http://www.tq.com.au/fms/tq_corporate/research%20%28NEW%29/Summary%20Visitor%20Statistics/Domestic%20Tourism%20Snapshot/12%20December%20Domestic%20Automation%20Snapshot%20Master.pdf Last accessed 14 April 2014

Tourism and Events Queensland (2012b) International End of Year Snapshot. Available at http://www.tq.com.au/fms/tq_corporate/research%20%28NEW%29/International%20Visitor%20Data/12%20December%20International%20Automation%20Snapshot%20Master.pdf Last accessed 14 April 2014