Annex 2.3 Examples of trends in significant species and communities

1. Title of species/community

- Small Mammals and Reptiles of Lorna Glen ex-pastoral station, by Mark Cowan

2. Description

- Details about species/community: Lorna Glen is an ex-pastoral station of approximately 244,000 hectares that was purchased by the Department of Environment and Conservation in 2000 for biodiversity conservation. The area supports an extraordinarily rich array of flora and fauna with more than 480 vascular plant species and 220 vertebrate species identified thus far, but it is particularly the small ground dwelling vertebrates that make this area unique within arid Australia. There are 14 small mammal species known and at least 70 reptiles and although areas such as Cravens Peak in South western Queensland are claimed to have the richest reptile fauna of any arid zone in the world (de Blas 2006), the 65 or so species documented there is significantly less than that known for Lorna Glen.
- Distribution: Lorna Glen is located within the southern rangelands (towards the eastern margin of the pastoral country) and close to the geographic centre of Western Australia, approximately 160 km North West of Wiluna (Fig. 2). It straddles the boundary between two biogeographic regions, with the southern half in the Murchison IBRA region and the northern half in the Gascoyne IBRA region. Although there is adjoining estate managed for conservation along the north eastern boundary of Lorna Glen, the remaining surrounding land use comprises of four active pastoral stations running cattle.
- Relevant ecological characteristics: The climate for this area (based on data from the Wiluna Meteorological Station) is typified by highly irregular rainfall averaging less than 250mm per year, with this falling in both winter and summer. The coolest time of the year, July, averages a maximum of 23° C while the warmest month, January, averages 38° C. Extensive sandplains with scattered dune systems are the dominant landform but breakaway systems, low stony hills and rises, broad outwash plains, lake and claypan systems are common features also (Mabbutt et al 1963). Although fine scale patterning and diversity of vegetation communities across the property contributes to the richness of this community, the spinifex species *Triodia basedoweii* and *T. melvillei,* which occur separately but sometimes with Mulga (*Acacia aneura* complex), or Eucalyptus species (*Eucalyptus gongelocarpa, E. kingsmilli*) as an overstory, support as many as 60 species of reptiles , or 85% of that known for the area, and 9 species (64%), of the small ground dwelling mammals (Cowan pers com).

3. Significance

- Legislative listing: The community as a whole has no legislative listing although a number of species present do. These include the Mulgara (*Dasycercus cristicauda*), and the Malleefowl (*Leipoa ocellata*) as well as a recently reintroduced species, the Bilby (*Macrotis lagotis*). All of these species are listed as Vulnerable under WA's category of threat status and the *Environment Protection and Biodiversity Conservation Act (1999)*. The Long-tailed Dunnart (*Sminthopsis longicaudata*) is also listed as a Priority species for WA.
- Reasons for listing – eg. Distribution, decline: More than 30% of the pre-European mammal fauna is either extinct or has disappeared from the local region. The listed species above have either undergone significant range and abundance reductions or their status is difficult to determine.
- Other definitions of significance: There are few documented vertebrate communities as diverse as that found at Lorna Glen, certainly with the same array of species. This is particularly significant given the limited extent of land set aside for conservation in this region where pastoralism and mining remain the dominant land uses.
- Linkage to other species: Linkage is through the existence of a relatively intact and diverse ecosystem that forms part of the matrix for the region as a whole. It is hoped that reintroductions of other taxa identified from subfossil remains (Baynes 2006) will further assist in the reconstruction of a functional system close to that which would have existed prior to the introduction of stock, cats and foxes

4. Data/Information

- Sources of information: Data has been compiled from biannual survey and monitoring of ground dwelling vertebrates by the Department of Environment and Conservation since 2002.
- Extent of knowledge: Overall vertebrate richness and general community structure is well understood at the property to site scale, although temporal dynamics of populations and their overall trends and responses to management will only be fully understood through continued detailed assessment.
- Information needs/gaps: Continued assessment of Lorna Glen survey sites, as a long term monitoring reference area, is essential to understanding natural temporal dynamics and management effectiveness of the area and will assist in the development of a conservation management model for other rangeland areas.

5. Management requirements/Issues

- Nature of threats: The increased availability of water through the establishment of wells and bores over much of the rangelands has allowed grazing of stock and also improved conditions for kangaroos and introduced herbivores such as goats and camels. This has resulted in varying levels of degradation and alteration to landscape function across the arid shrublands of Western Australia (Pringle et al 2006). Initial management requires the decommissioning of artificial water points on conservation lands to reduce total grazing pressure thus allowing some level of landscape function recovery, and this was completed for Lorna Glen in 2002. Stock from neighbouring properties, and the movement of certain introduced herbivores is further managed by strategic establishment of stock proof fencing along boundaries or cooperative repositioning of boundary water points.

  Increased frequency, intensity and patch size of fire all have the potential to result in habitat homogenisation and thus reduce biodiversity. Conversely, lack of fire in certain habitats may have a similar homogenising effect through senescence and lack of fire induced regeneration. Understanding the importance of fire and how it should be applied remains one of the key issues for effective conservation management, particularly in relation to threatened taxa that may already be on the edge of persistence due to other pressures.

  Predation, particularly by cats, has been linked to the decline and/or disappearance of many native vertebrates (Dickman 1996) and unchecked, along with other pressures may continue to result in local extinctions and or abundance reductions . Lorna Glen has been the focus of a baiting trial for cats (Algar 2003) which is now operational across the entire property resulting in a significant reduction of cat numbers across the property. While this will assist in ensuring the long term viability of extant species, it has also provided the opportunity for a reintroduction and fauna reconstruction program that is well underway (Burrows 2008, Morris et al 2006).

- Need to manage species/community: Despite the apparent robustness of arid environments they are often remarkably fragile and highly susceptible to human induced impacts from mining and exploration activities, introduced herbivore grazing, infrastructure development and maintenance, recreational use etc. Careful management of these areas is required to ensure the maintenance and continued improvement of the integrity of existing ecosystems and their biodiversity attributes.

6. Management actions/responses

- Timeframe: Ongoing.
- Recovery plan: Lorna Glen is the target of an adaptive management plan which is still in the draft form (Burrows 2008). The focus of this plan is to both maintain and enhance biodiversity values through effective management and monitoring of existing attributes, ameliorating threats and undertaking a fauna reconstruction program. These actions are already underway.

- NRM plans or species management plans: None for the community as a whole although threatened species are covered under National and State recovery plans, for example the 1996 Action Plan for Australian Marsupials and Monotremes.
- Stage of implementation: An adaptive management plan will run from the present to 2020 with a number of ongoing activities including continued and expanded biodiversity assessment and monitoring, feral animal control and monitoring, fire management, and fauna reintroductions etc.
- Reservation: Although currently designated as Unallocated Crown Land and managed under a memorandum of understanding with the States land administration agency, Landgate, for biodiversity conservation, the area is in the process of formal inclusion in the reserve system as Conservation Reserve.
- Amount of investment: The exact amount is unknown but it would be in the 100's of thousands.
- Community involvement: Lorna Glen is managed under a memorandum of understanding between the Department of Environment and Conservations and Ngaanyatjarra Native Title claimants from the Wiluna area. This has provided opportunities for collaboration with, as well as training and employment for traditional owners. This has enabled the transfer and exchange of traditional and scientific thinking in a management context. Interest groups such as Birds Australia, the WA Naturalist Club and Conservation Volunteers Australia have and continue to have ongoing involvement in survey and on-ground management activities. The area has some capacity and facilities to support natural history recreational activities to the broader community.

7. Outcomes

- Recent trends eg. recovery? Assessment of small mammal captures in spring sampling has identified a significant increase in abundance over the period between 2002-2007 and this does not appear to be directly correlated with annual rainfall (Fig 1). Vegetation trend analysis over longer time frames using Landsat TM imagery, and the reassessment of a number of the Department of Agriculture Rangeland Monitoring sites positioned across the property, have shown an increase in vegetative cover. It is possible that this resource increase, resulting from a reduction in total grazing pressure may be driving this response. An analysis of all pit trapped vertebrates from 24 sampling sites in 2002 compared to those caught in 2007 using the Wilcoxon's test for matched pairs, also shows significant change in both average site richness (T=53, P<0.028) and average site abundance (T=48, P<0.005) with both having increased over this five year period.

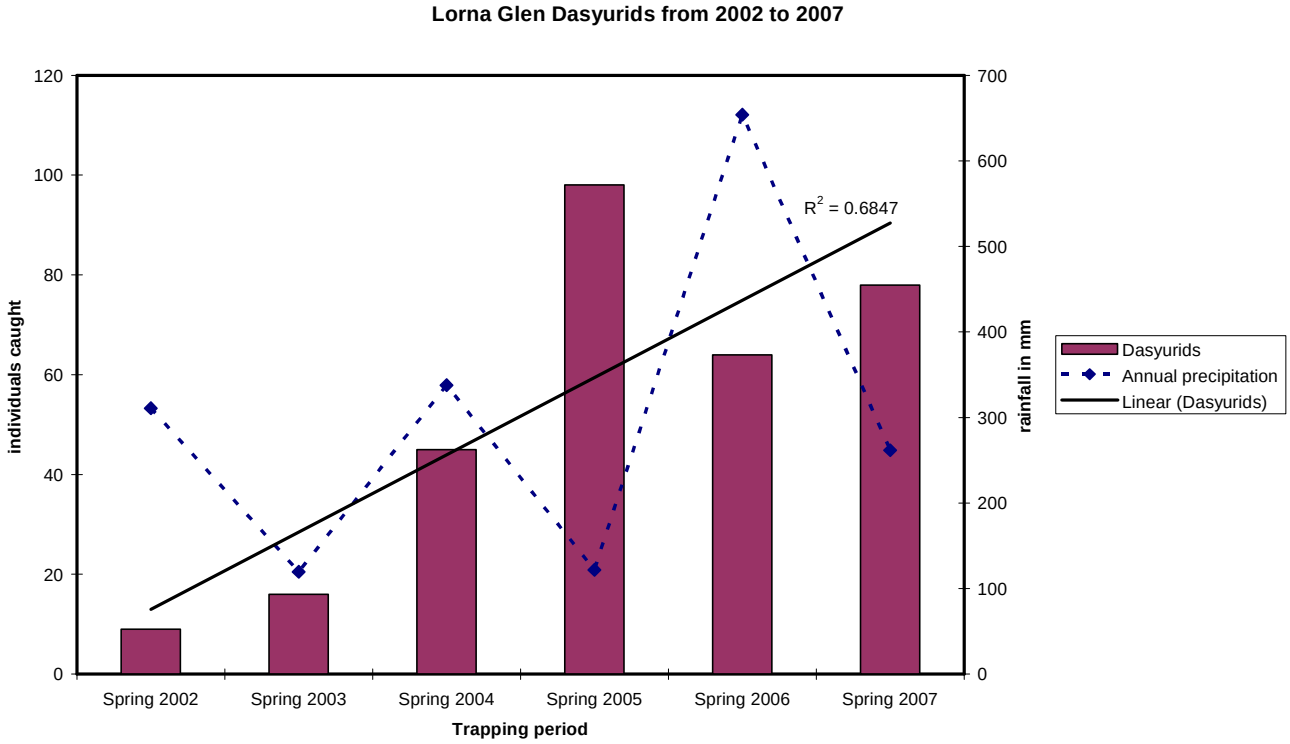

Figure 1. Collective abundance of all Dasyurids trapped in spring from 2002 to 2007. The positive regression line has an R^2 value of 0.6847

- Monitoring of change: Monitoring of vertebrate assemblages at 24 sites representing the major habitat diversity occurs biannually. Baseline data against which change can be measured exists for birds and floristics. Monitoring of response of vertebrate assemblages to reduction in cat numbers through baiting was carried out from 2003-2007 with a preliminary assessment made in 2004 (Cowan 2004).
- Some analysis of effectiveness of action: There is an improvement in overall condition across Lorna Glen as documented through current vertebrate survey and monitoring work, but also supported through on ground assessment of pastoral monitoring sites and through remote sensing (Cowan 2008).

8. Future scenario

- Predicted change in status: Unlikely to change.
- Emerging/new management issues: These will primarily revolve around fire management and continued and sustained feral animal control. The reintroduction of additional threatened species is dependant on this and will also require significant investment and resources to monitor success.
- Broader implications: The Gascoyne and Murchison bioregions are significantly altered through continuing and sustained pastoral activities and introduced herbivore grazing. The establishment of reserves and their effective management for biodiversity conservation is critical to ensure representation of the functioning natural components of these bioregions into the future.
- Way(s) forward? Completion and implementation of an adaptive management plan that continues to maintain and enhance the substantial biodiversity values of Lorna Glen. This will assist in the development of a model for management of all southern rangeland reserves in Western Australia.

9. Images

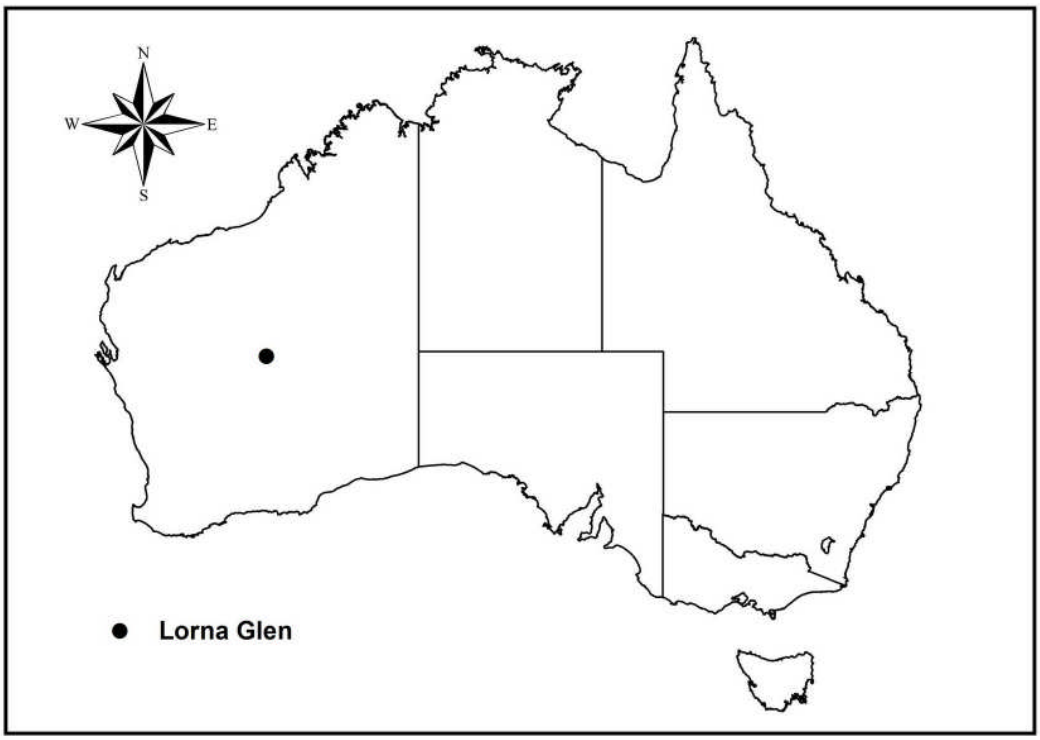

Figure 2. Location of Lorna Glen in central Western Australia

Lorna Glen contains a diverse array of habitat types. The view here shows parts of the remnant inland plateau interspersed with Mulga shrublands and hummock grasses.

Fire is an important feature of the arid zone with mosaics of differing fire ages essential to the maintenance of biodiversity.

Long-tailed Dunnart (*Sminthopsis longicaudata*) was infrequently captured in WA until work at Lorna Glen demonstrated their relative abundance in certain habitats.

Management of cats and foxes through baiting has enabled the reintroduction of two species of mammal and will assist in the maintenance and recovery of other extant species.

Establishment of vertebrate trapping grids.

Breakaways overlook a flooded claypan with Mulga shrublands in the distance

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