

Department of Resources, Energy and Tourism (DRET)

PROPOSED COMMONWEALTH
RADIOACTIVE WASTE MANAGEMENT
FACILITY, NORTHERN TERRITORY

**Biological Environment
Report**

Proposed Commonwealth
Radioactive Waste
Management Facility,
Northern Territory

BIOLOGICAL
ENVIRONMENT REPORT

13 March 2009

**Department of Resources,
Energy and Tourism (DRET)**

KBR

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Acknowledgments

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B1. Introduction

This report provides a summary assessment of the biological characteristics for four potential sites within the Northern Territory being considered for the Commonwealth Radioactive Waste Management Facility (CRWMF). The report forms part of the site characterisation process for use in the selection of a preferred, permanent site.

B1.1 Study areas

The four potential sites are located within the Northern Territory, Australia (Figure B1.1). Three sites are located on land owned by the Commonwealth and managed by the Department of Defence: One site is on a pastoral property owned by Aboriginal interests.

The sites considered are:

- Mount Everard (JORN) location with one potential site (0.4 km²). This site is located approximately 25 km north-west of Alice Springs, immediately north of the Tanami Road.
- Harts Range (JORN) location with one potential site (1.0 km²). This is located approximately 100 km north east of Alice Springs north of the Plenty Highway and about 25 km west of the Harts Range police station.
- Fishers Ridge, which includes two potential sites, Area 1 of 2.57 km² and Area 2 of 1.3 km² within a larger area of land. Both are located approximately 40 km south east of Katherine, 5 km east of the Stuart Highway and are north of the main access road to the King Valley community. (Both of these areas are contiguous, and, from a biological perspective, are considered to present similar biological characteristics.)
- Muckaty which is on the southern edge of Muckaty Station, approximately 110 km north of Tennant Creek, within the Tomkinson Creek Province of the Tennant Region, in the Central Northern Territory. Regional studies were also conducted in the northern area of Muckaty Station. Muckaty Station homestead is located approximately 8 km west of the Stuart Highway, 60 km east of the Alice Springs-Darwin railway and 45 km east of the gas pipeline that connects the Amadeus Basin gasfields to Darwin. Muckaty Station is a pastoral station used for cattle and horse grazing leased by the several guardian clans to Mr Ray Aylett. The study areas are under the guardianship of the Ngapa clan.

B1.2 Regional setting

B1.2.1 Mount Everard and Harts Range

The Mount Everard and Harts Range sites are located in the Burt Plain Bioregion (NRETA 2006). One of the distinguishing features of the Burt Plain Bioregion is the predominance of earthy, alluvial red soils in a plain formation, compared to sandplains and sand dunes common throughout adjoining bioregions, such as the Tanami Bioregion.

Thackway and Cresswell (1995) describe the region as undulating plains with a number of rugged rocky outcrops and low ranges crossed by numerous broad sandy watercourses. Specifically, Harts Range is predominantly red earths and alluvial soils (sands) while Mount Everard is predominantly red earths. There are more defined watercourses in the Harts Range region due to the larger area of higher, rocky terrain.

The bioregion is characterised by plains of low woodland and shrubland typically dominated by *Acacia aneura* (mulga) woodland and *A. kempeana* (witchetty wattle) shrubland over grassland, plus tussock and hummock grasslands and smaller areas of Eucalyptus woodlands, usually along riparian corridors and on floodplains. Hills and steep rocky ranges occur in the east, north and west of the bioregion (NRETA 2006). Much of the region has been impacted by grazing of livestock, primarily cattle, pest plants and animals, and mining.

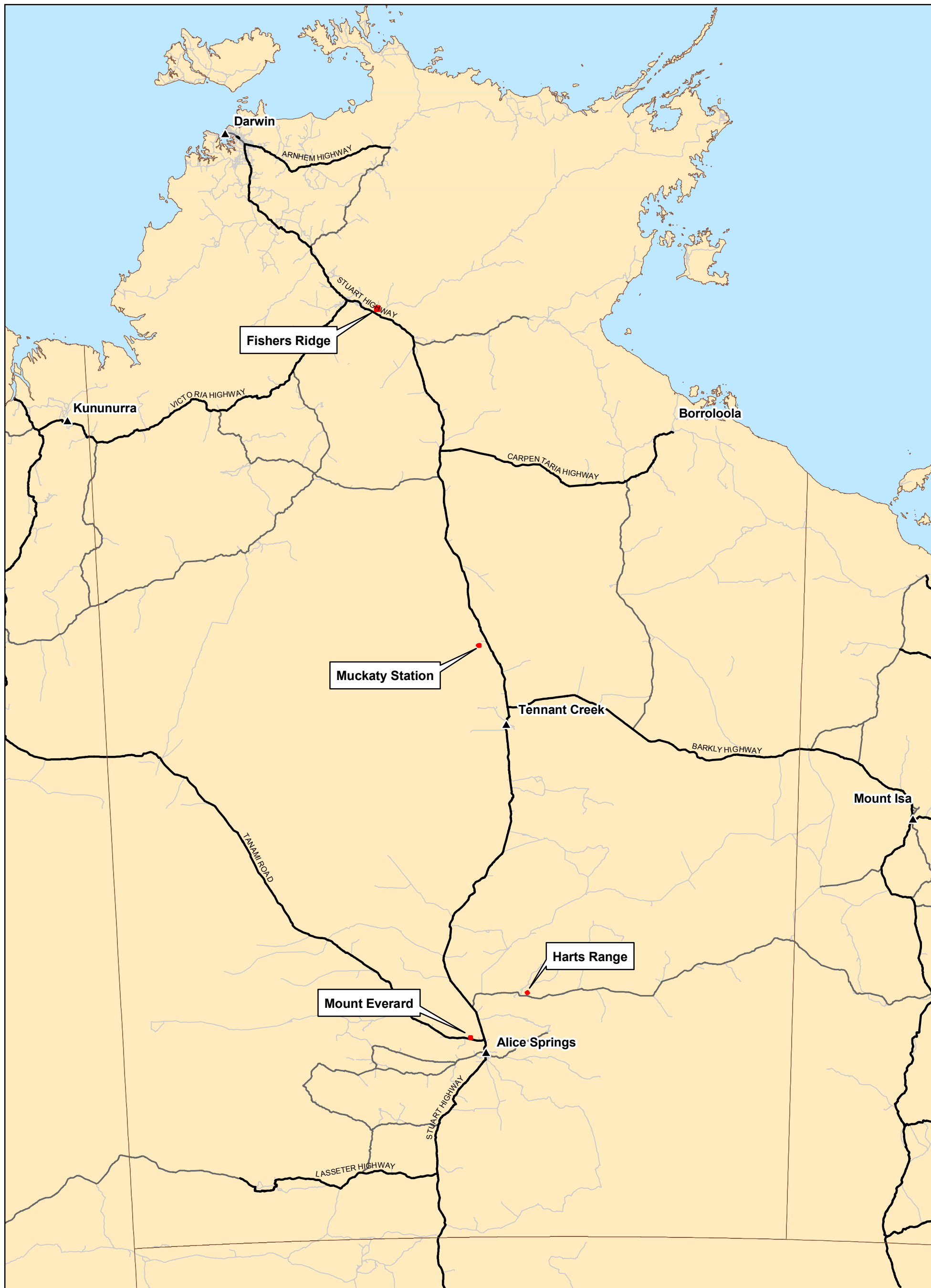
B1.2.2 Fishers Ridge

Fishers Ridge is located in the Daly River Bioregion of the Northern Territory (Thackway and Cresswell 1995) on gently undulating plains and scattered low rises over Palaeozoic sandstones, siltstones and limestones. The land systems of the region were mapped by Specht et al. (1965) with additional information available in Aldrick and Robertson (1972). Both the Blain and Woggaman land systems occur in and adjacent to the site. Small areas of the Wriggley land system are adjacent to the site.

Areas of skeletal soils (lithosols), alluvial and levee soils (soloths and rudosols), yellow earths and red earths are present. Laterite as outcrop, subcrop and residual lag cover are present, both in the region and at the site. Tindall or Manbulloo Limestone is not present at or immediately adjacent to Fishers Ridge.

The southern boundary of Nitmiluk (Katherine Gorge) National Park is about 18 km north of the site. The King River is approximately 1.5 km east of the larger of the proposed sites. This is a permanently flowing watercourse and the riparian habitat surrounding the river and its creeks is important for fauna, particularly during the dry season. The Draft Conservation Plan for the Daly Basin Bioregion (Department of Infrastructure, Planning and Environment (DIPE) 2003), provides criteria for the identification of significant and sensitive ecosystems. The riparian areas and vegetation of the areas adjacent to the King River satisfies a number of these criteria including providing:

- dry season refugia
- core habitat for some bird species
- shade and nutrients to the King River.



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Commonwealth Radioactive Waste Management Facility Site Characterisation
 Proposed repository sites
Figure B1.1

Leech Lagoon (sometimes referred to as Leach Lagoon) is approximately 5 km south of the site and is also of ecological significance. During the wet season the lagoon overflows and is contiguous with various swamps and small creeks. Roper Creek is adjacent to this lagoon and the site access road. It provides wet season habitat, plus remnant pools for various fauna species for part of the dry season. The lagoon has not been formally assigned a conservation status by the Territory Government or the Commonwealth Government, but is considered to be important to the region as it is a constant water source for regional fauna. Similar criteria as applicable to the King River are likely to apply to Roper Creek and Leech Lagoon.

There is a very long history of fire in this environment — lit by lightning strikes and by Aboriginal people — and most native plant species are adapted to periodic burning. Based on the condition of the vegetation on the site, a fuel reduction burn had occurred in the region and the site about 6 weeks prior to the field survey. Within the Top End, the regime of bushfires that occur in the savannah woodlands has shifted from one dominated by mild fires mostly lit early in the dry season, to more intense fires later in the dry season i.e. as occurred at Fishers Ridge in 2006. Fires are a common occurrence through this area and are evident through fire scars and the presence of plant species related to disturbance.

The most extensive vegetation community in the region is open forest dominated by *Eucalyptus tetradonta* (Darwin stringybark) and *E. miniata* (Darwin woollybutt) with an understorey of perennial and annual grasses (NRETA 2006). Wilson et al. (1990) provides more detail on the broadscale distribution of vegetation communities in the region namely, *E. tetradonta*, *E. miniata* and *Corymbia dichromophloia* woodland with *Plectrachne pungens* - *Chrysopogon fallax* grassland understorey as the dominant within the area which includes the site. Other vegetation communities recorded by Wilson et al. (1990) include *Corymbia dichromophloia*, *E. tetradonta* woodland with grassy understorey and *Acacia shirleyi* open forest with open grassland understorey. Kinhill Stearns (1983) provided detailed regional vegetation mapping at the site and adjacent areas and distinguished the communities listed above, plus several other communities, including large areas of riparian woodland and tall shrubland and small areas of grassland and *Callitris intratropica*.

This bioregion includes areas which have been significantly modified since colonisation, with open range grazing by cattle being the major land use. Approximately 8% of the region has been cleared for horticultural production or intensive grazing, with more extensive agricultural and horticultural development being proposed for the region (NRETA 2006).

B1.2.3 Muckaty Station

The station is on the edge of two bioregions, Tanami and Sturt Plateau (NRETA 2006). It shares a range of characteristics and similarities with both bioregions. While there is a strong monsoonal influence on climate and water availability, many of the flora and fauna species, especially ground fauna, are more typical of a desert environment than the Top End. Christian et al. (1952) indicates that the Ashburton (hilly, rocky country) and Elliot (plains) land systems are present in the region.

The Muckaty site forms part of the Tanami Bioregion with the regional studies area forming part of the Sturt Plateau bioregion.

The Tanami bioregion comprises mainly red Quaternary sandplains overlying Permian and Proterozoic strata which are exposed locally as hills and ranges. The sandplains support mixed shrub steppes of *Hakea suberea*, desert bloodwoods, acacias and grevilleas over *Triodia pungens* hummock grasslands. Acacia shrublands over hummock grass communities occur on the ranges. Alluvial and lacustrine calcareous deposits occur throughout.

The Sturt Plateau bioregion mostly comprises a gently undulating plain on lateritised Cretaceous sandstones. Soils are predominantly neutral sandy red and yellow earths. The most extensive vegetation is eucalypt woodland (dominated by variable-barked bloodwood, *Corymbia dichromophloia*) with spinifex understorey.

Most of the bioregion is generally in moderate to good condition, due at least in part to the lack of intensive development. There are pervasive, but generally minor impacts associated with weeds, feral animals, pastoralism and changed fire regimes.

A conservation plan for the Sturt Plateau bioregion is currently being prepared. This included a comprehensive survey of the bioregion's fauna and flora, and an assessment of conservation values. The conservation plan was not available at the time of survey.

B1.3 Climate and seasonal weather conditions

This section is a summary of climatic conditions as they relate to flora and fauna. A more detailed report on climate is in the Meteorology Analysis Report (PB, 2008).

B1.3.1 Mount Everard and Harts Range

The Mount Everard and Harts Range sites are in Central Australia, which is a desert environment and is predominantly dry from April to September. Rainfall usually occurs in the hottest months from October to March. Alice Springs and surrounds experiences a yearly average of 275 ml with 4.7 rain days per year (Bureau of Meteorology 2006).

Conditions in Alice Springs during the survey were dry with daytime temperatures between 29°C and 36°C. Night time temperatures varied between 12°C and 21°C. Wind direction and speed was east south east (3 days) to north northwest (2 days) with maximum wind speeds between 35 and 61 km/h.

Annual rainfall in the Katherine region is 971.6 mm (Bureau of Meteorology 2006). The total rainfall in the Katherine region over the last 3 years (September 2003–August 2006) was between 3600 mm and 4800 mm depending on the gauging station (Bureau of Meteorology, 2006), which indicates above average rainfall conditions. Annual average rainfall in the Alice Springs Region is 279.1 mm. Total rainfall in the Alice Springs region over the last 3 years was between 400 mm and 800 mm (Bureau of Meteorology 2006).

Climate conditions in the Alice Springs region were typical of a drought year, although above average rainfall was recorded in the region in April 2006. The Bureau of Meteorology rates the rainfall in the region for the last 3 years as “seriously deficient”.

B1.3.2 Fishers Ridge

The Fishers Ridge site has a sub-tropical savannah climate with two distinct seasonal patterns occurring as a wet season (December to March) and dry season (April to November). The average rainfall of Katherine is approximately 971 mm, with 95% occurring over November to April (Dames and Moore 1998, Kinhill Stearns 1983). Humidity levels range between 51% and 81% throughout the year. The average annual temperature in the Katherine region is approximately 27°C (Bureau of Meteorology 2006). The average annual evaporation (Class A pan) for the Katherine region is 3,500 mm.

During the dry season, average relative humidity is considerably less (50% at 9 am and 25% at 3 pm) than those recorded during the wet season (80% at 9 am and 55% at 3 pm) (Kinhill Stearns 1983).

Weather conditions in the Katherine region during the September 2006 survey were typical of the dry season. Daytime temperatures in Katherine varied between 34°C and 35°C with night temperatures between 15°C and 16°C. Prevailing winds were predominantly from the east south east and between 7 and 13 km/h. No rainfall was recorded and humidity was low.

B1.3.3 Muckaty Station

The average annual maximum temperature for the site is 33.4°C with an average minimum temperature of 18.9°C. Estimated rainfall is variable according to month, with Tennant Creek recording an average annual rainfall of 370 mm and Elliott recording an average of 609 mm. Almost all rain falls during the wet season (November to March).

B1.4 Legislation and policy

B1.4.1 National

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relates to the definition, protection and management of all matters of national environmental significance such as ecological communities, species and sites. It also establishes national strategies, nationally applicable threatening processes and provides for the development of recovery, action and threat abatement plans. It is illegal to undertake an action that will have a significant adverse impact on a matter of national environmental significance.

B1.4.2 Territory

The *Territory Parks and Wildlife Conservation Act* (TPWC Act), and its *Amendment Act 2000*, is an Act that provides for the establishment of Territory Parks and other Parks and Reserves and the study, protection, conservation and sustainable utilisation of wildlife. It allows for determining species of Territory conservation significance and laws to protect them. Schedule 1 of the Act is a list of threatened species for the Northern Territory. The classification of species was updated in February 2007.

B1.4.3 Territory Policy

A strategy for the conservation of threatened species and ecological communities in the Northern Territory of Australia (PWCNT, no date)

This document provides an outline of principles and objectives to protect and manage threatened biodiversity elements and the threats to these elements.

Northern Territory Parks and Conservation Masterplan 2005 (Draft)

The draft Masterplan provides future directions for the conservation of the Northern Territory's biodiversity and for the continued development of its parks and reserves over the next 15 years. It is intended to be a blue print for conservation of biological resources in the Territory and provides information on the current status of flora and fauna species.

Northern Territory Bioregions: assessment of key biodiversity values and threats 2005

The Northern Territory Bioregions report is a resource document to accompany the Northern Territory Parks and Conservation Masterplan. The report provides a baseline of the status of the flora and fauna of each bioregion, summarizes the land uses and management issues which affect biological diversity, and provides an understanding of the environmental pressures that need to be managed.

Draft Conservation Management Plan for the Daly Basin Bioregion 2003 (DIPE 2003)

This plan forms part of the Northern Territory's sustainability framework which was established to provide a regional planning context for conservation. The goal of the Conservation Plan is to ensure that the species, ecosystems and ecological processes present in the Daly Basin are adequately conserved. Key objectives are to ensure that:

- no species of vertebrate or macro-invertebrate animal or vascular plant becomes extinct from the bioregion
- ecological processes continue to function, including those essential to human wellbeing (such as water and nutrient cycling) and others essential for the persistence of plant and animal species
- the ecological character of ecosystems, including, for example, the balance of species, is retained.

Integrated Natural Resource Management Plan 2005

This plan was established to protect natural assets as part of an Australia-wide focus on the management of natural resources. A consultation process was undertaken where assets in terrestrial biodiversity, land, inland waters, coast and marine, and community were identified. Assets were then ranked in order of risk. This document forms the basis for NRM investment in the Northern Territory.

Checklist of NT Vascular Plant Species (Kerrigan and Albrecht 2007)

Weeds of the Northern Territory 2007 (Cowie and Kerrigan 2007)

This document lists the introduced flora classified as weeds in the Northern Territory.

B2. Methodology

Data collection and review began prior to the field surveys. A data request was sent to the Northern Territory Government (Department of Natural Resources, Environment and the Arts Biological Records Scheme) requesting flora and fauna records for each site and adjacent areas. However, the data were not provided until the end of September 2006 after field work at the first three sites was complete.

Further data were sourced prior to the field survey including:

- threatened species lists
- information relating to the Daly River and Burt Plain Bioregions (from the NT Government website for NRETA)
- information relating to the Sturt Plateau and Tanami Bioregions (from the NT Government website for NRETA)
- Environment Protection and Biodiversity Conservation Act Protected Matters Search for each individual site, derived from Commonwealth Government's website for the EPBC Act

Aerial photography, satellite imagery and cadastral data were provided by Parsons Brinckerhoff (PB) prior to the field survey. This information was used to determine site access and location as well as providing an indication of drainage lines, the distribution of vegetation communities and other geographical features.

Past reports relevant to the area were collected and reviewed to provide background information on vegetation types and fauna species. Field survey methodology developed for the Biological Survey of South Australia (Department of Environment and Heritage) was used as a basis for the survey methodology. The initial survey methodology was further developed in the field following a reconnaissance survey and characterisation of each site during the first day at each site. The biological survey of each site is not a detailed, comprehensive assessment. It is a summary review only with limited assessment using stratified, non-random sampling to characterise the flora and fauna of each site and its adjacent region. This form of methodology allowed for key vegetation associations and potential fauna habitat areas to be targeted and assessed only.

Each site was assessed during the dates listed in Table B2.1.

Table B2.1 Survey dates

Site	Survey dates	No. of trap nights
Fishers Ridge	16–19 September 2006	4
Harts Range	20–24 September 2006	4
Mount Everard	20–23 September 2006	3
Muckaty Station	14–19 April 2008	4

B2.1 Vegetation and flora

Assessment sites were approximately 1 ha in area. The location of all sites were recorded using a differential Global Positioning System (dGPS) and Trimble Datalogger. Photographs were recorded of each site (Appendices A, B, C and D).

The identity of species was determined in the field. Voucher specimens were collected for all species that could not be positively identified in the field and the identity of these were determined out of the field.

B2.2 Fauna

The fauna assessment on Muckaty Station was undertaken under Permit No. 26888 (expiry date 15 August 2008) issued by the NT Parks and Wildlife Commission. Access to Muckaty Station was approved by the Northern Land Council (Permit ID: 5281).

B2.2.1 Materials and methods

Target sites were identified based on vegetation community composition and ecotone areas to ensure that all representative areas were sampled. Non-random sampling methods were employed as part of the fauna survey methodology. A range of standard and modified survey methods and materials were used during the survey for fauna.

B2.2.2 Trapping

Ground-dwelling animals were surveyed using 5 L, 10 L and 20 L plastic buckets (pitfall traps) and medium and large rectangular aluminium box traps (Elliott traps) and cage traps. This mixture was freshly prepared during the evenings prior to trapping. Aniseed was selected in a conscious effort to attract any native mammals which may have been present in the vicinity. Vanilla essence and lucerne pellets were used to maximise capture rates of rodents.

The bait routinely used in cage and Elliott traps consisted of:

- rolled oats (1 kg)
- crunchy peanut butter (0.5 kg)

- dry cat food (0.5 kg)
- canned cat food
- strongly flavoured and odiferous (Messmate) honey (0.5 kg)
- mixed dried fruit (0.25 kg)
- sardines in vegetable oil (0.40 kg)
- aniseed essence (25 ml) and vanilla essence (20 ml).

Elliott traps (up to 50) and pitfall traps (up to 50) were used continuously at each of the four sites during the survey periods (refer Table B2.1).

This allowed for the assessment of a relatively large area and for sampling of all major habitats and ecotones represented in a site.

Pitfall lines (transects) were placed in an orientation which provided maximum sampling of the target habitat (e.g. woodlands and grasslands). Ten 20 L straight sided plastic buckets were buried at 5 m intervals with their opening at or slightly below ground level. Where soil conditions—usually the presence of rock at depth—prevented digging the required depth for a 20 L bucket, a 10 L bucket was inserted. This was the case in a few instances at all sites. A low, temporary fence (drift net) of black fly wire 20 cm high was erected along the length of the pitfall line such that it passed over each bucket. To provide captured animals with protection, cardboard cylinders, newspaper, shredded paper, rocks and leaf litter were placed in each bucket. To prevent dehydration, a small amount of water was added to each bucket.

An example of a pitfall trap line is shown in Photograph B2.1.



PHOTOGRAPH B2.1
Example of a pitfall trap line

Elliott traps made up the second part of the 'short arms' of the cross-transect, and continued in both directions from the centre of the pitfall transect. Five to twenty five traps were placed along one length of the pitfall area. Traps were set at an interval of approximately 15 m. Every effort was made to leave traps in an area that was shaded from direct sun and protected from exposure to adverse

weather conditions. As a consequence of this policy no animals died in traps. In addition, every effort was made to place traplines away from meat ant and inch ant colonies. These species are pugnacious and their continual biting will stress or kill a small to medium animal in an Elliott or pitfall trap. Following the completion of trapping, all Elliott and cage traps were collected, removed from the field and thoroughly washed, rinsed and dried. Routine maintenance, including adjustment of all trap trigger mechanisms to react to a minimum weight was undertaken. Oiling was with fish oil. After use, pitfall traps were removed or were filled with rocks, closed by a secure plastic lid, capped with a large rock, buried with soil and each lid further covered with cobbles and boulders. The centre point of each trapline site was pegged using a 1 m hard wood or plastic stake and pink flagging tape.

An example of an Elliott trap is shown in Photograph B2.2.

B2.2.3 Scats and pellets

Scats, samples of faecal material from omnivores and predator carnivores, were collected in the field and analysed in the laboratory. Pellets were collected and assessed (one site only).

B2.2.4 Observation and active searching

Direct observations of actual and potential burrows, den and nest sites, diggings/scratching/forage areas, paw prints and scats were important indicators of the presence of animals and all were recorded.



PHOTOGRAPH B2.2
Example of an Elliott trap

Prints provided clear evidence of species that had not been directly observed or trapped during the survey (e.g. they are rare or are naturally trap-shy). Based on this evidence, traps could be baited with a target-specific bait or the area identified as an area for a more intensive and focused trapping attention.

Active searching involved rock-turning, litter raking and in some cases excavating fresh burrows.

Observations made about regional and local fauna by Defence personnel were valuable sources of information at Harts and Fishers Ridge. They provided an indication of fauna that has occurred in the past in years of good rainfall and periods of drought. This information provided reports of a number of regionally significant species (primarily at Harts Range).

Road kill specimens were also recorded.

B2.2.5 Birds

Historical information on bird species for the region was obtained from the Biological Resources Database held by the Territory Government and provided by the Biodiversity Unit of NRETA. Observations were also made by the field survey team within the region during the fauna assessment period.

B2.2.6 Bats

No targeted bat survey work was undertaken as part of the initial site characterisation process. Records of bat species for all regions were provided by the Biodiversity Unit of NRETA.

B2.2.7 Reptiles and amphibians

Reptiles and amphibians were surveyed using pitfall traps. Active searching in areas adjacent to fauna sites was undertaken.

B2.3 Taxonomy and significance status

The nomenclature sources applicable to the taxonomy and significance status for each group of fauna is provided in Table B2.2.

Table B2.2 Nomenclature and taxonomy sources

Taxa	Taxonomies		Significance status criteria		
	Primary source	Other sources	Aust	NT	Regional
Mammals	Menkhorst 2001	TPWC Act Amendment Act 2000, Threatened species list	EPBC Act 1999	TPWC Act, Amendment Act, 2005	DIPE 2003 & NRETA 2006
Birds	Barrett et al. 2003	TPWC Act Amendment Act 2000, Threatened species list	EPBC Act 1999 Garnett and Crowley (2000)	TPWC Act, Amendment Act, 2005	DIPE 2003 & NRETA 2006
Reptiles	Cogger 1994 Wilson & Swan 2003	TPWC Act Amendment Act 2000, Threatened species list	EPBC Act 1999	TPWC Act, Amendment Act, 2005	DIPE 2003 & NRETA 2006
Amphibians	Cogger 1994 Frogs of the NT (web site)	TPWC Act Amendment Act 2000, Threatened species list	EPBC Act 1999	TPWC Act, Amendment Act, 2005	DIPE 2003 NRETA 2006
Invertebrates	-		EPBC Act 1999	TPWC Act, Amendment Act, 2005	-

B2.3.1 Species significance criteria

Taxa are the categories into which plants and animals are classified (e.g. family, species or subspecies) or specific examples of these categories (e.g. *Canis familiaris dingo*, the subspecies of dog that is found wild in Australia).

The following criteria have been applied to determine the significance of species:

- Local: All indigenous fauna are significant at a local level, because of the overall decline in this component of the fauna since European settlement, and the continued incremental loss of habitat and reduction in abundance due to development.
- Regional: A taxon is considered significant at a regional level if it has a disjunctive distribution, an unusual ecological occurrence, extraordinary concentration such

as colonial nesting, roosting or feeding sites, or if it is substantially depleted or restricted in the region.

- Territory: A taxon is considered significant at Territory level if it is listed as critically endangered, endangered, vulnerable, near threatened or data deficient under the Territory Parks and Wildlife Conservation Act 2000. Species protected by international migratory wader agreements (e.g. migratory birds under CAMBA or JAMBA) are also considered to be of at least Territory significance.
- National: Nationally significant taxa that are endemic to Australia are of international significance (IUCN), although this distinction is rarely made and is not made in this current assessment and report.

The classifications for denoting the conservation status of wildlife taxa in the Territory are the IUCN Red List Categories as prepared by the IUCN Species Survival Commission and approved by the IUCN Council.

The IUCN definitions for 'extinct', 'critically endangered', 'endangered', 'vulnerable', 'rare' and 'insufficiently known' (IUCN 1996) are applicable in the NT as an integral part of the TPWC Act and have been used throughout this report.

Definitions of these terms are provided below:

- Extinct: Taxa not definitely located in the wild during the past fifty years.
- Endangered: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction. Also included are taxa that may be extinct but have definitely been seen in the wild in the past fifty years.
- Vulnerable: Species believed likely to move into the endangered category in the near future if the causal factors continue operating. Included are taxa of which most or all of the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance; species with populations that have been seriously depleted and whose ultimate security has not yet been assured; and taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range.
- Rare: Taxa with small populations that are not at present endangered or vulnerable, but are at risk. These taxa are usually localized within restricted geographical areas or habitats or are thinly scattered over a more extensive range.
- Indeterminate: Taxa known to be endangered, vulnerable or rare, but where there is not enough information to indicate which of the three categories is appropriate.
- Insufficiently known: Taxa that are suspected but not definitely known to belong to any of the above categories. In general this is because of lack of information (unknown is also applied as an equivalent, alternative category).
- Threatened: This general term is used to denote species which are endangered, vulnerable, rare, indeterminate or insufficiently known.

B2.3.2 Site significance criteria

The criteria for determining the significance of sites are considered under local, regional, Territory and national criteria.

B2.3.2.1 Local significance

A site is designated as being of local significance if it:

- supports a small population of a regionally rare or unusual species
- supports a population of at least moderate density of a locally depleted species
- has moderate to high potential for serving as a habitat link between two sites of regional significance or as a link to areas to enable native species to disperse into such areas
- has moderate potential for rehabilitation and management for the public appreciation of faunal values.

In effect, all native fauna species are considered to be of some local conservation significance. However, local conservation significance is used here to indicate that a species or habitat is of particular interest in the context of the local area.

B2.3.2.2 Regional significance

A site is designated as being of regional significance if it:

- supports taxa that are uncommon, restricted and/or have declined in the region
- contains a disjunctive population, an unusual ecological occurrence, extraordinary concentration in a regional context or a naturally restricted (e.g. colonial nesting, roosting or feeding) or substantially depleted or restricted taxon in the region
- supports a high level of species richness in the region
- contains a partial habitat link between two sites of Territory faunal significance, or a regional and State site, or a primary habitat link between two sites of regional significance, or between a site of State significance and large urban areas
- has a high potential for rehabilitation and management for public appreciation of Territory faunal values.

B2.3.2.3 Northern Territory significance

A site is designated as being of Territory significance if it:

- contains a population of a taxon listed by The Minister in accordance with Section 29 of the *Territory Parks and Wildlife Conservation Act 2000*
- contains an intact primary habitat link containing comparable habitat attributes to two connecting sites or series of sites of Territory or higher faunal significance
- has high scientific significance (e.g. forms a study site for a particular species or assemblage of species or has particularly biogeographical significance in the region).

B2.3.2.4 National significance

A site is designated as being of national significance if it:

- contains a population of a taxon listed under Schedule 1 of the EPBC Act
- has had more than 200 species of native birds recorded there since 1970

- contains large concentrations or one or more species covered by international treaties such as Bonn, Japan Australia Migratory Bird Agreement (JAMBA) and China Australia Migratory Bird Agreement (CAMBA)
- supports an appreciable number of rare, vulnerable or endangered taxa
- is of special value for maintaining genetic and ecological diversity of a region because of the quality or peculiarities of its fauna
- is of special value as animal habitat at a critical stage of their biological cycle
- is of special value for its endemic animal species or communities.

B3. Mount Everard

The Mount Everard property includes one area of land potentially of use as a CRWMF site.

An initial reconnaissance of the site was undertaken on 20 September, 2006. This site is small and relatively homogeneous in composition, consequently only two assessment sites were considered as necessary to characterise it. Pitfall trap-lines and Elliott traps were established and opened on the 20 September 2006. Traps were opened for 3 days and nights and placed in areas that were considered to represent the best quality habitat available in the site. Refer to Figure B3.1.

B3.1 Vegetation setting

The Mount Everard Defence area and the site are within the Burt Plains Bioregion Subregion 3 Woinarski (1992). The region is dominated by earthy, alluvial soils with sandy plains of *Acacia* shrubland and tussock and hummock grasslands. Land use within the Bioregion is predominantly pastoralism (>80% of the region) (NRETA 2006). The bioregion is currently classified as very poorly reserved with especially poor representation of the dominant Mulga Woodlands (NRETA 2006).

Morgan (2001) states that the landscape stress of this subregion is moderate to high with a continental landscape stress score of 3 assigned. This assessment translates to a subregion that is moderately to severely impacted by land use. Native vegetation extent is estimated at >90% of the subregion with high impacts from total grazing pressure.

Wilson et al. (1990) recorded the dominant vegetation of the plains adjacent to Mount Everard as isolated patches of *Acacia aneura* (Mulga) mixed species low open woodland with open grassland understorey. The dominant vegetation community is described as *Acacia aneura* (Mulga)/mixed species low open-woodland with open-grassland understorey. Other species common in *Acacia* communities of this region include *Acacia kempeana*, *Eremophila latrobei*, *Atalaya hemiglauca*, *Einadia nutans*, *Ptilotus obovatus* and *Sclerolaena lanicuspis*.

Wilson et al. (1990) notes that this community often merges into the *A. aneura* tall sparse-shrubland with which it is extensively associated. This community is differentiated from the *A. estrophiolata* woodland by the greater abundance of Mulga, although floristically the upper layers are very similar.

The NT flora data base lists 26 native species and 3 introduced species for the region 3 km from the site. This reflects the limited amount of assessment and collecting of common, widespread species in the area.

B3.2 Results of vegetation surveys

B3.2.1 Vegetation communities

The vegetation communities common to Mount Everard are similar in species composition to quadrat 3 in Harts Range i.e. both are Mulga woodland. The shrub and herb species diversity in this area is slightly less than Harts Range, while grass species diversity and abundance is more at the Mount Everard site. As evidence by dead trees, carbonised wood on the surface and thickets of young Mulga, the latter site has also been burned in the past.

The sole dominant vegetation community is:

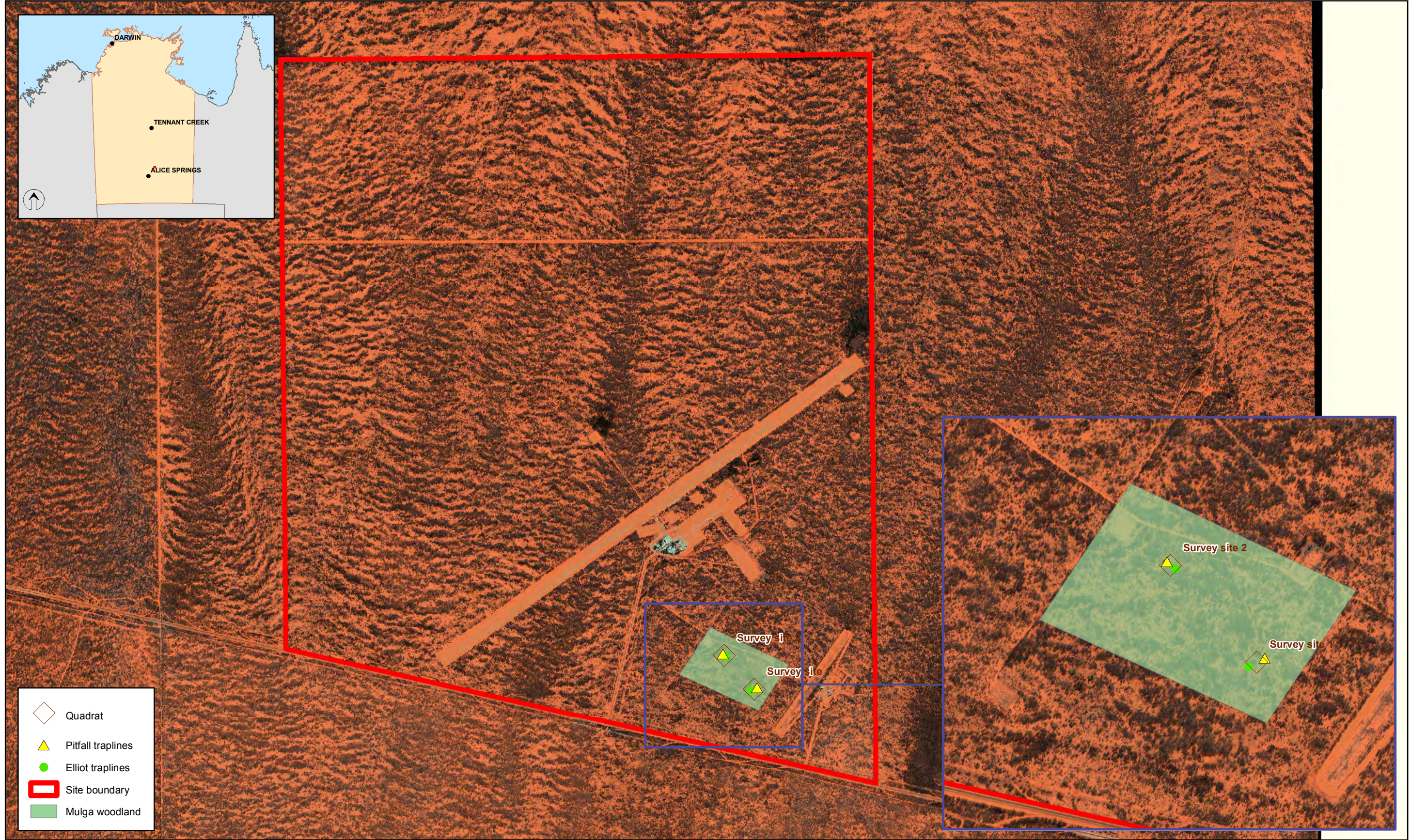
- *Acacia aneura* (Mulga) open woodland with rare *Acacia estrophiolata* (Ironwood/Spearwood) and occasional *Acacia kempeana* (Witchetty bush) over a sparse *Eremophila* shrubstorey and understorey dominated by *Eragrostis eriopoda* (Woollybutt grass) and *Cheilanthes sieberi* (Carrot fern).

B3.3 Conservation status of vegetation species and communities

No species or communities of conservation concern were observed during the September survey. Photographs, regional information and species lists are in Appendix A. Table B4.1 (Section B4) provides a summary of threatened and data deficient flora of the Northern Territory for this region. A review of previous literature for the region and data supplied by the NT Government indicates that no species of conservation significance occur on site.

With the exception of *Sclerolaena birchii*, which was recorded near the site adjacent to the Tanami Road, it is unlikely that most of the species listed in Table B4.1 are present on site. It is possible that a few annual species of significance may be present following above average rainfall.

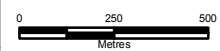
The site was composed of regrowing, moderately degraded and depauperate communities of Mulga with a few areas of relatively intact Mulga thickets adjacent to the site. Cattle grazing and years of drought have adversely impacted the biodiversity in this area. Based on species described in Wilson et al. (1990), the site contains approximately 20% of the species normally associated with this vegetation community.



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Coord. Sys.: GDA94 MGA53



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Drawn By: RP Checked by: MD

Client Ref: RADWASTE

**Commonwealth Radioactive Waste Management Facility
Site Characterisation
Mt Everard vegetation communities
Figure B3.1**

B3.4 Introduced plants

Two introduced plants were recorded in the site and eight species for the general area. Of these, Buffel grass and Couch grass was present along the main access road to the site and at a few cleared areas in the area.

B3.5 Vegetation clearance

The site contains one reasonably intact band of older mulga woodland in about the centre of the site, with areas of regrowth mulga either side. There are several tracks and other cleared areas present.

B3.6 Fauna

Due to the small area involved and the uniformly homogeneous habitat, there are very few opportunities for the presence of an unusually high diversity of fauna and threatened species from any group.

B3.6.1 Fauna survey locations

Figure B3.1 shows the location of the assessment sites. As noted in the field assessment, only the avifauna showed any diversity. Even so, there is no special habitat afforded by the site such as watercourses, old trees with hollows and areas of rocky outcrop or sand plain or dune.

B3.7 Results of fauna survey

B3.7.1 Ground mammals

Red kangaroo and echidna were the only species recorded at the site. No small mammals were present and there is no key habitat available for the species which have been recorded or which could occur in the region. The NT BRS records five species of small mammals in the wider region. It is possible that Sandy inland mouse or Striped-face dunnart could occur, although they would require more understorey vegetation than is currently present. Site staff have also recorded various pest species.

B3.7.2 Bats

No assessment was undertaken, primarily because only feeding habitat is provided by the site. Up to 12 species may occur in the wider region.

B3.7.3 Birds

The NT BRS database lists 34 species for a 3 km area around the site. Kinhill (1992) notes that over 80 species have been recorded in the wider region. The site assessment recorded 23 species with the most common being Singing honeyeater, White-browed babbler, Grey butcherbird and Splendid fairy-wren. No species of particular conservation significance was recorded. Site staff have recorded Common boobook owl and Barn owl at the site during the past five years. The presence of a permanent water supply in the Defence facility is a major attraction for many species.

B3.7.4 Reptiles and amphibians

Ctenotus schomburgkii (Sandplain ctenotus) and *C. leonhardii* (Common desert ctenotus) were recorded by trapping, with Sand (Gould's) goanna, Central bearded dragon and Gilbert's dragon observed. Fifteen species have been recorded in the region by the NT BRS and most data date to 1994/95. Centralian blind snake, a data deficient species for the NT, has been reported for the area and could occur at the site. Site staff records include King brown snake (also data deficient for the NT), Perentie, a blue-tongue lizard (presumably Centralian) and geckoes.

No species of amphibian was recorded during the field assessment and one species is recorded in the NT BRS. It is possible that a further 5 species could occur in the region.

B3.7.5 Other species

Termites, especially low mound building species, are present throughout this site and area. Mound building species are useful indicators of disturbance and habitat fragmentation; they are also an important food source for a number of vertebrates, especially reptiles, throughout the region. Mulga ants are equally abundant in the site.

B3.7.6 Introduced species

European rabbit and cattle were present adjacent to the site. Facility staff indicated that European rabbit can be abundant and is increasing in number after a number of years of low population (presumably due to the impact of RCD (calici-virus). House mouse and feral cat are relatively common, with the former species being seasonally abundant at times. Dingo and dingo-dog hybrids, are relatively common. Arabian camel, horse, donkey and Red fox are present, but rarely recorded for the region. Rock dove (feral pigeon) and House sparrow has also been present at the facility in the past. They were not recorded during 2006. No introduced invertebrates were recorded and none has been reported by Defence contractor staff. A number of introduced ant species have been reported recently in Alice Springs, but not at the site.

B3.8 Conservation status of fauna species

A search of the EPBC Act Protected Matters Database and Northern Territory Parks and Wildlife Schedules showed that a number of threatened fauna species or their potential habitat may occur in the area. These species are as follows:

- Desert sand-skipper (*Croitana aestivalis*) – Endangered (Commonwealth and Territory)

The Desert sand-skipper is endemic to the Northern Territory. The species is known only from a small number of specimens collected in 1966, 1972 and 2007 at various locations west of Alice Springs in the MacDonnell Ranges.

The species requires native grasslands as breeding habitat, and is not known to occur in Mulga woodlands. It is therefore highly unlikely to occur at this site.

- Mulgara (*Dasycercus criticauda*) – Vulnerable (Commonwealth and Territory)

The Mulgara is widespread but patchily distributed in the arid and semi-arid sandy regions of central Australia. In the Northern Territory it now occurs mostly in sandy desert regions. Its strongholds appear to be the Tanami and Great Sandy Desert bioregions. It is not known to occur in the Burt Plains Bioregion. This species preferred habitat is the Spinifex grasslands of the Tanami and Great Sandy Desert.

- Black-footed rock-wallaby (*Petrogale lateralis*) MacDonnell Ranges race) – Vulnerable (Commonwealth), Near threatened (Territory).

Black-footed rock-wallabies occur in rocky outcrops and associated steep rocky slopes common to the MacDonnell Ranges Bioregion. The species is not known to occur in the Burt Plains Bioregion as its preference is for rocky terrain.

- Greater bilby (*Macrotis lagotis*) – Vulnerable (Commonwealth), Endangered (Territory).

The Greater bilby lives in sandy desert areas in spinifex (*Triodia* species) grasslands. They are known to occur in the sandplain country of the Tanami and Greater Simpson Desert regions.

- Oriental plover (*Charadrius veredus*) – Listed Migratory Bird Species (Commonwealth)

This species prefers open plains, bare, rolling country often far from water. It is common to coastal and northern inland Australia and could occur as a vagrant in this area, especially following floods.

- Oriental pratincole – Listed Migratory Bird Species (Commonwealth)

This species prefers be in the vicinity of water on inland plains or coastal floodplains or swamp areas. It is not believed to occur within the Mount. Everard site due to the lack of water and severe drought conditions. It could occur anywhere in the region following floods.

B4. Harts Range

The Harts Range property includes one area of land potentially of use as a CRWMF site.

An initial reconnaissance of the site was undertaken on 20 September, 2006. Flora assessment sites coincided with each ground fauna trapping site and notes were compiled of the remainder of the site and the adjacent area. Pitfall trap-lines and Elliott traps were established and opened on the 20 September 2006. Traps were placed in areas that represented reasonable quality, typical habitat or showed distinct eco-tone characteristics. Traps were opened for 4 days and nights.

Refer to Figure B4.1 for the location of the assessment sites.

B4.1 Vegetation setting

The Harts Range site is within the Burt Plains Bioregion Subregion 2 as described in Woinarski (1992). The region is dominated by earthy, alluvial soils with sandy plains of *Acacia* woodland and shrubland, and tussock and hummock grasslands. Land use within the area is predominantly pastoralism (cattle) on unimproved native vegetation (NRETA 2006). The bioregion is currently classified as very poorly reserved within the NT conservation system with especially poor representation of the dominant Mulga Woodlands (NRETA 2006).

The whole of this bioregion includes 971 plant species, of which 7 are endemic to the bioregion, 35 are endemic to the NT and 3 are listed as threatened under Commonwealth or NT legislation (NRETA 2006).

Morgan (2001) states that the landscape stress of this subregion is moderate with a continental landscape stress score of 4. This assessment translates to a subregion that is moderately impacted by land use. Vegetation extent is estimated at >90% of the subregion with moderate to high impacts from total grazing pressure.

Wilson et al. (1990) recorded the dominant vegetation of the Harts Range region as isolated patches of *Acacia aneura* (Mulga) mixed species low open woodland with open grassland understorey. A second dominant vegetation community in the region is *Acacia estrophiolata* (Ironwood), *Atalaya hemiglauca* (Whitewood) low open-woodland with open grassland understorey. This community often overlaps with *A. aneura* woodland. Other species recorded in this community included *Senna*

artemisoides nothosp. artemisiodes, *Ptilotus obovatus*, *Sclerolaena bicornis* and *Einadia nutans*.

The NT BRS for flora has records of 60 indigenous plant species, 3 exotic species and 1 cosmopolitan species for a 3 km radius around the site. MBS Environmental Services (2004) recorded 122 indigenous species and 9 exotic species in the region immediately east of the site. The latter report is the most detailed, applicable and current assessment of the region.

B4.2 Results of vegetation survey

Flora survey quadrat sites are shown in Figure B4.1 and the distribution of vegetation communities are also recorded on this figure.

B4.2.1 Vegetation communities

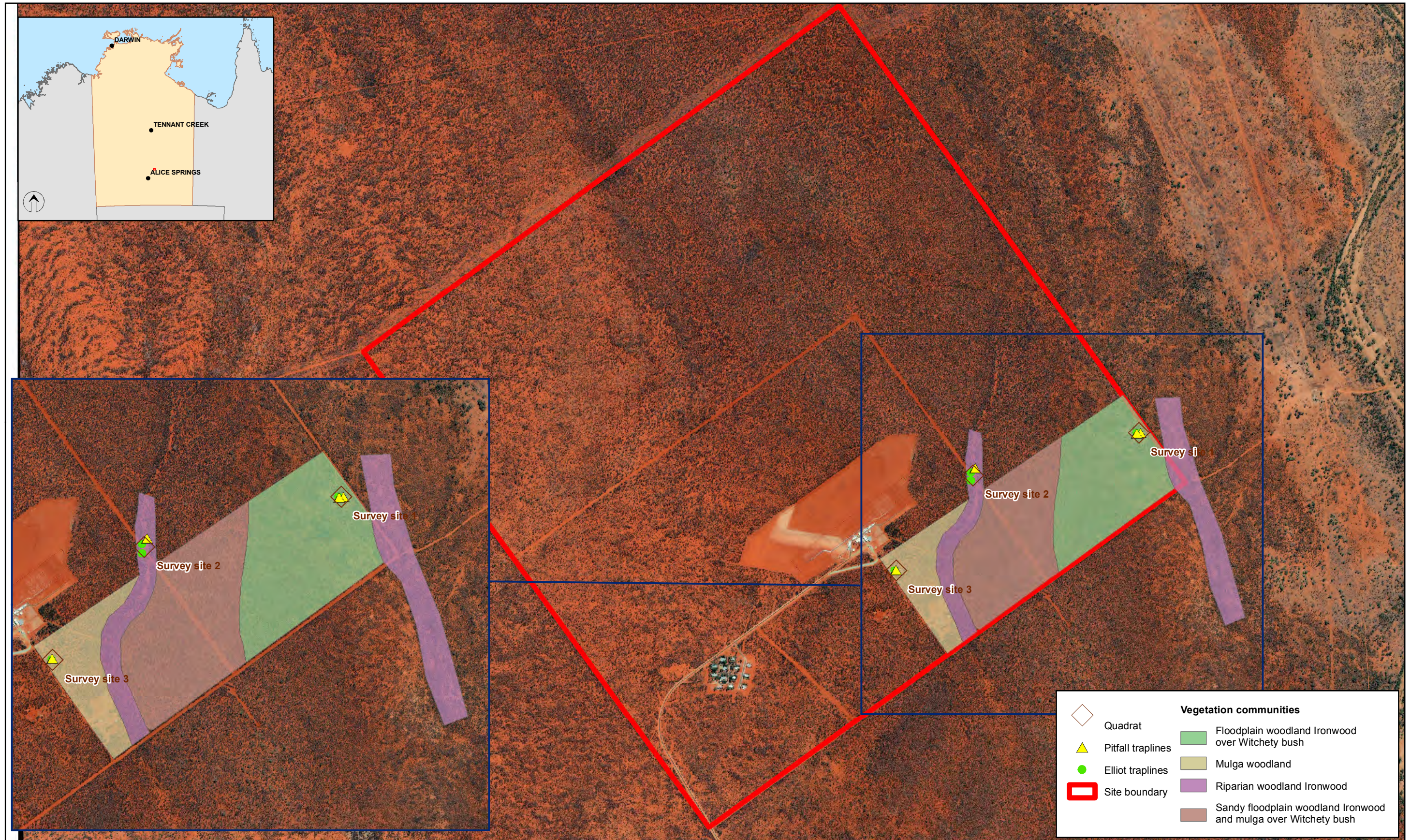
Dry woodland and shrubland species dominated all vegetation communities throughout the site, with limited quantities of perennial understorey species present. Due to the annual and seasonal drought conditions few annual-ephemeral species were recorded.

Based on the site reconnaissance and the vegetation quadrats established, the dominant vegetation communities are:

- *Acacia estrophiolata* (Ironwood) very open woodland with *Acacia kempeana* (Witchetty bush) and *Senna artemesoides* shrubstorey over *Sclerolaena johnsonii* (quadrat 1).
- *Acacia estrophiolata* (Ironwood) tall woodland with emergent *Corymbia opaca* (Desert bloodwood), primarily along a small, sandy creekline and its adjacent flood-out areas (quadrat 2).
- *Acacia aneura* (Mulga) open woodland with *Eremophila* spp. over mixed native and grasses and low shrubs such as *Sclerolaena bicornis* and bare ground (quadrat 3).

All communities were in poor to fair condition with the riparian community in the best condition. Few signs of recruitment and regeneration of perennial species were noted throughout the site, particularly within the lower stratum species diversity. The age structure and diversity of the communities indicates that the last year of reasonable rainfall was approximately three years ago.

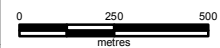
Previous and current disturbance to the site has resulted in changes to traditional vegetation community structure. Cessation of traditional Aboriginal burning practices and the active suppression of fire by European pastoralists have been linked to increases in Mulga populations, both in extent and density (Williams 2002). The potential fire frequency in arid zone *Acacia* shrublands has been estimated to be in the order of every 5–50 years based on average rates of fuel accumulation and burning whenever there is sufficient fuel to carry a fire (Williams 2002). The site showed no evidence of recent fire, with Mulga communities typical of open woodland with a range of age structures, but mostly large, older trees.



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Data Source: KBR, DoD

Coord. Sys.: GDA94 MGA53



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Site Characterisation
Harts Range vegetation communities
Figure B4.1**

A limited number and amount of grass species were present in the understorey of the communities. *Aristida holathera* (Kerosene grass), *Paspalidium* sp. (Budgie grass) and *Eragrostis eriopoda* (Wollybutt grass) were present at all quadrat sites, albeit in very small amounts at quadrats 1 and 3. Quadrat 2 (Figure B4.1) was located close to an ephemeral watercourse, therefore vegetation surrounding this area was generally in better condition with a greater number of understorey species. Based on Wilson et al. (1990), various native grasses and forbs, such as *Enneapogon polyphyllus* are common in these communities. Forbs such as *Einadia nutans* were present, however due to drought conditions and grazing pressure many of the expected species were absent.

The understorey (particularly around Quadrats 1 and 3) was primarily composed of species that are unpalatable to large herbivores, such as the copperburrs, *Sclerolaena johnsonii* and *S. bicornis*. Wilson et al. (1990) note that *Salsola kali*, which is primarily a summer growing annual, can be dominant in the shrubstorey of the region, accounting for up to 42% of this layer. This plant is similar to the copperburrs in that it is attractive to stock when young but woody and inedible when mature (Allan 2005).

The site is not currently used for cattle grazing (but it has been in the past) and it is also used by Defence as an access area to facilities and boundary areas.

Quadrat 1 is located on part of a floodplain of the Ongeva Creek in open mature Ironwood woodland. Other tree species include a few examples only of *Corymbia opaca* (Desert bloodwood) and *Ventilago viminalis* (Supplejack). *Atalaya hemiglauca* reaches the height of a small tree and also occurs as a tall shrub. The shrubstorey was predominantly composed of woody perennials such as *Acacia kempeana*, *Senna* spp. including *S. artemesioides* subsp. *artemesioides* and ssp. *filifolia* and *S. pleurocarpa* (Desert cassia) and *Eremophila latrobei* with occasional *Rhagodia spinescens*. These species were common throughout the site, and in some sections they dominate the shrubstorey. *Acacia victoriae* and *Capparis spinosa* are rare in this section of the site. This quadrat contains few grasses and the groundstorey is dominated by *Sclerolaena johnsonii* and *S. bicornis*.

Quadrat 2 is located on the northern edge of the site in a small, sandy overflow creek connected to Ongeva Creek. In relation to the site (though not the region), it contains a unique tall woodland community of large trees dominated by Ironwood and Desert bloodwood. Small tree and tall shrub species recorded here included *Santalum lanceolatum* (Plumbush) and *Carissa lanceolata*. *Aristida holathera* and *A. strigosa* were also only recorded from the understorey at this quadrat. Weed species included Buffel grass, Prickly lettuce and Milk thistle. Two forms of *Salsola kali* were present here and elsewhere in the Defence area and site; a large and vigorous form growing to about 2 m x 2 m and a small, sparse low shrub usually about 0.3 m tall. This is a cosmopolitan species and the former form may not be native to the area i.e. it may have been introduced into region and site from elsewhere.

Quadrat 3 is located adjacent to past and current landfill and storage sites. Patches of open Mulga woodland with very limited understorey species diversity, indicate that drought and over grazing has impacted the site. There are very few tall shrubs at this site and most were young Mulga plants. The groundstorey is dominated by bare ground and small plants of *Sclerolaena johnsonii* and *S. bicornis*. Following rainfall, this community typically contains a wide range of annual and ephemeral herb species, especially *Xerochrysum*, *Chrysocephalum*, *Craspedia*, *Hyalosperma*, *Podolepis*, *Ptilotus* and annual grasses

Termites are present throughout this site. Mound building species are useful indicators of disturbance and habitat fragmentation; they are also an important food source for a number of vertebrates, especially reptiles, throughout the region.

Ephemeral species were present in small numbers only and usually in small areas where concentrated run-off had occurred, such as adjacent to hardstand areas and tracks. These included species such as *Helipterum floribundum* (White paper daisy) and *Ptilotus* spp.

Plant species diversity was low to moderate across the site and the species present are consistent with those recorded by Wilson et al. (1990). In years where rainfall is average to above average, species diversity and numbers would be expected to be considerably higher. (Mount Everard recorded more understorey grass species than Harts Range suggesting a higher level of biodiversity. The reverse was true for the two sites for overstorey shrub and tall shrub species.)

Tree species not recorded on the site but which are present elsewhere in the region are *Eucalyptus camaldulensis* and *E. coolabah*. Photographs, regional information and species lists are in Appendix B.

B4.3 Conservation status of vegetation communities and species

No plant communities or species of listed conservation status (Commonwealth and Territory) was present on the Harts Range site at the time of the survey. At a national level, there are no eucalypt or acacia species endemic to the Burt Plain Bioregion (NRETA 2006).

On a regional level the site contains communities which are common throughout the Burt Plains Bioregion and Subregions. However, the bioregion is poorly reserved particularly in relation to Mulga Woodlands with only 0.26% of the area of the bioregion covered by a formal reserve agreement.

Table B4.1 which is adapted from Neave et al. (2006) provides a summary of Commonwealth, Territory and Regionally threatened species in the Burt Plain Bioregion.

Some of these species are widespread in the region while others are present in small occurrences or particular micro-habitats only and they are not likely to be present at the Harts Range site. In addition, years of cattle grazing and several seasons of below average rainfall also contribute to reducing the chance of recording some of the more widespread species.

Sclerolaena birchii is present as a few plants in the area adjacent to the site. However, *S. bicornis* along with *S. johnsonii* are dominant species in the understorey layer. *S. birchii* is rated as Data Deficient on a Territory level but is not listed under Commonwealth legislation. Its rating as Data Deficient relates to a lack of knowledge on the abundance of the species throughout the NT.

Table B4.1 Threatened and data deficient flora of the Burt Plain Bioregion

Threatened taxa	Common name	AUS Status	NT Status
<i>Eleocharis papillosa</i>	Dwarf Desert Spike-rush	VU -	-
<i>Ipomoea sp. Stirling (P.K. Latz 10408)</i>	Bush Potato	VU	VU
<i>Macrozamia macdonnellii</i>	MacDonnell Ranges Cycad	VU	VU
<i>Acacia macdonnellensis subsp. teretifolia</i>	Hill Mulga	-	DD
<i>Arabidella trisecta</i>	Shrubby Cress	-	DD
<i>Astrebla lappacea</i>	Curly Mitchell Grass	-	DD
<i>Bulbine alata</i>	Native leek	-	DD
<i>Calandrinia disperma</i>	Blue Burr-daisy	-	DD
<i>Calotis cuneifolia</i>		-	DD
<i>Calotis kempei</i>		-	DD
<i>Centipeda nidiformis</i>	Erect Sneezeweed	-	DD
<i>Centipeda racemosa</i>		-	DD
<i>Chenopodium pumilio</i>	Clammy Goosefoot	-	DD
<i>Corchorus walcottii</i>	Woolly Corchorus	-	DD
<i>Crotalaria dissitiflora subsp. dissitiflora</i>		-	DD
<i>Cullen graveolens</i>	Native Lucerne	-	DD
<i>Cyperus gilesii</i>		-	DD
<i>Daucus glochidiatus</i>	Australian Carrot	-	DD
<i>Daviesia eremaea</i>	Desert Broom-bush	-	DD
<i>Dissocarpus biflorus var. biflorus</i>	Twin-flower Saltbush	-	DD
<i>Enneapogon intermedius</i>		-	DD
<i>Eragrostis crateriformis-</i>		-	DD
<i>Eragrostis lanicaulis</i>		-	DD
<i>Eragrostis subtilis</i>		-	DD
<i>Eriachne benthamii s.lat</i>	Swamp Wanderrie	-	DD
<i>Erodium angustilobum</i>		-	DD
<i>Gilesia biniflora</i>		-	DD
<i>Gomphrena leptophylla</i>		-	DD
<i>Goodenia cylindrocarpa</i>		-	DD
<i>Goodenia halophila</i>		-	DD
<i>Heliotropium ballii</i>		-	DD
<i>Heliotropium inexplicitum</i>		-	DD
<i>Heliotropium sphaericum</i>		-	DD
<i>Heliotropium subreniforme</i>		-	DD
<i>Ixiochlamys integerrima</i>		-	DD

			NT Status
<i>Ixiochlamys nana</i>	Small Fuzzweed	-	DD
<i>Kohautia australiensis</i>		-	DD
<i>Lawrencia viridi-grisea</i>		-	DD
<i>Lechenaultia lutescens</i>		-	DD
<i>Leiocarpa tomentosa</i>		-	DD
<i>Lythrum paradoxum</i>		-	DD
<i>Maireana lobiflora</i>	Lobed Bluebush	-	DD
<i>Maireana schistocarpa</i>		-	DD
<i>Marsilea sp. Neutral Junction (D.E. Albrecht 9192)</i>		-	DD
<i>Marsilea costulifera</i>	Narrow-leaf Nardoo	-	DD
<i>Mimulus prostratus</i>	Monkey Face	-	DD
<i>Oldenlandia argillacea</i>		-	DD
<i>Oxalis radicata</i>		-	DD
<i>Phyllanthus erwinii</i>		-	DD
<i>Plantago cunninghamii</i>	Sago Weed	-	DD
<i>Ptilotus aevoides</i>		-	DD
<i>Samolus eremaeus</i>	Water Pimpernel	-	DD
<i>Sauropus ramosissimus</i>		-	DD
<i>Scaevola graminea</i>		-	DD
<i>Sclerolaena birchii</i>	Galvanised Burr	-	DD
<i>Sclerolaena minuta</i>		-	DD
<i>Sida sp. Bond Springs (D.J. Nelson 2538)</i>		-	DD
<i>Sida sp. Hale River (P.K. Latz 12036)</i>		-	DD
<i>Streptoglossa cylindriceps</i>		-	DD
<i>Tephrosia brachycarpa</i>		-	DD
<i>Tephrosia sp. granite (P.K. Latz 12116)</i>		-	DD
<i>Triumfetta centralis</i>		-	DD
<i>Triumfetta chaetocarpa</i>		-	DD
<i>Triumfetta clivorum subsp. brevipedata</i>		-	DD
<i>Triumfetta johnstonii</i>		-	DD
<i>Triumfetta maconochieana</i>		-	DD
<i>Vittadinia pustulata</i>		-	DD

VU – Vulnerable, DD – Data deficient.

B4.4 Introduced plants

Weed diversity in the Alice Springs region is relatively low, excluding areas of high disturbance such as around township and settlement sites, roadsides and some stock grazing properties. Eleven introduced plant species were recorded on the wider area of which four were present in the site. Most are typical low impact and low risk weed species. However, four high or higher impact (risk) species were present.

Buffel grass (*Cenchrus ciliaris*) occurs throughout the region and site. Saffron thistle (*Carthamus lanatus*) and Mexican poppy (*Argemone ochroleuca*) were recorded in the wider area, including adjacent to quadrat 3, near the rubbish dump and in areas used for stockpiling materials. Both species are declared weeds under the *Weeds Management Act 2001* (NT). Buffel grass and Mexican poppy are listed as significant management issues for the region (NRETA 2006).

In addition, the vigorous form of *Salsola kali*, which is a cosmopolitan species, may also be a significant weed species.

B4.5 Vegetation clearance

The eastern and central sections of the site are reasonably intact with little evidence of clearing outside of the fenceline and access tracks. The western section of the site is heavily disturbed and cleared for use by Defence. Grazing by cattle is likely to have been responsible for impacts on the understorey and shrubstorey in the past.

B4.6 Fauna

The vertebrate fauna of the Burt Plain Bioregion has many species in common with neighbouring bioregions. This is not surprising since many desert species are relatively habitat-specific and localised while a larger group are regional migrants that use a wide range of habitats depending on the season and rainfall conditions. 94% of vertebrate species found in the Burt Plain Bioregion have also been recorded in the MacDonnell Ranges Bioregion to the south and 79% in the West MacDonnell National Park (Neave et al. 2006). The Tanami Bioregion to the north shares 87% of vertebrate species with the Burt Plain Bioregion, the Great Sandy Desert to the west shares 86% of vertebrate species, the Channel Country Bioregion to the east shares 56% of vertebrate species, while the Simpson-Strzelecki Dunefields Bioregion to the south-east shares 78% of vertebrate species with the Burt Plain Bioregion (Neave et al. 2006).

The Burt Plain Bioregion has undergone substantial losses of its mammal fauna over the last century, while there are ongoing declines of some bird and mammal populations (NRETA 2006).

There are 13 native vertebrate species with at least 25% of their records in this Bioregion (4 birds, 4 mammals and 5 reptiles), and none is unique to it (Neave et al. 2006). Of the birds, Malleefowl and Night parrot are listed as critically endangered under the *Territory Parks and Wildlife Conservation Amendment Act 2000*, while the Chestnut quail-thrush is listed as lower risk -near threatened- in the Territory. All four mammals are either regionally extinct in the Northern Territory or extinct nationally

(Neave et al. 2006). The Centralian blind snake is listed as data deficient in the Northern Territory.

There is limited data available on species distribution and occurrence for region and this site from both the NT BRS database and the literature. Defence does not, apparently, have baseline ecological information for the site. Kinhill (1992) contains regional information only and the most recent information applicable to the region immediately east of the site is the report by Low Ecological Services (LES) in MBS Environmental Services (2004).

B4.7 Fauna survey locations

The location of pitfall and Elliott trapping sites is shown in Figure B4.1. The habitat provided by the site is typical of this floodplain location, although it lacks many of the key habitat elements provided by Ongeva and Annamurra creeks, which are respectively east and west of the area and the rock outcrops and hills of Harts Range south of the site.

B4.8 Results of fauna survey

B4.8.1 Mammals

Sminthopsis youngsoni (Lesser hairy-footed dunnart, Desert dunnart) was the only species recorded by trapping (Site 3) and Red kangaroo was observed throughout the site. Dingo was recorded adjacent to the site. Based on regional biological records, 13 other species are predicted to potentially occur and 14 other species are listed as extinct for the region. By observation, no unusual or critical habitat for mammals is present in the site.

Defence contractor staff have recorded Echidna, Euro, House mouse, feral cat, European rabbit, Red fox, dingo and dingo-dog hybrids, cattle, camel and an unknown species of dunnart in the past.

B4.8.2 Bats

No assessment was undertaken of this group due to unsuitable weather conditions at the time of survey, although site staff have recorded at least two different species around the buildings. Within the region, at least nine species could occur, although there does not appear to have been a recent systematic survey of this group (Terry Reardon, SA Museum, pers. comm. Nov. 2006). All are relatively common and most would be associated with the roosting habitat provided by mature trees with hollows along the major watercourses and in the rocky hills and with any source of free water.

B4.8.3 Birds

38 species were recorded in the wider region west of the site in MBS Environmental (2004) and the NT BRS fauna database. The current survey recorded 31 species and

it and the MBS Environmental assessment constitute the most detailed and recent bird records for the region.

During the current, brief survey Singing honey-eater, Yellow-throated miner, Rufous whistler, Yellow-rumped thornbill, and Grey-crowned babbler were the most numerous species. Species of interest recorded as single observations were Mistletoe bird, Chiming wedgebill and Crested bellbird.

B4.8.4 Reptiles and amphibians

Within the wider region about 54 reptile species have been recorded (Kinhill 1992), although five species only were recorded in MBS Environmental (2004). Trapping and observations during this survey in the site recorded *Pogona vitticeps* (Central bearded dragon), *Heteronotia binoei* (Bynoe's gecko), *Gehyra variegata*, *Varanus giganteus* (Perentie), *Lerista labialis* (Eastern two-toed slider), *Menetia greyii* (Dwarf skink) and *Ctenotus schomburgkii* (Sandplain ctenotus).

Additional species observed by facility staff are King brown snake (Mulga snake, *Pseudechis australis*) (data deficient in the NT), *Morelia spilota* (Carpet snake), *Tiliqua multifasciata* (Centralian bluetongue lizard) and "several small skinks and geckoes". Carpet snake has decreased in numbers in the region in recent years, so this record is of particular interest. Species observed in the region along the main road, including road kill, were *Ctenophorus nuchalis* (Central netted dragon) and Sand goanna (*Varanus gouldii*).

Site staff reported that a burrowing frog (possibly a species of *Cyclorana* or *Neobatrachus*) and a small brown tree frog (possibly *Litoria rubella*) occur at the facility. An additional 4 species may occur in the region.

B4.8.5 Introduced species

No introduced species were observed at the site, although there was evidence of cattle having been present. Facility staff indicated that House mouse and feral cat are relatively common, with the former species being seasonally abundant at times. Dingo and dingo-dog hybrids, and very rarely, Red fox and European rabbit also occur. Arabian camel, horse and donkey are also rarely recorded for the region. No introduced birds or invertebrates were recorded and none has been reported by Defence contractor staff. A feral European honey-bee colony was recorded adjacent to the property in Ongeva Creek. A number of introduced ant species have been reported recently in Alice Springs, but not at the site.

B4.9 Conservation status of fauna species

A search of the EPBC Act Protected Matters Database and Northern Territory Parks and Wildlife Schedules showed that four threatened species or species habitat may occur in the area. These species are as follows:

- Desert sand-skipper (*Croitana aestivalis*) – Endangered (Commonwealth and Territory)

The Desert sand-skipper is endemic to the Northern Territory. The species is known only from specimens collected in 1966, 1972 and 2007 west of Alice Springs in the MacDonnell Ranges. It is apparently confined to native grasslands in these ranges. It is therefore highly unlikely to occur at this site.

- Mulgara (*Dasyercus criticauda*) – Vulnerable (Commonwealth and Territory)

The Mulgara is widespread but patchily distributed in the arid and semi-arid sandy regions of central Australia (sand plains and dune fields). In the Northern Territory it is almost entirely confined to these sandy desert regions. Its strongholds appear to be the Tanami and Great Sandy Desert bioregions. It is not known to occur in the Burt Plains Bioregion.

- Black-footed rock-wallaby (*Petrogale lateralis* MacDonnell Ranges race) – Vulnerable (Commonwealth), Near threatened (Territory).

Black-footed rock-wallabies occur in rocky outcrops and associated steep rocky slopes common to the MacDonnell Ranges Bioregion. If the species occurred in this section of the Burt Plains Bioregion, it would be confined to Harts Ranges south of the site. The species has not been recorded at the facility by Defence contractor staff.

- Australian painted snipe

The Australian painted snipe is found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water’s edge and on mudflats, taking invertebrates, such as insects and worms, and seeds (DEH 2003). No permanent wetlands or watercourses were present, therefore the likelihood of this species occurring is minimal.

Table B4.2 provides a summary of Commonwealth and Territory threatened and data deficient species relative to the Burt Plain Bioregion and is adapted from Neave et al. (2006).

Table B4.2 Threatened and data deficient fauna of the Burt Plain Bioregion

Threatened taxa	Common name	AUS Status	NT Status
Birds			
<i>Ardeotis australis</i>	Australian Bustard		VU
<i>Conopophila whitei</i>	Grey Honeyeater		DD
<i>Dromaius novaehollandiae</i>	Emu		VU
<i>Erythrotriorchis radiatus</i>	Red Goshawk	VU	VU
<i>Leipoa ocellata</i>	Malleefowl	VU	VR
<i>Pezoporus occidentalis</i>	Night Parrot	EN	VR
<i>Polytelis alexandrae</i>	Princess Parrot	VU	VU
<i>Porzana fluminea</i>	Australian Spotted Crake		DD
<i>Rostratula australis</i>	Australian Painted Snipe		VU

			NT Status
Mammals			
<i>Bettongia lesueur graii</i>	Burrowing Bettong (inland)	EX	EX
<i>Bettongia penicillata</i>	Brush-tailed Bettong		rEX
<i>Chaeropus ecaudatus</i>	Pig-footed Bandicoot	EX	EX
<i>Dasyercus cristicauda</i>	Mulgara	VU	VU
<i>Dasyurus geoffroii geoffroii</i>	Western Quoll	VU	rEX
<i>Isoodon auratus auratus</i>	Golden Bandicoot	VU	EN
<i>Lagorchestes asomatus</i>	Central Hare-wallaby	EX	EX
<i>Lagorchestes hirsutus</i>	Mala (central mainland form)	EN	EW
<i>Leporillus apicalis</i>	Lesser Stick-nest Rat	EX	EX
<i>Macroderma gigas</i>	Ghost Bat		DD
<i>Macrotis lagotis</i>	Greater Bilby	VU	VU
<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse	EX	EX
<i>Notoryctes typhlops</i>	Southern Marsupial Mole	EN	VU
<i>Onychogalea lunata</i>	Crescent Nailtail	EX	EX
<i>Perameles eremiana</i>	Desert Bandicoot	EX	EX
<i>Phascogale calura</i>	Red-tailed Phascogale	EN	rEX
<i>Planigale ingrami</i>	Long-tailed Planigale		DD
<i>Trichosurus vulpecula vulpecula</i>	Common (Central) Brushtail Possum		EN
<i>Zyomys pedunculatus</i>	Central Rock-rat	EN	EN
Reptiles			
<i>Ctenotus lateralis</i>	Gravelly-soil Ctenotus		DD
<i>Demansia torquate</i>	Collared Whip Snake		DD
<i>Egernia kintorei</i>	Great Desert Skink	VU	VU
<i>Pseudechis australis</i>	Mulga Snake (King Brown)		DD
<i>Pseudonaja nuchalis</i>	Western Brown Snake		DD
<i>Ramphotyphlops centralis</i>	Centralian Blind Snake		DD
<i>Varanus acanthurus</i>	Ridge-tailed Monitor		DD
<i>Varanus tristis</i>	Black-tailed Monitor		DD
Frogs			
<i>Cyclorana australis</i>	Giant Frog		DD

VU – Vulnerable, DD – Data deficient, EN – Endangered, EX – Extinct, rEX – regionally Extinct.

Emu, Grey-headed honeyeater and Princess parrot are threatened species which may occur in the region. These species might make incidental use of the site.

B5. Fishers Ridge

Two potential sites have been identified within the Fishers Ridge property. Due to their geographical continuity and biological continuity, this report treats the individual areas as one site.

B5.1 Vegetation setting

The vegetation of the region is dominated by Eucalypt woodlands over savannah grasslands with small areas of a number of riparian vegetation communities (DIPE 2003). The communities described for the region in the Northern Territory Parks and Conservation Masterplan-Daly Basin Region 2004 (NRETA 2005) include *Corymbia dichromophloia* and *Eucalyptus tetradonta* woodland with grassland understorey.

Detailed assessment of both the region and the local area vegetation has been described in Kinhill Stearns (1983) with more recent assessments northeast of the site in Maud Creek South Station, Maude Creek (Dames and Moore 1998), which is about 55 km north of Fishers Ridge.

Kinhill Stearns (1983) described the following vegetation communities as common in the area:

- open forest-woodland of *E. tetradonta*, *E. miniata*, *Corymbia terminalis* over mixed spinifex-annual sorghum and tropical tall-grass (*Themeda*, *Sehima*)
- low open woodland or low woodland with *Corymbia dichromophloia*, *C. terminalis* over spinifex and annual grasses
- mixed open woodlands of *Eucalyptus foelscheana*, *E. tectifera*-*Corymbia confertiflora* and other species with perennial tall grasses.

The dominant vegetation communities recorded in the region by Dames and Moore (1998) were:

- *Corymbia dichromophloia* and *Erythrophleum chlorostachys* woodland
- *Eucalyptus tetradonta* open woodland to woodland
- *E. foelscheana*/*E. tectifera* woodland to open woodland
- *Lophostemon grandiflorus* open woodland
- *E. tectifera*/*Erythrophleum chlorostachys* low open woodland
- *Eucalyptus pruinosa* low open woodland.

B5.2 Results of vegetation surveys

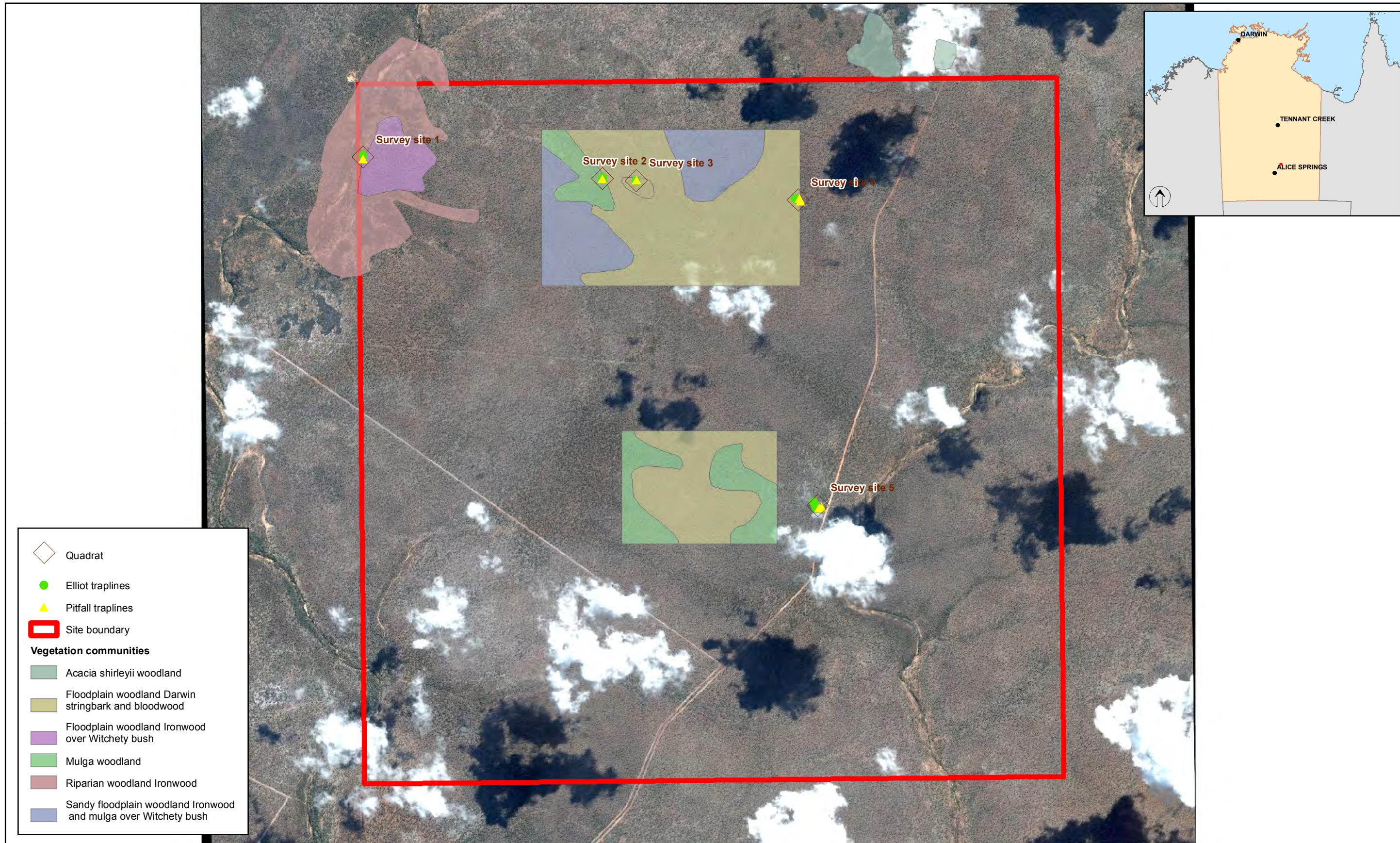
Vegetation quadrats were assessed across the site (Figure B5.1). Appendix C provides photographs, regional information and species lists for the site. The site comprises a low plateau with ridges, often dominated by laterite as outcrop and subcrop, and low slopes and small plains dominated by various earths. The site vegetation is typical of the region with open, dry woodland dominated by Eucalypt and bloodwood species over grassland. It has a lower density and height woodland vegetation than the plains elsewhere in the region, no doubt as a result of the poorer quality soils. Riparian areas of the King River and Roper Creek are adjacent to the site and these areas include tall Eucalypt woodlands and Melaleuca-dominated tall shrublands.




The vegetation survey was carried out during the dry season and immediately following a fuel reduction fire which passed through the area in about late July to early August i.e. prior to the survey. Due to the season and the impact of fire, the understorey plant diversity was poor throughout the area at the time of the survey (see photograph 2, Appendix C). A few small areas of reasonably intact understorey were present, with the best quality being at quadrat 4 (refer to Figure B5.1). In areas of high fire intensity, such as quadrat 5, it was almost impossible to 're-construct' the vegetation species diversity.

The regional information in Wilson et al. (1990) and the regional and local scale information in Kinhill Stearns (1983) is reasonably accurate for the site although *E. patellaris* woodland, *E. pruinosa* low open woodland and *E. tectifera* were not present on the site or the adjacent areas.

The primary vegetation communities recorded during the field assessment were:

- *Corymbia dichromophloia*/*Eucalyptus tetradonta* +/- *Corymbia bleeseri* and *Erythrophleum chlorostachys* low open and dry woodland over sparse tall shrubs such as *Alphitonia* sp., *Terminalia* spp., especially *T. ferdinandiana*, *Buchanania obovata*, *Gardenia megasperma* and *Grevillea decurrens* +/- *Acacia aulacocarpa* with low shrubs of *Grewia retusifolia*, *Bossiaea* and *Pachynema* over annual and perennial grasses and herbs.
- *Eucalyptus tetradonta*/*Corymbia dichromophloia* +/- *E. miniata*, *Erythrophleum chlorostachys* tall open woodland with shrub species such as *Owenia ventricosa*, *Petalostigma pubescens*, *Brachychiton paradoxum* and *Calytrix exstipulata* over annual and perennial grasses and herbs.
- *Eucalyptus camaldulensis*, *E. tetradonta*, *Erythrophleum chlorostachys*/*Eucalyptus miniata* +/- *E. bigalarita*, *Corymbia ferruginea* tall open woodland over *Pandanus aquaticus*, *Melaleuca leucadendra*, *M. viridiflora* (on levee soils), *Acacia aulacocarpa* and *A. holosericea*, with *Grevillea pteridifolia*, *Flagellaria indica* and *Sorghum* spp. (on the flood plain). This community occurs adjacent to the King River and is therefore outside of the site's boundary.
- *Acacia shirleyi* low woodland, which does not occur on the site but which is present as small thickets on dry ridges along the King Valley Road north of the site and about 1 km north east of the north east corner of the site.

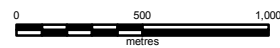


-  Quadrat
 -  Elliot traplines
 -  Pitfall traplines
 -  Site boundary
- Vegetation communities**
-  Acacia shirleyii woodland
 -  Floodplain woodland Darwin stringbark and bloodwood
 -  Floodplain woodland Ironwood over Witchety bush
 -  Mulga woodland
 -  Riparian woodland Ironwood
 -  Sandy floodplain woodland Ironwood and mulga over Witchety bush

KBR



1:30,000 at A3



Data Source: KBR, DoD

Coord. Sys.: GDA94 MGA53

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Client Ref: RADWASTE

**Commonwealth Radioactive Waste Management Facility
Site Characterisation
Fishers Ridge vegetation communities
Figure B5.1**

Changes in the structure of vegetation communities occurred with changes in soil types, as observed by Dames and Moore (1998). The dominant communities in the site are *Eucalyptus tetradonta* woodlands and its associated shrubland and grassland species on the better drained, slightly deeper, more fertile areas (e.g. quadrat 5). *Corymbia dichromophloia* +/- *C. terminalis*, *Eucalyptus tetradonta* woodlands were common on the higher, drier relief laterite areas of the site which usually had a relatively shallow soils profile (quadrats 1A and 3). *Eucalyptus tetradonta*/*Erythrophleum* +/- *E. miniata* woodlands were observed on small areas of more fertile, deeper and free draining areas of the site (quadrat 4).

One of the dominant tall shrub to small tree species across the site is *Erythrophleum chlorostachys* (Ironwood). Kinhill Stearns (1983) refers to its presence as a tall shrub layer which is common throughout the region. Wilson et al. (1990) indicates that it can occur in all strata though it rarely dominates the upper stratum. It generally comprises from 15% to 49% of the total canopy species and is often dominant in the middle stratum. This species is resistant to fire, termites and the impacts of many vertebrate herbivores and is therefore one of the more dominant species across the site. This species is the dominant tree and tall shrubstorey at quadrat 2, which is the only small area of deep, higher fertility red earth recorded at the site.

Eucalyptus camaldulensis, *Acacia holosericea* and *A. aulacocarpa* are common along the river bank, creek lines and floodplain. Understorey species were limited, again primarily due to fire. Disturbance to the riparian area (fire and grazing) has resulted in weed infestations such as *Hyptis suaveolens*, *Passiflora foetida* and *Sida acuta*. Species diversity in the riparian area (quadrat 1, Figure B5.1) was moderate, but is expected to be greater in the wet season. The area has been disturbed by domestic stock (cattle) and pest animals, especially feral pigs. Cattle pads and pig rooting areas were recorded and active gullying is taking place in this area adjacent to the site. Cane toads are also abundant in this area, although their range also extends further along creeklines, into the drier areas of the floodplain and onto the base of low slopes. It is anticipated that the species would occur across the site during the wet season.

Acacia aulacocarpa and *A. holosericea* are common 'disturbance species' found throughout much of the Northern Territory. Both species can rapidly colonise an area following severe disturbances such as land clearing or fire. Both were recorded in disturbed areas of the site, such as along road edges and areas of gullying. The weed, *Hyptis suaveolens*, a species that colonises disturbed areas, was also abundant throughout this section of the site (and on the King River floodplain).

The fire in about early August removed much of the understorey vegetation prior to the field survey. A mixed grassy understorey of *Spinifex* and other species such as *Sorghum*, *Sehima*, *Heteropogon* and *Themeda* along with various tall grass species, was recorded as the most common understorey in Kinhill Stearns (1983). Wilson et al. (1990) note that an understorey of *Buchanania obovata*, *Persoonia falcata*, *Sorghum* spp., *Sehima nervosum*, *Arthrostylis aphylla*, *Aristida* spp. and *Eriachne ciliata* are present. The majority of these grass species prefer high ground with shallow soils, such as those found at the site. It is likely that all of these species occur on the site. Moderately dense to dense understorey is usually confined to drainage lines and riparian areas.

A number of communities and species of interest or importance in the region do not occur at the site. These are discussed immediately below.

Acacia shirleyi (Lancewood) was present approximately 1 to 2 km north and north east of the site boundary. This species is common on crests and slopes of sandstone hills and low hills with rock outcrop and is often a component of mixed eucalypt communities in this region (Wilson et al. 1990). *A. shirleyi* was not recorded at the site.

Monsoon rainforest and vine-forest and thickets occur in the region, either on sandstone or limestone. These small communities include a range of species that do not occur in the dry woodlands such as *Antidesma*, *Flueggia* and *Ficus* spp. *Ficus platypoda* (Rock fig), *Ficus racemosa* (Cluster fig) and *Ficus virens* (Banyan, Spotted fig) occur in the region surrounding Katherine. These species produce fruit which are an important food source for fructivores, primarily birds, fruit bats and some mammals, and their dense shade provides important roost, refuge and rest areas for birds. The species may occur along creeklines, in riparian woodland and in rocky limestone areas, especially those associated with sinkholes and in vine thickets.

No areas of monsoon rainforest, vine-forest or vine thicket were recorded. The only areas of riparian woodland were associated with the King River, which is adjacent to the site. The site is characterised by a lack of limestone and there are no sinkholes present. *Ficus opposita* (Sandpaper fig) was the only fig species recorded at the site.

Species of *Cycas*, such as *Cycas calcicola* which occurs in the region, were not recorded on site.

Callitris intratropica was not present.

Eucalyptus tintinnans, a species which occurs in the rocky hills in Nitmiluk National Park and further north, and is an important breeding habitat for finches and manikins, was not present.

Ideally a wet season survey should be undertaken to confirm the seasonal variation present at the site and allow for a more rigorous analysis of species diversity. Some of these habitats may support a high number of plant species in the wet season, particularly in those areas where water is abundant such as floodplains and other riparian systems adjacent to the site. Few annuals and vines/climbing plant species were present at the time of the survey. Both are expected to be present in these habitats.

However, based on the information available, none of the communities and species recorded or predicted to occur on the site is of particular conservation status and there are no areas of unusual or threatened habitat.

B5.3 Conservation status of vegetation species and communities

A search of the EPBC Act Protected Matters Database indicates that there are no known plant species of national significance in the area.

In the Daly Basin Bioregion, two plant species regarded as vulnerable under the Territory Parks and Wildlife Conservation Act, have been recorded. *Nervilia plicata*, *Hibiscus vitifolius* are known to occur to the northwest of Katherine (DIPE 2003). Neither species is likely to occur at Fishers Ridge, due to differences in soils and habitat characteristics. Four species regarded as data deficient have been identified

as requiring more research to confirm their status, namely *Nervilia cordata*, *N. peltata*, *N. uniflora* and *Didymoplexis pallens* (DIPE 2003). None of these species was recorded during the dry season survey and based on their habitat requirements, none would be expected to occur at the site.

A small riparian strip of flood terrace vegetation occurs along the King River adjacent to the site. The vegetation is generally in good condition and represents significant fauna habitat to the area. The Draft Conservation Plan for the Daly Basin Bioregion 2003 identifies riparian strips as significant ecosystems for the Daly Basin.

B5.4 Fire regimes

A fire had occurred in the survey area approximately six weeks prior to the field assessment. Regular burning as part of a fuel reduction program is common in this area; however it was not possible to determine fire frequency at the time of the survey.

B5.5 Introduced plants

A number of weed species are common throughout the Katherine region. These are summarised in Table B5.1.

Table B5.1 Weeds of the Katherine region (NRETA 2006)

Scientific names	Common names
<i>Xanthium spinosum</i>	Bathurst Burr
<i>Xanthium strumarium</i>	Noogoora Burr
<i>Jatropha gossypifolia</i>	Bellyache Bush
<i>Cabomba caroliniana</i>	Cabomba
<i>Senna alata</i>	Candle Bush
<i>Ziziphus mauritiana</i>	Chinee apple
<i>Martynia annua</i>	Devils claw
<i>Hyptis suaveolens</i>	Hyptis
<i>Alternanthera pungens</i>	Khaki weed
<i>Mimosa pigra</i>	Mimosa
<i>Acacia nilotica</i>	Prickly Acacia
<i>Pennisetum polystachion</i>	Mission Grass
<i>Sida rhobifolia</i>	Paddy's lucerne
<i>Parthenium hysterophorus</i>	Parthenium
<i>Passiflora foetida</i>	Wild passionfruit
<i>Calotropis procera</i>	Rubber bush
<i>Cryptostegia grandiflora</i>	Rubber vine
<i>Salvinia modesta</i>	Salvinia
<i>Sida acuta</i>	Spinyhead Sida
<i>Eichornia crassipes</i>	Water hyacinth

Assessing the weed diversity and populations was difficult given the recent fuel reduction burn. Observations of weed species along the Stuart Highway and surrounding access tracks provided some indication of the species expected to occur on site.

Hyptis was reasonably widespread throughout the site, with a higher density in the riparian habitat and along the access track. Dames and Moore (1998) also noted that this was the most abundant weed on the creek banks and levees of the Maud Creek region. *Passiflora foetida* was also present in these floodplain habitats.

Sida acuta was recorded in the heavily grazed areas of the site (quadrats 1 and 5) and is potentially as abundant as Hyptis in the drier regions of the site. Dames and Moore (1998) recorded significant infestations of both *Sida acuta* and *Sida cordifolia*. Both species are likely to occur throughout the site especially given the presence of feral animals such as pigs, which readily disperse seeds.

No Weeds of National Significance (WONS) or Schedule Class A/C, B/C, or C species as listed under the *Weed Management Act 2001* (NT) were observed in the site.

B5.6 Fauna

The Daly Basin Bioregion is biologically diverse and supports populations of at least thirty threatened species (DIPE 2003). However, the majority of species recorded in the bioregion (over 300) are common and not threatened.

Regional fauna information is considered in PWCNT (2000), PWCNT (2002) and the NT biological records managed by NRETA.

Detailed assessment of both the region and the local area fauna and their habitat has been described in Kinhill Stearns (1983) with more recent assessments northeast of the site in Maud Creek South Station, Maude Creek (Dames and Moore 1998), which is about 55 km north of Fishers Ridge.

B5.7 Faunal habitat

Regional fauna habitats are woodland, grassland, rocky areas (sandstone escarpment and limestone) and riparian (wetland) areas. Only woodland is present at the site, with small areas of grassland habitat and large areas of riparian habitat adjacent to the site. Woodland habitat is abundant within the region and Top End and is considered to be the least threatened of habitats in this section of the Territory.

By observation, the site and more especially the whole of the Fishers Ridge woodland, contains a relatively large number of mature trees with various sized hollows. Hollow-dependent fauna, such as small mammals, some bat and reptile species and a range of bird species could use this woodland habitat for nesting and roosting.

B5.8 Results of fauna survey

Figure B5.1 shows pitfall and Elliott trapping sites. NRETA has records of seven bird species only for Fishers Ridge. Consequently, the assessment of the site's fauna values is a combination of observations on site and predictions using regional data.

B5.8.1 Mammals

No species was recorded in the site, although three species were seen adjacent to the site and 24 species have been recorded in the wider region. Short-beaked echidna, Agile wallaby and Antilopine kangaroo were seen along the King River or the main access road to the site. Water rat and Grassland Melomys would be predicted to occur at the site, while Northern quoll could use the site as part of a wider territory.

B5.8.2 Bats

Twenty one species have been recorded in the wider region, including the threatened species, Ghost bat and Orange horseshoe (leaf-nosed) bat. A number of small insectivorous bat species would be expected to roost in hollow trees and to use the surface water for drinking. However, the absence of large areas of rock outcrop, caves and sink holes will exclude the presence of many species. No field assessment was undertaken of this group. Even so, the site does not provide critical habitat for any bat species.

B5.8.3 Birds

Over 200 bird species have been recorded in Nitmiluk National Park, with 77 species from the Cutta Cutta Caves Nature Park and about 70 species from RAAF Base Tindal. Twenty one species were recorded in and adjacent to the site during the survey, with most species present along the King River. All were species common in the Top End, although several species were of particular conservation significance.

B5.8.4 Reptiles and amphibians

Seventy eight reptile species and 25 frog species have been recorded in all of Nitmiluk National Park. Twenty nine reptile species and 12 species of amphibians have been recorded at Cutta Cutta Caves, with similar species diversity from RAAF Base Tindal. Eleven reptile species and one frog species were recorded during field assessments. All were common species with a wide range in the Top End.

B5.8.5 Fish

Thirty eight species have been recorded in the watercourses in the region. Red-tailed rainbow fish was the only species seen during the assessment in the King River adjacent to the site.

B5.8.6 Introduced species

The Cane toad (*Bufo marinus*) was recorded along the floodplain and adjacent areas west of the site. Cane toads were trapped and were also observed occupying burrows within termite mounds and soil holes and hollows and low tree hollows. It is likely that the species will occur across the site during the wet season.

Cattle and pigs were present across the site, with the latter common along the King River, Roper Creek and the edge of Leech Lagoon.

Six other introduced vertebrates have been recorded in the region.

B5.8.7 Invertebrates

A detailed assessment of invertebrates was not undertaken. The ground invertebrate fauna was depauperate. No assessment was made of mosquitoes and other pest invertebrate species.

B5.9 Conservation status of fauna species

A search of the EPBC Act Protected Matters Database showed that a number of threatened bird and mammal species and/or species habitat may occur in the area. These species are as follows:

- Red goshawk (*Erythrotriorchis radiatus*) – Vulnerable

The Red goshawk is known to occupy a range of habitats in northern and eastern Australia. This species prefers coastal and subcoastal tall open forests and woodlands. Habitats required by Red goshawk for breeding are very specific. They will only nest in trees taller than 20 m, and these are usually within 1 km of water. The species has a large home range and is often a coastal woodland species (Birds Australia 2006).

The Fishers Ridge site contains very few trees over 20 m high, but it is in close proximity to Leech Lagoon and the King River, where trees of this stature are present. It is also likely that there are small areas of tall trees on more fertile or better watered sites elsewhere in the area. Nonetheless, the species is present in Nitmiluk National Park. While it has not been recorded for the region in the NT fauna database, it could occur as a vagrant over the site.

- Gouldian finch (*Erythrura gouldiae*) – Endangered

The species is listed as endangered and migratory under the EPBC Act and endangered under the TPWC Act. Occasional records for the Gouldian finch (*Erythrura gouldiae*) occur across much of the northern NT, including a record 15 km north east of the site (DPI 2006). No records have been found to show that the species occurs within the Fishers Ridge area. The species prefers open tropical woodland with grassy understorey habitat within or close to areas of rocky hills containing *Eucalyptus tintinnans*, which is an important small tree used for nesting by the species (Garnett and Crowley 2002). *Eucalyptus tintinnans* does not occur at the site or adjacent region and the grasslands within the site

are unlikely to provide enough suitable habitat to support Gouldian finches. It was not recorded for the site in Kinhill Stearns (1983) or at Cutta Cutta Caves (PWCNT 2000).

- Crested shrike-tit (northern) (*Falcunculus frontatus whitei*) – Vulnerable

A single record of Crested shrike-tit (northern form) is available 9 km to the south east of Fishers Ridge. Crested shrike-tit prefer eucalypt woodlands and forests. Populations are generally strongly associated with river red gum open woodland. In this region, the Crested shrike-tit appears to be reliant on extensive stands of this species. In southern Australia, the species can more easily glean prey from the loose ribbon-like bark of species such as *E. camaldulensis* than from the deeply furrowed bark of some other Eucalypt species (Joseph and Reid 1981).

The King River floodplain adjacent to the site has scattered river red gums within the tall open riparian woodlands. These trees are sparse, however they may provide the habitat required for Crested shrike-tit. A number of the large trees within the riparian zone were also noted as being hollow, thereby providing further habitat for this species.

- Australian painted snipe (*Rostratula australis*) – Vulnerable

The Australian painted snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds (DEH now DEWHA 2003).

The species has a scattered distribution throughout many parts of Australia. Though some individuals are apparently resident in some areas, other individuals appear to be nomadic, temporarily occupying areas where suitable habitat exists (DEH 2003).

A search of the NT Parks & Wildlife Commission's Biological Records Scheme (BRS) database, 2006 showed no records of Australian painted snipe occurring in the Fishers Ridge area, although Leech Lagoon provides suitable habitat for the species.

- Bare-rumped sheath tail bat (*Saccolaimus saccolaimus nudicluniatus*) – Critically endangered

This species or species habitat was noted as potentially occurring in the Fishers Ridge area during a search of the EPBC Protected Matters Database. A search of the Territory BRS indicated that the species has not been recorded in this area or its surrounds.

Other species of particular conservation significance which could occur in the region include a group of bird species, such as Hooded parrot, Rainbow bee-eater, Azure kingfisher, Black falcon, Square-tailed kite, Grey falcon, Masked owl, Australian bustard and Bush stone-curlew. Brush-tailed phascogale is a mammal that could be present, if not in the site, then at least in the region. Most of these species are declining in distribution and population number in the NT and Australia.

Hooded parrot (*Psephotus dissimilis*) occurs north of the site and has been reported as occurring in the district. It nests in large termite mounds. All termite mounds greater than 1.5 m high in the site were inspected but nest holes were not recorded.

Rainbow bee-eater (*Merops ornatus*) was present in the riparian vegetation of the King River and Roper Creek adjacent to the site. It was abundant at the former location. This species is a listed migratory marine species under the EPBC Act and JAMBA. The presence of a permanent watercourse provides important nesting and feeding habitat for this species which uses slopes and riverbanks for establishing nests. It is highly likely that this species uses the area for nesting and breeding and the site for feeding. The species is common across all of the Top End and some birds are regional migrants, while others are transcontinental migrants.

Azure kingfisher (*Alcedo azurea*) is a species confined to riparian corridors and it is likely to occur along the King River and possibly at Leech Lagoon. It is too dry for the species in the site and it would not occur there.

The other bird species could occur in the region, but the site does not offer any area of habitat that is preferred or of critical importance to any of the species.

Very little is known of the Brush-tailed phascogale (*Phascogale tapoatafa pirata*) in the NT, let alone the region. It is likely that the northern form of the species will be recognised as a new species. Typical of the species, it has a large home range and low capture rates occur. It appears to have been relatively common in the past and there has been a decline in its population recently, with all of the recent records of the species north of Katherine. Nonetheless there is sufficient suitable habitat for the species in the region and site.

B6. Muckaty Station

B6.1 Vegetation setting

Muckaty Station is on the edge of two bioregions, Tanami and Sturt Plateau (NRETA 2006). It shares a range of characteristics and similarities with both bioregions. While there is a strong monsoonal influence on climate and water availability, many of the flora and fauna species, especially ground fauna, are more typical of a desert environment than the Top End. Christian et al. (1952) indicates that the Ashburton (hilly, rocky country) and Elliot (plains) land systems are present in the region.

The Muckaty site forms part of the Tanami bioregion with the regional studies area forming part of the Sturt Plateau bioregion.

The Tanami bioregion comprises mainly red Quaternary sandplains overlying Permian and Proterozoic strata which are exposed locally as hills and ranges. The sandplains support mixed shrub steppes of *Hakea suberea*, desert bloodwoods, acacias and grevilleas over *Triodia pungens* hummock grasslands. Acacia shrublands over hummock grass communities occur on the ranges. Alluvial and lacustrine calcareous deposits occur throughout.

The Sturt Plateau bioregion mostly comprises a gently undulating plain on lateritised Cretaceous sandstones. Soils are predominantly neutral sandy red and yellow earths. The most extensive vegetation is eucalypt woodland (dominated by variable-barked bloodwood, *Corymbia dichromophloia*) with spinifex understorey.

Most of the bioregion is generally in moderate to good condition, due at least in part to the lack of intensive development. There are pervasive, but generally minor impacts associated with weeds, feral animals, pastoralism and changed fire regimes.

A conservation plan for the Sturt Plateau bioregion is currently being prepared. This included a comprehensive survey of the bioregion's fauna and flora, and an assessment of conservation values. The conservation plan was not available at the time of survey.

B6.2 Results of vegetation surveys

B6.2.1 Vegetation communities

Five main vegetation communities were described for Muckaty and the regional studies area in Wilson et al. (1990). Three dominant vegetation communities have been previously described for Muckaty Station (DIPE 2003), namely:

- *C. dichromophloia* (Variable bloodwood) over *Triodia pungens* (Soft spinifex) hummock grasslands. *Acacia* spp. shrublands are noted as occurring over the ranges.
- *Triodia pungens* (Soft spinifex) +/- *Triodia schinzii* (= *Plectrachne schinzii*,syn.) (curly spinifex) hummock grassland with *Acacia* tall sparse shrubland overstorey.
- *Eucalyptus pruinosa* (Silver box), *Lysiphyllum cunninghamii* (Bauhinia) low open-woodland with *Triodia pungens* (Soft spinifex) hummock grassland understorey.

These assessments are regional, very broadscale and local variations will occur. Detailed records of the vegetation on Muckaty Station and at each area assessed in each of the two study sites is provided below.

None of the ecosystems in this bioregion have been assessed formally for risk category. However, riparian areas and wetlands are believed to be at risk (DIPE 2003).

Photographs, regional information and species lists are in Appendix D.

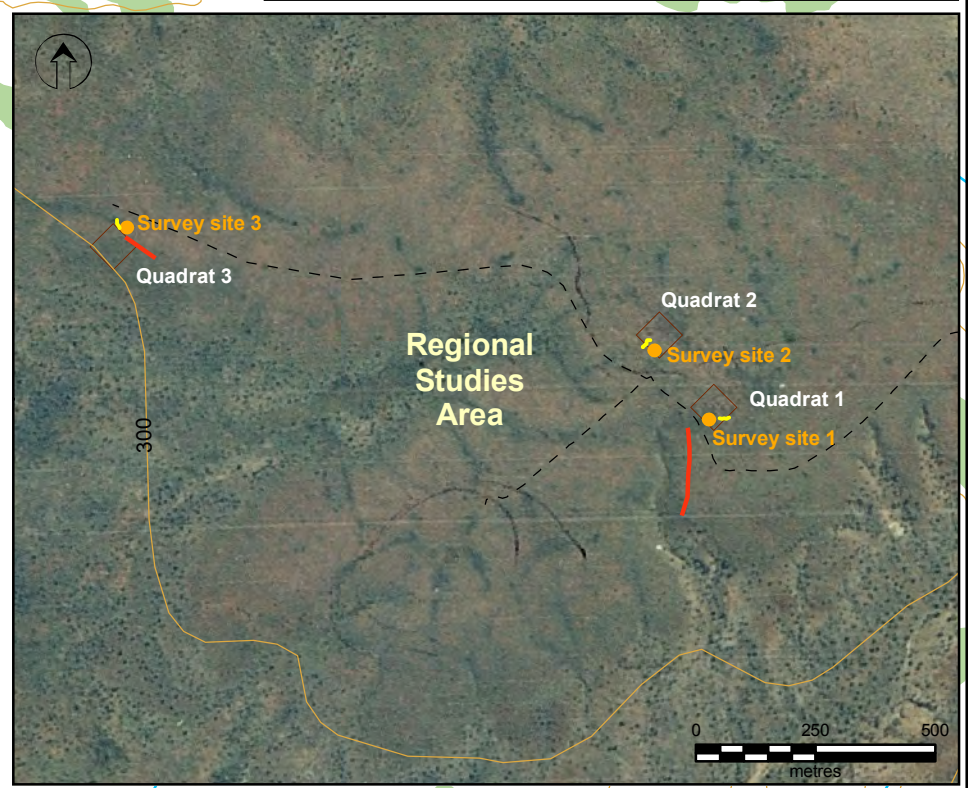
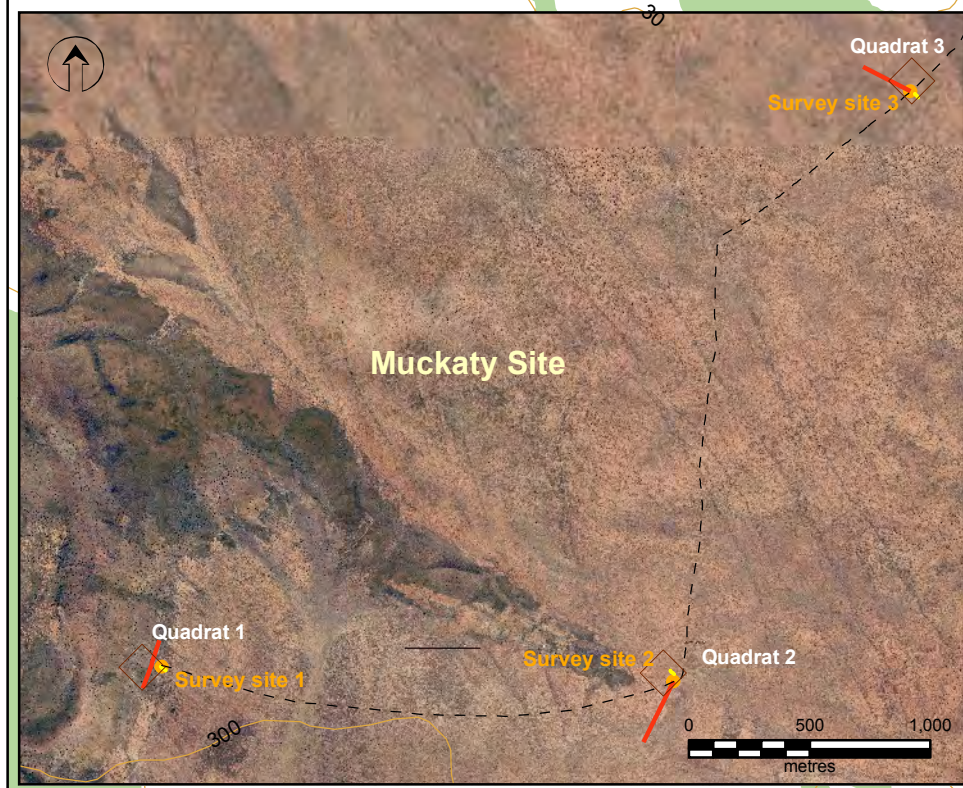
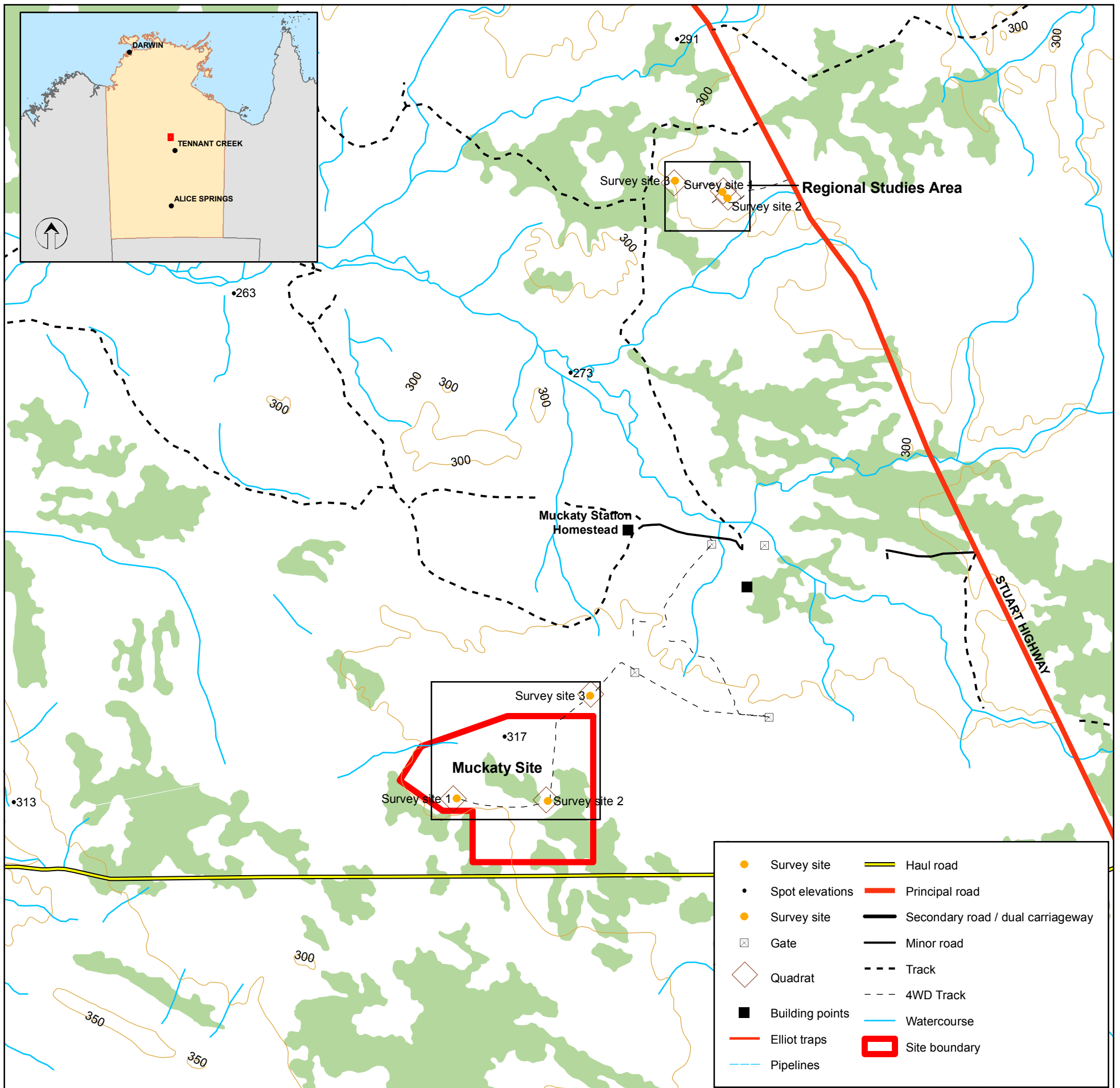
B6.2.2 Muckaty site

The Muckaty site is located in the southern part of the station. There are no woodland riparian or swamp areas associated with the site. Three vegetation quadrats were sited and read and these are considered to be representative of the entire site (Refer Figure B6.1). The site vegetation is typical of the region with low, open to very open, dry woodland dominated by Eucalypt and bloodwood (*Corymbia*) species over *Acacia* shrubland and hummock grassland. This description accords with the Australian Natural Resources Atlas – Biodiversity Assessment Tanami Bioregion 2002 but varies considerably to the regional description in Wilson et al. (1990) and DIPE (2003).

The vegetation survey was carried out during the start of the 2008 dry season following a wet season with below average rainfall. Based on fire scars and regrowth vegetation, several fires have occurred through the area over the past 5 years, with the most recent, a bushfire, about 12 months before this survey. Due to the impact of fire, the understorey plant diversity was poor throughout most of the burned areas at the time of the survey.

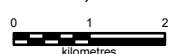
Two main vegetation communities were recorded during the field assessment.

The first community is common on the ridge lines, plateaux, rock outcrops and other rocky areas of the site. It is dominated by *Eucalyptus leucophloia* (Snappy gum) low open-woodland over open to dense *Triodia pungens* (Soft spinifex) hummock grassland. A variety of other *Eucalyptus* and *Corymbia* species occur sparsely, including, *E. odontocarpa*, *E. pruinosa*, *C. opaca* and *C. dichromophloia*. The



KBR

1:100,000 at A3



Source: Geoscience Australia, KBR, DoD

Coord.: GDA94 MGA53

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Commonwealth Radioactive Waste Management Facility Site Characterisation
 Muckaty Station vegetation communities
Figure B6.1

shrubstorey is typically absent and the understorey stature and diversity is typically low and sparse. Soft spinifex is the dominant understorey.

The second community is associated with the sand slopes and plains areas in the gazetted, including shallow drainage lines. These areas are dominated by low *Acacia* and/or *Grevillea* shrublands over soft spinifex +/- an occasional *C. opaca* or a higher density of *C. setosa* as emergents (with the latter usually along diffuse drainage lines). This community contains a higher density and diversity of shrub and understorey species, such as *Abutilon odontocarpum*, *Brachychiton multicaulis*, *Sida* spp., *Aristida* spp., *Fimbristylis* spp. and *Eragrostis setifolia*. These sand areas are the most floristically diverse areas recorded in the gazetted.

Changes to vegetation community structure and dominance coincided with changes in soil type throughout the site. Areas of more fertile soil and greater water availability, as was recorded along one sandy drainage swale between survey sites 1 and 2, were dominated by communities with distinct stratification and higher species diversity.

Skeletal soils (i.e. very rocky) with low water holding capacity and nutrient status were dominated by a sparse, low Eucalypt overstorey and lower stratum species such as *Triodia pungens*. These have low species diversity.

The site is considered relatively undisturbed, with disturbance primarily related to the effects of fire and ongoing pastoral activities. All higher relief and ridgeline areas were intact and sand areas were characterised by dense communities of *Acacia*, albeit with limited understorey as a result of fire. Of particular note was the lack of weed species throughout the site. All weed species recorded were primarily associated with the more fertile red earths and black soil areas of Muckaty Station and adjacent to more heavily used tracks and sites.

B6.2.3 Regional studies area

Three vegetation quadrats were assessed across the area (refer Figure B6.1). The site vegetation is typical of the region and dominated by sparse *Acacia* shrublands and hummock grasslands. The area is located on one of the highest ridge lines (plateaux) of Muckaty Station and grades into a floodplain to the south. It includes two small and a number of minor shallow rocky drainage lines. Soil types in this area of the site are skeletal and nutrient deficient soils (lithosols). Bare rock is common with gravel, pebbles and cobbles as the surface and/or subsoil.

The primary vegetation community recorded at the regional study area is a Eucalyptus low open-woodland and/or *Acacia* shrubland over *Triodia pungens* (Soft spinifex) +/- *Triodia schinzii* (Curly spinifex). A mixture of eucalypt species occur as dominants, including *Eucalyptus leucophloia* +/- *E. odontocarpa* with occasional *Corymbia dichromophloia* and *C. setosa*.

The shrub layer is mixed, low and dominant, the most common species being *Acacia* spp., *Grevillea aspera*, *G. wickhamii*, *Petalostylis* spp. and *Gossypium* spp. Species diversity within parts of the understorey was limited, with *Acacia hilliana* the dominant to only species present.

B6.3 Conservation status of vegetation species and communities

No flora species of conservation significance were recorded at the time of the survey. Based on regional data from NRETA, it is considered unlikely that species of conservation significance occur at the site in the areas of interest.

B6.4 Introduced plants

Of particular note was the lack of weed species throughout both of the sites. All weed species recorded were primarily associated with the more fertile red earths and black soil areas of Muckaty Station and adjacent to more heavily used tracks and sites.

No weed species were recorded at the regional site even though the area is considered more disturbed and is relatively close to the Stuart Highway.

B6.5 Fauna

Figure B6.1 shows pitfall and Elliott trapping sites. The following assessment of the sites' fauna values is a combination of observations on site and predictions based on the characteristics of the sites and regional data.

B6.6 Results of fauna survey

B6.6.1 Mammals

Mammals were not recorded at the regional studies area, while four species were recorded at the Muckaty site. Red kangaroo (*Macropus rufus*) and Euro (*Macropus robustus*) were seen in the general vicinity of the Muckaty site and would be expected to occur here. The Northern nailtail wallaby (*Onychogalea unguifera*) was recorded once within the denser shrubland vegetation of the gazetted site. Spinifex hopping mouse (*Notomys alexis*) was found across the Muckaty site in the sandy areas with hummock grassland habitats. Being a colonial species, it is likely that a relatively large population of this species occurs on site.



PHOTOGRAPH B6.1
Spinifex hopping-mouse (*Notomys alexis*)
trapped at the Muckaty site

The Short-beaked echidna (*Tachyglossus aculeatus*), Forrest's mouse (*Leggadina forresti*), Greater bilby (*Macrotis lagotis*), Sandy inland mouse (*Pseudomys hermannsburgensis*) and Desert mouse (*P. desertor*) are predicted to occur (echidna, desert mouse and Forrest's mouse) or may be present (other species). The Echidna

would likely inhabit both sites. Forrest’s mouse, Desert mouse, Sandy inland mouse and Greater bilby would more likely use the sandy slopes and plains with shrublands and hummock grasslands at the Muckaty site.

The Centralian pebble-mound mouse (*Pseudomys johnsoni*), has been recorded within the region. It has a preference for gravelly slopes in hummock grasslands (as found in both sites, but more especially the larger areas of this habitat in the gazetted site).

B6.6.2 Birds

Forty one (41) native bird species were recorded in and adjacent to Muckaty Station, of which twenty five species were recorded. Most species were associated with the Muckaty site due to the presence of more diverse overstorey and understorey habitats that were largely absent from the regional studies area. The most numerous species at both sites were Zebra finch and Spinifex pigeon, both of which are typical desert species widespread in the arid zone.

B6.6.3 Reptiles

As predicted, reptile diversity and abundance was highest and yielded the greatest result for the trapping effort across both sites. Two species were numerically dominant at Site 1 of the Muckaty site, *Ctenophorus isolepis gularis* (Sand dragon, Military dragon) and *Varanus gouldii flavirufus* (Sand goanna (monitor)).

Ctenotus grandis, *Strophurus ciliaris* and *Varanus tristis* were also recorded at the Muckaty site.



PHOTOGRAPH B6.2
Varanus acanthurus (Spiny-tailed monitor)
 from the regional site



PHOTOGRAPH B6.3
Ctenotus grandis trapped at the
 Muckaty site

Centralian blind snake, a data deficient species for the NT, has been reported for the region and could occur at the site. Blind snake tracks were evident through Site 1 and deep, sandy soil is preferred habitat by this group.

Tiliqua multifasciata (Centralian bluetongue) and *Varanus acanthurus* (Spiny-tailed monitor) were the only captures at the regional studies area. A *Ctenophorus* sp. and *Ctenotus saxatilis* were seen, but not captured, at this site and *Ctenophorus nuchalis* was recorded as road kill on the Stuart Highway. This species is, therefore, expected to be present.

An additional 14 species of reptiles and at least four amphibian species are predicted to occur in the sites (NRETA database).

B6.6.4 Invertebrates

A detailed assessment of invertebrates was not undertaken, although a range of invertebrates were collected through incidental capture in pitfalls and Elliott traps. Taxa recorded included six species of ants, stick insect, dung beetles, and several wolf spider species. The ground invertebrate fauna was considered to be depauperate.

B6.6.5 Introduced species

House mouse (*Mus musculus*) was the only introduced species captured (in the burned shrubland and tussock grassland of the gazetted site).

Cattle (*Bos indica* and *Bos taurus*), goats and horses were present across the site and associated with the pastoral activities of Muckaty Station. While not observed by the survey team, anecdotal evidence from the station owner and managers of the Bootu Creek mine indicated that donkeys were also present.

Feral cat has been recorded recently at Bootu Creek mine and on Muckaty Station. Cat tracks were observed adjacent to the denser vegetation of the Muckaty site, although none was captured during the survey. This observation was confirmed by the Parsons Brinckerhoff hydrogeological assessment team, which observed a cat on the southern area of the gazetted site. European red fox is also likely to be present in small numbers across the region and site and European rabbit has been reported to occur here in the past.

Asian house gecko (dtella) is present around habitation areas. Cane toad has not been recorded in the region.

B6.7 Conservation status of fauna species

No mammal species of conservation significance were recorded during the survey. Suitable habitat is present for Greater bilby and Centralian pebble-mound mouse. Both species are predicted to have been present at the site in the past and may still be present, especially following above average seasonal conditions. Further investigations would be required to confirm their occurrence.

Nearly all bird species recorded were common in central Australia, with the exception of the Australian bustard, which is listed as vulnerable at the Territory level. This species was recorded as one bird along the main access road into the Station.

B7. Discussion

From a biodiversity perspective, the larger and more intact a site is, the greater the potential adverse impact that may occur. All of the potential sites assessed are small to very small areas and each has some degree of existing disturbance. Where a site is a component of a larger area of relatively intact vegetation, impacts will also involve potential fragmentation of the larger area, plus the introduction of pest species.

None of the sites is included in the Interim or final Register of the National Estate or as a site of conservation or heritage significance. The Muckaty site on Muckaty Station contains suitable habitat for Greater bilby. None of the sites contain critical habitat for species of national significance.

B7.1 Mount Everard

The Mount Everard site is not located in or associated with drought refugia as defined by Morton et al. (1995) or significant biodiversity areas as defined by Thackway and Cresswell (1995) and NRETA (2006).

Being the smallest and most disturbed of all of the sites, it has the least biodiversity values. Flora diversity data are typical of Mulga woodlands in this region and there are no matters of particular significance at the site. Native fauna values for this site are low.

B7.2 Harts Range

The Harts Range site is not located in or associated with drought refugia as defined by Morton et al. (1995) or significant biodiversity areas as defined by Thackway and Cresswell (1995) and NRETA (2006).

Despite drought conditions, this site's flora values are relatively good, primarily because of its location on the floodplain of the Ongeva Creek and the diversity of soil types and habitats. Outside of firebreak and track clearance, there are relatively few disturbance factors in the site. Pest plant species are more common here, both in the site and, more especially, adjacent to it. Most introduced species are associated with disturbed areas, especially the main access road and the infrastructure sites.

Native fauna values are relatively high, primarily for avifauna. Pest fauna species are typical of the region.

The greatest risk issue associated with the site is its location on a floodplain, with several small creeklines being located on the site.

B7.3 Fishers Ridge

Fishers Ridge is the largest, least disturbed and least fragmented of all the sites. It is acknowledged that construction at any site would result in some degree of habitat fragmentation, including those due to establishing or upgrading road access.

Despite being grazed by cattle and impacted by feral pigs, which is a national threatening process (for which a threat abatement plan has been prepared by the Commonwealth), Fishers Ridge is the most biologically intact of the areas.

Fishers Ridge has a relatively high regional and site species diversity of perennial flora species and fauna species. This diversity is also typical of most sites on similar terrain in the region. Nonetheless, if a construction and use impact occurred, it will result in a higher risk to biodiversity, especially when the potential for threatened species to occur adjacent to the site is included. Rainbow bee-eater was the only species of national significance recorded in the site, with most of its population was adjacent to riparian areas. Additional threatened species could use the site, but only as incidental habitat.

The Fishers Ridge area, though not the site, has the potential for the greatest faunal diversity primarily due to its proximity to permanent water and the amount of habitat complexity, such as a relatively large number of hollow-bearing trees and termitaria. The current survey was undertaken in the dry season and only a limited number of species was recorded. A predictive model of the seasonal variation for this site indicates that there will be few significant biodiversity issues for the site. However, there will be a larger number of potentially significant species and issues within the adjacent region, primarily with the riparian areas (which are not present at the site).

Ideally a wet season survey should be undertaken at Fishers Ridge to confirm the seasonal variation present at the site and allow for a more rigorous analysis of actual species diversity, rather than predicted. Some of the habitats may support a high number of plant species in the wet season, particularly in those areas where water is abundant such as floodplains and other riparian systems adjacent to the site. Few annuals and vines/climbing plant species were present at the time of the survey. Both are expected to be present in these habitats.

However, based on the information available none of the communities and species recorded or predicted to occur on the site is of particular conservation status and there are no areas of unusual or threatened habitat. Consequently, while additional survey would be useful, it is not essential.

The site does not contain Territory or regionally significant or rare habitats such as sinkholes and Tindall or Manbulloo Limestone, sandstone escarpment or rocky outcrops and areas of tall grassland. All of the open woodland vegetation communities present in the site are common and do not have a conservation status. Communities dominated by species such as *Acacia shirleyi*, *Callitris intratropica* and Cane grasses

as *Chionachne cyathopoda* and *Mnesithea rottboellioides*, which, while not rare or threatened, nonetheless are relatively restricted species, do not occur in the site. Few species endemic to the NT were recorded in the site.

Cane toads are abundant and their impact will no doubt be responsible for temporary reductions (at least) in the site's ground fauna.

While Fishers Ridge has the highest biodiversity risk of all sites, this is, overall, a low risk matter, since all of the species recorded occur in habitats that are widespread in the region adjacent to the site and elsewhere in the Top End.

B7.4 Muckaty Station

The Muckaty site and regional studies area on Muckaty station are not located in or associated with significant biodiversity areas as defined by Thackway and Cresswell (1995) and NRETA (2006). There are no matters of national environmental significance associated with either site as per the Protected Matters Search under the EPBC Act.

The vegetation communities and flora species complements are typical of the region and none is rare or threatened.

Based on the observations in April, the fauna characteristics are indicative of a desert environment i.e. more typical and closely related to the Tanami bioregion.

Both study areas have been disturbed by fire in the past and recently (within the past 12 months). The level of disturbance is reflected in the relatively low flora diversity recorded across the site at the time of assessment.

Native fauna value is considered reasonably high for the Muckaty site, particularly when the impact of fire and a poor wet season is taken into consideration. Assessment following regeneration of vegetation is likely to yield a higher quality habitat area.

No mammal species of conservation significance were recorded during the survey. Suitable habitat is present for Greater bilby and Centralian pebble-mound mouse, especially at the Muckaty site. Both species are predicted to have been present at the site in the past and may still be present following above average seasonal conditions. Further investigations, including liaison with the traditional owners for the Muckaty site, would be required to confirm the past history and future occurrence of the species.

Further seasonal investigations would be required to determine the occurrence and populations of threatened species such as the Greater bilby and the Australian bustard, plus more fully document the dominant group, the herpetofauna, of the sandy areas of the site.

The regional studies area is very rocky, dominated by skeletal soils and has been significantly disturbed by fire. All of these factors are reflected in the low stature and relatively low flora diversity recorded during the assessment. Flora diversity data are generally typical of hummock grasslands and Acacia shrublands in this region and there are no matters of particular conservation significance in the area.

Native fauna values for this area are low. Based on the assessment, the rocky gullies and annual riparian areas, including those adjacent to the site, will have the highest fauna values.

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Appendix A

Mount Everard photographs and regional information



PHOTOGRAPH 1
Mount Everard, Quadrat 1



PHOTOGRAPH 2
Mount Everard, Quadrat 2

Flora species list – Mount Everard (data taken from NT Government database)

FAMILY	Scientific name	Observed during survey
MIMOSACEAE	<i>Acacia aneura</i> var. <i>aneura</i>	Yes
MIMOSACEAE	<i>Acacia aneura</i> var. <i>indeterminate</i>	
POACEAE	<i>Aristida nitidula</i>	
ASTERACEAE	<i>Bidens bipinnata</i>	
RUBIACEAE	<i>Canthium lineare</i>	
RUBIACEAE	<i>Canthium lineare</i>	
ADIANTACEAE	<i>Cheilanthes</i> sp.	Yes
ASTERACEAE	<i>Conyza bonariensis</i>	
CUSCUTACEAE	<i>Cuscuta victoriana</i>	
POACEAE	<i>Digitaria brownii</i>	Yes
POACEAE	<i>Enneapogon polyphyllus</i>	Yes
POACEAE	<i>Eragrostis laniflora</i>	
POACEAE	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	
EUPHORBIACEAE	<i>Euphorbia drummondii</i> subsp. <i>drummondii</i>	Yes
MALVACEAE	<i>Gossypium australe</i>	
PROTEACEAE	<i>Hakea lorea</i> subsp. <i>lorea</i>	
PROTEACEAE	<i>Hakea lorea</i> subsp. <i>lorea</i>	
PROTEACEAE	<i>Hakea lorea</i> subsp. <i>lorea</i>	
VIOLACEAE	<i>Hybanthus aurantiacus</i>	
ASTERACEAE	<i>Lactuca serriola</i>	
BRASSICACEAE	<i>Lepidium phlebopetalum</i>	
POACEAE	<i>Monachather paradoxus</i>	
CUCURBITACEAE	<i>Mukia</i> sp.	
POACEAE	<i>Oxychloris scariosa</i>	
PAPAVERACEAE	<i>Papaver hybridum</i>	
AMARANTHACEAE	<i>Ptilotus helipteroides</i> var. <i>indeterminate</i>	
CHENOPODIACEAE	<i>Sclerolaena cornishiana</i>	
CHENOPODIACEAE	<i>Sclerolaena costata</i>	
CAESALPINIACEAE	<i>Senna artemisioides</i> subsp. <i>quadrifolia</i>	
SOLANACEAE	<i>Solanum quadriloculatum</i>	Yes
VERBENACEAE	<i>Spartothamnella teucriflora</i>	
FABACEAE	<i>Swainsona flavicarinata</i>	
POACEAE	<i>Thyridolepis mitchelliana</i>	

Mount Everard fauna list (data taken from NT Government database)

FAMILY	Scientific name	Common name
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
Pardalotidae	<i>Acanthiza apicalis</i>	Inland Thornbill
Pardalotidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
Pardalotidae	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill
Pardalotidae	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr
Pardalotidae	<i>Aphelocephala leucopsis</i>	Southern Whiteface
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck
Cacatuidae	<i>Cacatua roseicapilla</i>	Galah
Sylviidae	<i>Cincloramphus mathewsi</i>	Rufous Songlark
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush
Columbidae	<i>Columba livia</i>	Rock Dove
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Scincidae	<i>Ctenotus alacer</i>	Lively Ctenotus
Scincidae	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus
Scincidae	<i>Ctenotus schomburgkii</i>	Schomburk's Ctenotus
Hylidae	<i>Cyclorana maini</i>	Main's Frog
Gekkonidae	<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko
Scincidae	<i>Egernia inornata</i>	Desert Egernia
Falconidae	<i>Falco berigora</i>	Brown Falcon
Falconidae	<i>Falco hypoleucos</i>	Grey Falcon
Gekkonidae	<i>Gehyra purpurascens</i>	Purplish Dtella
Gekkonidae	<i>Gehyra variegata</i>	Tree Dtella
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove
Pardalotidae	<i>Gerygone fusca</i>	Western Gerygone
Scincidae	<i>Lerista xanthura</i>	Yellow-Tailed Lerista
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater
Agamidae	<i>Lophognathus gilberti</i>	Gilbert's Dragon
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-wren
Meliphagidae	<i>Manorina flavigula</i>	Yellow-throated Miner
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar
Scincidae	<i>Menetia greyii</i>	Grey's Menetia

		Common name
Accipitridae	<i>Milvus migrans</i>	Black Kite
Psittacidae	<i>Neopsephotus bourkii</i>	Bourke's Parrot
Strigidae	<i>Ninox novaeseelandiae</i>	Boobook Owl
Muridae	<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon
Pachycephalidae	<i>Oreoica gutturalis</i>	Crested Bellbird
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
Petroicidae	<i>Petroica goodenovii</i>	Red-capped Robin
Agamidae	<i>Pogona vitticeps</i>	Central Bearded Dragon
Psittacidae	<i>Psephotus varius</i>	Mulga Parrot
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse
Pygopodidae	<i>Pygopus sp.</i>	
Typhlopidae	<i>Ramphotyphlops centralis</i>	Centralian Blind Snake
Dicruridae	<i>Rhipidura albiscapa</i>	Grey Fantail
Dicruridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Gekkonidae	<i>Rhynchoedura ornata</i>	Beaked Gecko
Dasyuridae	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart
Dasyuridae	<i>Sminthopsis ooldea</i>	Ooldea Dunnart
Elapidae	<i>Suta punctata</i>	Little Spotted Snake
Passeridae	<i>Taeniopygia guttata</i>	Zebra Finch
Halcyonidae	<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher
Turnicidae	<i>Turnix velox</i>	Little Button-quail



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Burt Plain

N

Bioregional description

One of the distinguishing features of the Burt Plain Bioregion is the predominance of earthy, alluvial soils as opposed to sandplains and sand dunes. The bioregion is broadly characterised by plains of *Acacia* shrubland, tussock and hummock grasslands, *Acacia* and *Eucalyptus* woodlands, and mountain ranges in the east, north and west of the bioregion. Most of the bioregion (>80%) is devoted to pastoralism. The Burt Plain Bioregion comprises four subregions all of which occur entirely within the Northern Territory.

Special values

The Burt Plain Bioregion supports some of Australia's best developed and most extensive mulga woodlands. It also supports resident populations of some plant and animal species that are significant at the Northern Territory and national level, including 13 threatened species. From a national perspective there are no extant vertebrate species that are endemic to the bioregion. However, there are three plant taxa endemic to the Burt Plain Bioregion (*Ipomoea sp. Stirling* (P.K. Latz 10408), *Ptilotus aristatus var. exilis* and *Ptilotus aristatus var. stenophyllus*). At the Northern Territory level, there are 7 plant taxa that have been recorded only from the Burt Plain Bioregion, but once again there are no extant vertebrate animal species that are unique to the bioregion.

Summary of overall condition and trend

As with other central Australian bioregions, the overall condition of the Burt Plain Bioregion is masked by a very strong rainfall effect, with degradation sometimes difficult to detect following a series of good seasons. However, much of the bioregion has been impacted by a range of pervasive factors such as grazing by livestock and/or feral animals, feral predators and weed infestations. Many of these detrimental factors were probably most pernicious and had the most impact in the first few decades following European settlement, and some may now have improved or stabilised, such that there may be some reversal in land condition in the bioregion.

The Burt Plain Bioregion has suffered substantial losses of its mammal fauna over the last century, while there are ongoing declines of some bird and mammal populations. Exotic predators are widespread and there are fifteen declared weed species currently listed under the Northern Territory *Weeds Management Act 2001* which are known to occur in the Burt Plain Bioregion. Other exotic plants species, most notably buffel and couch grass, also pose significant threats to some habitats.

Subregions of the Burt Plain Bioregion are scored a continental stress class of 3 (BRT3), 4 (BRT1, BRT2), and 5 (BRT4).

Summary of priority management/conservation priorities

The bioregion is currently very poorly reserved (<1% of bioregional extent), and most

ecosystems are not well represented in the reserve network. Additional reservation would be necessary to achieve a regional CAR reserve system. However, at least as effective for biodiversity conservation would be integrated management (across all tenures) of weeds, feral animals and fire, and implementation of some off-reserve conservation strategies and actions on pastoral lands. Such management actions will require additional resources and effective communication and capacity building amongst pastoral and Aboriginal landholders.

Wetlands

Nationally important wetlands

- While no wetlands are currently listed in the 'Directory of Important Wetlands in Australia' (DIWA) or under the 'Convention on Wetlands of International Importance' (Ramsar Convention), some significant wetlands in the Burt Plain Bioregion have been identified as meeting certain DIWA criteria and potentially meeting some Ramsar criteria.

Other wetlands of subregional significance

- A range of generally small swamps, ephemeral watercourses and rockholes occur in the Burt Plain Bioregion. Important wetlands of the bioregion include Stirling Swamp, and the swamps and waterholes of the Dulcie Ranges.

For more information on arid wetlands of the NT refer to our [arid wetlands](#) page.

Riparian zones

The bioregion contains some ephemeral watercourses, which are generally in fair to good condition, but are afforded little protection from a range of threatening processes including the impacts of livestock and/or feral animals and weed infestation. The major river systems occurring in the bioregion include parts of the Plenty, Hanson, Sandover and Lander Rivers.

Ecosystems at risk

No ecosystem has formally been listed as threatened, but wetland and riparian environments are likely to be impacted by livestock, feral animals and weeds. Other ecosystems are being altered by changed fire regimes. Part of the resource assessment of the Burt Plain Bioregion currently being undertaken is to identify important habitats through the analysis of available flora and fauna information (including pre-existing data and data collected from systematic wildlife surveys currently being undertaken), together with an assessment of their conservation values and the threatening processes that impact on these values.



Species at risk

Many species have been lost from this bioregion over the last 150 years. Of those that persist, 13 species are currently listed as threatened at the National and/or Territory level, including the southern marsupial mole (Endangered at the Federal level); *Ipomoea sp. Stirling* (P.K. Latz 10408), *Macrozamia macdonnellii*, great desert skink, red goshawk, princess parrot, mulgara, bilby and black-footed rock-wallaby (Vulnerable at the Federal level); common brushtail possum (Endangered at the NT level); and *Eleocharis papillosa*, bustard, emu and painted snipe (Vulnerable at the NT level).

Amongst these threatened species, predation is probably an important threat for the bustard, mulgara, southern marsupial mole, common brushtail possum and black-footed

rock-wallaby; changed fire regimes for *Ipomoea sp. Stirling* (P.K. Latz 10408), bustard, emu, princess parrot, mulgara and common brushtail possum; grazing impacts by livestock and/or feral animals for *Ipomoea sp. Stirling* (P.K. Latz 10408), bustard, emu, princess parrot, mulgara, common brushtail possum and black-footed rock-wallaby; weed infestation for *Eleocharis papillosa*; and changes in wetlands across its entire range for the painted snipe.

Number of taxa in the Burt Plain Bioregion currently listed as threatened at national and/or Northern Territory level (*nb this table includes only species definitely recorded from the bioregion (rather than putative occurrences based on modelling) and presumed to be still extant in the bioregion*).

taxa	National		Northern Territory	
	endangered	vulnerable	endangered	vulnerable
plants	0	2	0	3
reptiles	0	1	0	1
birds	0	2	0	5
mammals	1	3	1	3

Other flora values for eucalypts and acacias

Endemism

- At a national level, there are no eucalypts or acacias endemic to the Burt Plain Bioregion.

Richness

- The subregions of the Burt Plain Bioregion have only moderate richness of *Acacia* (11-27) and *Eucalyptus* (18-49) species.



Birds

Little change between Atlases, although notable decline for hooded robin. Other sources indicate substantial declines over the last 100 years for a broad range of bird species, probably associated with vegetation change brought about through the impacts of pastoralism and feral animals, weed infestations, changed fire regimes, and possibly feral predators.

Mammals

The Burt Plain Bioregion has suffered substantial losses of its mammal fauna. Of 55 native mammal species recorded, at least 15 are extinct or no longer occur in the bioregion, while several others have suffered population declines.

Management Responses

Reserve consolidation

The bioregion is currently very poorly reserved, with especially poor representation of the dominant mulga woodlands. There are five small conservation or historical reserves and one national park (Dulcie Ranges National Park) comprising 0.26% of the area of the bioregion. These small reserves would not be expected to contain a high proportion of the

plant and animal species found across the bioregion. The largest of the protected areas, the Dulcie Ranges National Park, supports 22% of animal species found in the bioregion but on 6% of plant taxa of the bioregion.

Off park conservation for species and ecosystem recovery

More detailed information is required on the habitats of the Burt Plain Bioregion and for a range of mulga-associated biota, to determine the potential threatening processes that may impact on them and to understand the causes of some apparent population declines (e.g. hooded robin), and devise management solutions.

Integrated NRM

A preliminary report directed towards a resource assessment of the Burt Plain Bioregion was completed in 2006. This included a compilation of available data and information on the bioregion's flora and fauna to help identify gaps in our current knowledge of the biodiversity of the bioregion, and assist with the design and implementation of wildlife surveys across the area. The collation of existing information and data is presented in a report titled 'Preliminary Report: Towards a Resource Assessment of the Burt Plain Bioregion for Conservation Planning' prepared by Helen Neave, Ben Sparrow and Bretan Clifford.

NRM priorities for the bioregion include the completion of wildlife surveys across the bioregion along with an assessment of conservation values and potential threatening processes, and evaluation of options for conservation management; establishment or enhancement of collaborative (cross-tenure) management of feral animals, weeds and fire; and the development of off-reserve conservation strategies, which may include the maintenance of some water-remote (lightly-grazed) habitats, particularly those of conservation significance.



Preliminary Report: Towards a Resource Assessment of The Burt Plain Bioregion for Conservation Planning

Section	pdf
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<u>Section 12 - References</u>	136Kb
<u>Appendix 1 - Summary of Wildlife Survey Methods</u>	113Kb

Further Information and Gaps

Major data gaps and research priorities for bioregion

A comprehensive biodiversity survey is needed to identify conservation values and options for their management. Furthermore, more information is required on the response of biodiversity to a spectrum of possible management options. Management would also

benefit from more detailed environmental mapping, in particular vegetation mapping at the scale of 1:250,000 or better.



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Appendix B

Harts Range photographs and
regional information



PHOTOGRAPH 1
Harts Range Mulga and Ironwood woodland



PHOTOGRAPH 2
Harts Range Mulga woodland



PHOTOGRAPH 3
Harts Range, Quadrat 3



PHOTOGRAPH 4
Harts Range, Ironwood woodland (floodplain)

Flora species list – Harts Range (data taken from NT Government database)

FAMILY	Scientific name	Observed during survey
MIMOSACEAE	<i>Acacia aneura</i> var. <i>aneura</i>	Yes
MIMOSACEAE	<i>Acacia aneura</i> var. <i>indeterminate</i>	
POACEAE	<i>Aristida nitidula</i>	
ASTERACEAE	<i>Bidens bipinnata</i>	
RUBIACEAE	<i>Canthium lineare</i>	
RUBIACEAE	<i>Canthium lineare</i>	
ADIANTACEAE	<i>Cheilanthes</i> sp.	Yes
ASTERACEAE	<i>Conyza bonariensis</i>	Yes
CUSCUTACEAE	<i>Cuscuta victoriana</i>	
POACEAE	<i>Digitaria brownii</i>	
POACEAE	<i>Enneapogon polyphyllus</i>	Yes
POACEAE	<i>Eragrostis laniflora</i>	
POACEAE	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	
EUPHORBIACEAE	<i>Euphorbia drummondii</i> subsp. <i>drummondii</i>	Yes
MALVACEAE	<i>Gossypium australe</i>	Yes
PROTEACEAE	<i>Hakea lorea</i> subsp. <i>lorea</i>	Yes
VIOLACEAE	<i>Hybanthus aurantiacus</i>	Yes
ASTERACEAE	<i>Lactuca serriola</i>	Yes
BRASSICACEAE	<i>Lepidium phlebopetalum</i>	
POACEAE	<i>Monachather paradoxus</i>	
CUCURBITACEAE	<i>Mukia</i> sp.	
POACEAE	<i>Oxychloris scariosa</i>	
PAPAVERACEAE	<i>Papaver hybridum</i>	
AMARANTHACEAE	<i>Ptilotus helipteroides</i> var. <i>indeterminate</i>	
CHENOPODIACEAE	<i>Sclerolaena cornishiana</i>	
CHENOPODIACEAE	<i>Sclerolaena costata</i>	
CAESALPINIACEAE	<i>Senna artemisioides</i> subsp. <i>quadrifolia</i>	Yes
SOLANACEAE	<i>Solanum quadriloculatum</i>	Yes
VERBENACEAE	<i>Spartothamnella teucriiflora</i>	
FABACEAE	<i>Swainsona flavicarinata</i>	
POACEAE	<i>Thyridolepis mitchelliana</i>	

Harts Range fauna list (data taken from NT Government database)

FAMILY	Scientific name	Common name
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
Pardalotidae	<i>Acanthiza apicalis</i>	Inland Thornbill
Pardalotidae	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
Pardalotidae	<i>Acanthiza robustirostris</i>	Slaty-backed Thornbill
Pardalotidae	<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
Dasyuridae	<i>Antechinomys laniger</i>	Kultarr
Pardalotidae	<i>Aphelocephala leucopsis</i>	Southern Whiteface
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck
Cacatuidae	<i>Cacatua roseicapilla</i>	Galah
Sylviidae	<i>Cincloramphus mathewsi</i>	Rufous Songlark
Pachycephalidae	<i>Colluricincla harmonica</i>	Grey Shrike-thrush
Columbidae	<i>Columba livia</i>	Rock Dove
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Scincidae	<i>Ctenotus alacer</i>	Lively Ctenotus
Scincidae	<i>Ctenotus leonhardii</i>	Leonhardi's Ctenotus
Scincidae	<i>Ctenotus schomburgkii</i>	Schomburk's Ctenotus
Hylidae	<i>Cyclorana maini</i>	Main's Frog
Gekkonidae	<i>Diplodactylus conspicillatus</i>	Fat-tailed Gecko
Scincidae	<i>Egernia inornata</i>	Desert Egernia
Falconidae	<i>Falco berigora</i>	Brown Falcon
Falconidae	<i>Falco hypoleucos</i>	Grey Falcon
Gekkonidae	<i>Gehyra purpurascens</i>	Purplish Dtella
Gekkonidae	<i>Gehyra variegata</i>	Tree Dtella
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove
Pardalotidae	<i>Gerygone fusca</i>	Western Gerygone
Scincidae	<i>Lerista xanthura</i>	Yellow-Tailed Lerista
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater
Agamidae	<i>Lophognathus gilberti</i>	Gilbert's Dragon
Maluridae	<i>Malurus splendens</i>	Splendid Fairy-wren
Meliphagidae	<i>Manorina flavigula</i>	Yellow-throated Miner
Petroicidae	<i>Melanodryas cucullata</i>	Hooded Robin
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar
Scincidae	<i>Menetia greyii</i>	Grey's Menetia
Accipitridae	<i>Milvus migrans</i>	Black Kite
Psittacidae	<i>Neopsephotus bourkii</i>	Bourke's Parrot

		Common name
Strigidae	<i>Ninox novaeseelandiae</i>	Boobook Owl
Muridae	<i>Notomys longicaudatus</i>	Long-tailed Hopping-mouse
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon
Pachycephalidae	<i>Oreoica gutturalis</i>	Crested Bellbird
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
Petroicidae	<i>Petroica goodenovii</i>	Red-capped Robin
Agamidae	<i>Pogona vitticeps</i>	Central Bearded Dragon
Psittacidae	<i>Psephotus varius</i>	Mulga Parrot
Muridae	<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse
Pygopodidae	<i>Pygopus sp.</i>	
Typhlopidae	<i>Ramphotyphlops centralis</i>	Centralian Blind Snake
Dicruridae	<i>Rhipidura albiscapa</i>	Grey Fantail
Dicruridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Gekkonidae	<i>Rhynchoedura ornata</i>	Beaked Gecko
Dasyuridae	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart
Dasyuridae	<i>Sminthopsis ooldea</i>	Ooldea Dunnart
Elapidae	<i>Suta punctata</i>	Little Spotted Snake
Passeridae	<i>Taeniopygia guttata</i>	Zebra Finch
Halcyonidae	<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher
Turnicidae	<i>Turnix velox</i>	Little Button-quail



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Burt Plain

N

Bioregional description

One of the distinguishing features of the Burt Plain Bioregion is the predominance of earthy, alluvial soils as opposed to sandplains and sand dunes. The bioregion is broadly characterised by plains of *Acacia* shrubland, tussock and hummock grasslands, *Acacia* and *Eucalyptus* woodlands, and mountain ranges in the east, north and west of the bioregion. Most of the bioregion (>80%) is devoted to pastoralism. The Burt Plain Bioregion comprises four subregions all of which occur entirely within the Northern Territory.

Special values

The Burt Plain Bioregion supports some of Australia's best developed and most extensive mulga woodlands. It also supports resident populations of some plant and animal species that are significant at the Northern Territory and national level, including 13 threatened species. From a national perspective there are no extant vertebrate species that are endemic to the bioregion. However, there are three plant taxa endemic to the Burt Plain Bioregion (*Ipomoea sp. Stirling* (P.K. Latz 10408), *Ptilotus aristatus var. exilis* and *Ptilotus aristatus var. stenophyllus*). At the Northern Territory level, there are 7 plant taxa that have been recorded only from the Burt Plain Bioregion, but once again there are no extant vertebrate animal species that are unique to the bioregion.

Summary of overall condition and trend

As with other central Australian bioregions, the overall condition of the Burt Plain Bioregion is masked by a very strong rainfall effect, with degradation sometimes difficult to detect following a series of good seasons. However, much of the bioregion has been impacted by a range of pervasive factors such as grazing by livestock and/or feral animals, feral predators and weed infestations. Many of these detrimental factors were probably most pernicious and had the most impact in the first few decades following European settlement, and some may now have improved or stabilised, such that there may be some reversal in land condition in the bioregion.

The Burt Plain Bioregion has suffered substantial losses of its mammal fauna over the last century, while there are ongoing declines of some bird and mammal populations. Exotic predators are widespread and there are fifteen declared weed species currently listed under the Northern Territory *Weeds Management Act 2001* which are known to occur in the Burt Plain Bioregion. Other exotic plants species, most notably buffel and couch grass, also pose significant threats to some habitats.

Subregions of the Burt Plain Bioregion are scored a continental stress class of 3 (BRT3), 4 (BRT1, BRT2), and 5 (BRT4).

Summary of priority management/conservation priorities

The bioregion is currently very poorly reserved (<1% of bioregional extent), and most

ecosystems are not well represented in the reserve network. Additional reservation would be necessary to achieve a regional CAR reserve system. However, at least as effective for biodiversity conservation would be integrated management (across all tenures) of weeds, feral animals and fire, and implementation of some off-reserve conservation strategies and actions on pastoral lands. Such management actions will require additional resources and effective communication and capacity building amongst pastoral and Aboriginal landholders.

Wetlands

Nationally important wetlands

- While no wetlands are currently listed in the 'Directory of Important Wetlands in Australia' (DIWA) or under the 'Convention on Wetlands of International Importance' (Ramsar Convention), some significant wetlands in the Burt Plain Bioregion have been identified as meeting certain DIWA criteria and potentially meeting some Ramsar criteria.

Other wetlands of subregional significance

- A range of generally small swamps, ephemeral watercourses and rockholes occur in the Burt Plain Bioregion. Important wetlands of the bioregion include Stirling Swamp, and the springs and waterholes of the Dulcie Ranges.

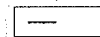
For more information on arid wetlands of the NT refer to our [arid wetlands](#) page.

Riparian zones

The bioregion contains some ephemeral watercourses, which are generally in fair to good condition, but are afforded little protection from a range of threatening processes including the impacts of livestock and/or feral animals and weed infestation. The major river systems occurring in the bioregion include parts of the Plenty, Hanson, Sandover and Lander Rivers.

Ecosystems at risk

No ecosystem has formally been listed as threatened, but wetland and riparian environments are likely to be impacted by livestock, feral animals and weeds. Other ecosystems are being altered by changed fire regimes. Part of the resource assessment of the Burt Plain Bioregion currently being undertaken is to identify important habitats through the analysis of available flora and fauna information (including pre-existing data and data collected from systematic wildlife surveys currently being undertaken), together with an assessment of their conservation values and the threatening processes that impact on these values.



Species at risk

Many species have been lost from this bioregion over the last 150 years. Of those that persist, 13 species are currently listed as threatened at the National and/or Territory level, including the southern marsupial mole (Endangered at the Federal level); *Ipomoea sp. Stirling* (P.K. Latz 10408), *Macrozamia macdonnellii*, great desert skink, red goshawk, princess parrot, mulgara, bilby and black-footed rock-wallaby (Vulnerable at the Federal level); common brushtail possum (Endangered at the NT level); and *Eleocharis papillosa*, bustard, emu and painted snipe (Vulnerable at the NT level).

Amongst these threatened species, predation is probably an important threat for the bustard, mulgara, southern marsupial mole, common brushtail possum and black-footed

rock-wallaby; changed fire regimes for *Ipomoea sp. Stirling* (P.K. Latz 10408), bustard, emu, princess parrot, mulgara and common brushtail possum; grazing impacts by livestock and/or feral animals for *Ipomoea sp. Stirling* (P.K. Latz 10408), bustard, emu, princess parrot, mulgara, common brushtail possum and black-footed rock-wallaby; weed infestation for *Eleocharis papillosa*; and changes in wetlands across its entire range for the painted snipe.

Number of taxa in the Burt Plain Bioregion currently listed as threatened at national and/or Northern Territory level (*nb this table includes only species definitely recorded from the bioregion (rather than putative occurrences based on modelling) and presumed to be still extant in the bioregion*).

taxa	National		Northern Territory	
	endangered	vulnerable	endangered	vulnerable
plants	0	2	0	3
reptiles	0	1	0	1
birds	0	2	0	5
mammals	1	3	1	3

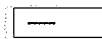
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Endemism

- At a national level, there are no eucalypts or acacias endemic to the Burt Plain Bioregion.

Richness

- The subregions of the Burt Plain Bioregion have only moderate richness of *Acacia* (11-27) and *Eucalyptus* (18-49) species.



Birds

Little change between Atlases, although notable decline for hooded robin. Other sources indicate substantial declines over the last 100 years for a broad range of bird species, probably associated with vegetation change brought about through the impacts of pastoralism and feral animals, weed infestations, changed fire regimes, and possibly feral predators.

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The bioregion is currently very poorly reserved, with especially poor representation of the dominant mulga woodlands. There are five small conservation or historical reserves and one national park (Dulcie Ranges National Park) comprising 0.26% of the area of the bioregion. These small reserves would not be expected to contain a high proportion of the

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More detailed information is required on the habitats of the Burt Plain Bioregion and for a range of mulga-associated biota, to determine the potential threatening processes that may impact on them and to understand the causes of some apparent population declines (e.g. hooded robin), and devise management solutions.

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Appendix C

Fishers Ridge photographs and regional information



PHOTOGRAPH 1
Fishers Ridge, Quadrat 4



PHOTOGRAPH 2
Fishers Ridge, Quadrat 3



PHOTOGRAPH 3
Fishers Ridge, Quadrat 2



PHOTOGRAPH 4
Fishers Ridge riparian vegetation (out of site)

Flora species list – Fishers Ridge

FAMILY	Scientific name	Common name
LEGUMINOSAE	<i>Acacia aneura</i>	Mulga
LEGUMINOSAE	<i>Acacia estrophiolata</i>	Ironwood
LEGUMINOSAE	<i>Acacia kempeana</i>	Witchetty Bush
GRAMINEAE	<i>Aristida contorta</i>	Curly Wire-grass
GRAMINEAE	<i>Aristida latifolia</i>	Feather-top Wire-grass
GRAMINEAE	<i>Atistida offusa</i>	
CHENOPODIACEAE	<i>Atriplex elachophylla</i>	
CHENOPODIACEAE	<i>Atriplex humifusa</i>	
COMPOSITAE	<i>Brachyscome ciliaris</i>	Variable Daisy
COMPOSITAE	<i>Calotis erinacei</i>	Tangled Burr-daisy
COMPOSITAE	<i>Calotis hispidula</i>	Hairy Burr-daisy
GRAMINEAE	<i>Cymbopogon obtectus</i>	Silky-head Lemon-grass
CHENOPODIACEAE	<i>Dysphania sp.</i>	Crumbweed/Rat Tails
CHENOPODIACEAE	<i>Einadia nutans</i>	Climbing Saltbush
CHENOPODIACEAE	<i>Enchylaena tomentosa</i>	Ruby Saltbush
GRAMINEAE	<i>Enneapogon avenaceus</i>	Common Bottle-washers
GRAMINEAE	<i>Enneapogon cylindricus</i>	Jointed Bottle-washers
GRAMINEAE	<i>Eragrostis eriopoda</i>	Woollybutt
GRAMINEAE	<i>Eragrostis setifolia</i>	Bristly Love-grass
MYOPORACEAE	<i>Eremophila gilesii</i>	Hairy-fruit Emubush
MYOPORACEAE	<i>Eremophila latrobei</i>	Crimson Emubush
COMPOSITAE	<i>Eriochlamys behrii</i>	Woolly Mantle
GERANIACEAE	<i>Erodium cygnorum</i>	Blue Heron's-bill
EUPHORBIACEAE	<i>Euphorbia drummondii</i>	
GOODENIACEAE	<i>Goodenia cycloptera</i>	Serrated Goodenia
GOODENIACEAE	<i>Goodenia fascicularis</i>	Silky Goodenia
GOODENIACEAE	<i>Goodenia helevechila</i>	
CHENOPODIACEAE	<i>Maireana radiata</i>	Radiate Bluebush
CHENOPODIACEAE	<i>Maireana villosa</i>	Silky Bluebush
CHLOANTHACEAE	<i>Newcastelia sp</i>	
GRAMINEAE	<i>Panicum decompositum</i>	Native Millet
GRAMINEAE	<i>Paspalidium</i>	Summer Grass
	<i>Pterocaulos sphacelatus</i>	
AMARANTHACEAE	<i>Ptilotus atriplicifolius</i>	
AMARANTHACEAE	<i>Ptilotus helipterodites</i>	Hairy Mulla Mulla
AMARANTHACEAE	<i>Ptilotus macrocephalus</i>	Feather-heads
AMARANTHACEAE	<i>Ptilotus polytachyus</i>	Bottle-washers

		Common name
CHENOPODIACEAE	<i>Sclerolaena birchii</i>	Galvanised Burr
CHENOPODIACEAE	<i>Sclerolaena costata</i>	Ribbed Bindyi
CHENOPODIACEAE	<i>Sclerolaena johnsonii</i>	Johnson's Bindyi
COMPOSITAE	<i>Senecio lautus</i>	Common Groundsel
COMPOSITAE	<i>Senecio magnificus</i>	Showy Groundsel
LEGUMINOSAE	<i>Senna sp</i>	
SOLANACEAE	<i>Solanum quadriloculatum</i>	Plains Nightshade
SOLANACEAE	<i>Solanum sturtianum</i>	Sturt's Nightshade
GRAMINEAE	<i>Thyridolepis mitchelliana</i>	Window Mulga-grass
CAMPANULACEAE	<i>Whalenbergia communis</i>	Tufted Bluebell

Fishers Ridge fauna list (data taken from NT Government database)

FAMILY	Scientific name	Common name
Cacatuidae	<i>Calyptorhynchus banksii</i>	Red-tailed Black-cockatoo
Campephagidae	<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike
Corvidae	<i>Corvus orru</i>	Torresian Crow
Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark
Accipitridae	<i>Milvus migrans</i>	Black Kite
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon
Psittacidae	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet



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Daly basin

N

Bioregional description

The Daly Basin bioregion comprises gently undulating plains and scattered low plateau remnants on Palaeozoic sandstones, siltstones and limestones; and neutral loamy and sandy red earths. The most extensive vegetation type is open forest dominated by Darwin Stringybark *Eucalyptus tetrodonta* and Darwin Woollybutt *E.miniata* with perennial and annual grass understory. The Daly Basin includes no subregions.

Special values

This bioregion comprises much of the catchment of the Daly River, one of the largest river systems in northern Australia. Some special values are associated directly with that river system, such as the unusually high diversity of freshwater turtles (with 8 species, the richest in Australia) and the exceptionally extensive and well developed riparian rainforest network. The bioregion also contains 11 species listed as threatened at Territory or national levels. The endangered Gouldian finch *Erythrura gouldiae* has a major stronghold in this bioregion. There area also contains some extensive cave systems with distinctive biota.

- **Summary of overall condition and trend**

Condition is generally good across much of the bioregion, reflected in a continental stress class score of 5. However, as one of the most fertile areas in northern Australia, and because of its proximity to Darwin and Katherine, the bioregion is one of the most developed in the Northern Territory. About 8% of the region has been cleared for horticultural production or intensive grazing, and more extensive development is being proposed. Much of the uncleared lowland area has been relatively heavily grazed by livestock, often in conjunction with the development of exotic pasture grasses. Mining and urban development have had some localised impacts in the bioregion. More extensively, the condition of the entire bioregion is being destabilised by the spread of weeds, feral animals (principally pigs) and altered fire regimes.

- **Summary of priority management/conservation priorities**

A conservation plan for this bioregion has recently been completed. It recommends a series of additional reserves to enhance the comprehensiveness of the existing reserve network, and to partly offset conservation losses due to proposed major horticultural developments. It also proposes a series of off-reserve conservation management actions, including retention of riparian corridors and bushland remnants on horticultural properties. Another priority is improvement in the integration across tenures of the management of weeds, feral animals and fire.

▲ TOP

- **Wetlands**

- o *Nationally important wetlands*

Much of the lower Daly River is recognised as a nationally significant wetland (NT001 Daly River middle reaches: wetland types B1 and B6). It provides the largest annual discharge of any river in northern Australia, possesses important breeding sites for colonially-nesting waterfowl, supports much of the Australian population of the pig-nosed turtle *Carettochelys insculpta*, areas of distinctive limestone tufas, significant riparian vegetation, and the occurrence of two threatened fish (freshwater sawfish *Pristis microdon* and speartooth shark *Glyphis* sp A).

- o *Other wetlands of subregional significance*

- **Riparian zones**

This bioregion is centred on the Daly River and includes at least parts of its important tributaries, the Katherine, Flora, Douglas, Fergusson and Fish Rivers. The riparian zones in this bioregion have been unusually well documented. Most are in reasonably good condition, although many sites have been detrimentally affected by heavy infestations of weeds and by feral animals and livestock. In some cases, frequent hot fires have also degraded riparian vegetation, and large stretches have been disturbed by recent.

- **Species at risk**

The Daly Basin contains 11 threatened species. Of these, the bioregion is probably particularly significant for Gouldian finch (for which the bioregion holds the largest known population), and the orchid *Nervilia plicata*, whose total known range consists of two sites in this bioregion.

Number of taxa in the Daly Basin bioregion listed as threatened at national and/or NT level (nb this table includes only species definitely recorded from the bioregion (rather than putative occurrences based on modelling) and presumed to be still extant in the bioregion).

▲ TOP

taxa	National		Northern Territory	
	endangered	vulnerable	endangered	vulnerable
plants	0	0	2	2
fish	0	2	0	0
birds	1	3	1	2
mammals	0	1	0	0

There is also some evidence that there is broad scale decline affecting at least some groups of mammals and birds in this bioregion, in addition to those species currently listed as threatened.

- **Other flora values for eucalypts and acacias**

- a. *Endemism*

This bioregion contains no endemic eucalypts and one endemic acacia - *Acacia douglasica* (=A. sp. Douglas River). This species may be affected by increased incidence of land clearing, and intensification of grazing practices; but there are no data on current trends or population size.

- b. *Richness*

This bioregion has moderately high richness for *Acacia* (49 species) and *Eucalyptus* (45 species).

- **Birds**

Some bird species and guilds exhibited changes in abundance over the period between the two bird Atlases. However, these changes may be artefactual: "*decreases in some guilds may be the result of changes in birdwatcher behaviour rather than real trends in abundance*" (Garnett & Crowley).

- **Mammals**

The mammal fauna of this region has proven relatively resilient. Of 51 species recorded, 1 has become regionally extinct, 1 has declined and 49 species are stable.

[▲ TOP](#)

Management Responses

- **Reserve consolidation**

The Daly Basin bioregion includes a portion of the large Litchfield National Park, and several smaller reserves. The conservation plan for the Daly Basin proposes three additional conservation reserves in order to achieve a CAR system for this bioregion. These reserves will also ensure the retention of adequate samples of those environments most likely to be cleared for horticultural development. The realisation of these proposed additional reserves will depend upon the provision of specific acquisition finances and availability of resources for ongoing management.

- **Off park conservation for species and ecosystem recovery**

The recovery plan for Gouldian finch provides some management guidelines for this species. There is also some existing management action associated with the Northern Territory *Strategy for conservation of biological diversity of wetlands*. The conservation plan for the Daly Basin provides specific recommendations for the maintenance of the rainforest patch network, for riparian areas and for wetlands.

A water allocation plan is in preparation for the Daly River system.

- **Integrated NRM**

The Daly Basin conservation plan provides a firm basis for integrated natural resource management across this bioregion, with specific consideration of protection of significant habitats and sites, regional- and property-scale management priorities for threatening processes, and the establishment of a monitoring program.

As with other bioregions in northern and central Australia, biodiversity conservation will require landscape-scale integration of management of weeds, feral animals and fire regimes. While there are many commonalities in this management across tenures, there is also a marked disjunction in this bioregion between "remote" poorly-resourced Aboriginal lands and more accessible, leasehold or freehold lands supporting intensive horticulture or pastoralism. The conservation priorities in the former lands are to provide resources and capacity building to Aboriginal owners in order to encourage and allow them to manage their lands better. The priorities in the more developed lands are to ensure retention of viable remnants and linkages, and to prevent, limit or mitigate erosion, pollution and other detrimental consequences of increased development.

Further Information and Gaps

- **Major data gaps and research priorities for bioregion**

Although some information is now available about the hydrological requirements of the aquatic biota of the Daly system, information is still limited, such that there is some uncertainty about the impacts of greatly increased water use associated with horticultural development and about the quantity and timing of minimum required environmental flows. Management would benefit from more detailed environmental mapping, in particular vegetation mapping at the scale of 1:100,000 or better.

There is also some priority to establish a bioregional monitoring program, especially relating to the occurrence of threats, their impacts and the consequences of their management.

- **Other information**



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Appendix D

Muckaty Station photographs and regional information



PHOTOGRAPH 1
Muckaty Station site, Quadrat 1



PHOTOGRAPH 2
Muckaty Station site, Quadrat 2



PHOTOGRAPH 3
Muckaty Station site, Quadrat 3



PHOTOGRAPH 4
Regional site Elliot trapping area in gully



PHOTOGRAPH 5
Regional site, Quadrat 2

Flora species list – Muckaty Station (data taken from NT Government database)

Family	Scientific name	Gazetted site	Regional site
MALVACEAE	<i>Abutilon leucopetalum</i>		Yes
MALVACEAE	<i>Abutilon otocarpum</i>	Yes	Yes
MIMOSACEAE	<i>Acacia adoxa</i> var. <i>adoxo</i>		
MIMOSACEAE	<i>Acacia aneura</i> var. <i>indeterminate</i>		
MIMOSACEAE	<i>Acacia bivenosa</i>		
MIMOSACEAE	<i>Acacia cowleana</i>		
MIMOSACEAE	<i>Acacia georginae</i>		
MIMOSACEAE	<i>Acacia gonoclada</i>		
MIMOSACEAE	<i>Acacia hemignosta</i>		
MIMOSACEAE	<i>Acacia hilliana</i>	Yes	Yes
MIMOSACEAE	<i>Acacia lysiphloia</i>	Yes	Yes
MIMOSACEAE	<i>Acacia retivenea</i> subsp. <i>retivenea</i>	Yes	
FABACEAE	<i>Alysicarpus muelleri</i>		
AMARANTHACEAE	<i>Amaranthus</i> sp. <i>Birindudu (J.L.Egan 4244)</i>		
LORANTHACEAE	<i>Amyema sanguinea</i> var. <i>sanguinea</i>	Yes	
POACEAE	<i>Aristida holathera</i> var. <i>indeterminate</i>	Yes	Yes
POACEAE	<i>Astrebla elymoides</i>		
POACEAE	<i>Astrebla lappacea</i>		
POACEAE	<i>Astrebla pectinata</i>		
POACEAE	<i>Astrebla squarrosa</i>		
SAPINDACEAE	<i>Atalaya hemiglauca</i>		
PITTOSPORACEAE	<i>Auranticarpa melanosperma</i>		
CONVOLVULACEAE	<i>Bonamia brevifolia</i>		
CONVOLVULACEAE	<i>Bonamia pannosa</i>		Yes
POACEAE	<i>Brachyachne convergens</i>		
STERCULIACEAE	<i>Brachychiton multicaulis</i>	Yes	Yes
SCROPHULARIACEAE	<i>Buchnera linearis</i>		
SCROPHULARIACEAE	<i>Buchnera tetragona</i>		
CAPPARACEAE	<i>Capparis lasiantha</i>		
CAPPARACEAE	<i>Capparis umbonata</i>		
APOCYNACEAE	<i>Carissa lanceolata</i>		
LAURACEAE	<i>Cassytha filiformis</i>	Yes	Yes
CAESALPINIACEAE	<i>Chamaecrista symonii</i>		Yes
POACEAE	<i>Chrysopogon fallax</i>		
CAPPARACEAE	<i>Cleome viscosa</i>		
VERBENACEAE	<i>Clerodendrum floribundum</i> var. <i>indeterminate</i>		
TILIACEAE	<i>Corchorus aestuans</i>	Yes	

			Regional site
TILIACEAE	<i>Corchorus sidoides</i> subsp. <i>indeterminate</i>		
MYRTACEAE	<i>Corymbia dichromophloia</i>		
MYRTACEAE	<i>Corymbia drysdalensis</i>		
MYRTACEAE	<i>Corymbia flavescens</i>		
MYRTACEAE	<i>Corymbia opaca</i>	Yes	
MYRTACEAE	<i>Corymbia setosa</i> subsp. <i>setosa</i>	Yes	Yes
CONVOLVULACEAE	<i>Cressa australis</i>		
FABACEAE	<i>Crotalaria cunninghamii</i> subsp. <i>indeterminate</i>		Yes
FABACEAE	<i>Crotalaria medicaginea</i> var. <i>indeterminate</i>	Yes	
CYPERACEAE	<i>Cyperus carinatus</i>		
FABACEAE	<i>Desmodium campylocaulon</i>	Yes	
FABACEAE	<i>Desmodium filiforme</i>		
POACEAE	<i>Enneapogon polyphyllus</i>	Yes	
POACEAE	<i>Enneapogon purpurascens</i>		
POACEAE	<i>Eragrostis cumingii</i>		
POACEAE	<i>Eragrostis dielsii</i>	Yes	
POACEAE	<i>Eragrostis setifolia</i>	Yes	
MYOPORACEAE	<i>Eremophila duttonii</i>		
MYOPORACEAE	<i>Eremophila latrobei</i> subsp. <i>glabra</i>		
POACEAE	<i>Eriachne aristidea</i>		
POACEAE	<i>Eriachne obtusa</i>		
MYRTACEAE	<i>Eucalyptus leucophloia</i> subsp. <i>euroa</i>	Yes	Yes
MYRTACEAE	<i>Eucalyptus odontocarpa</i>	Yes	Yes
MYRTACEAE	<i>Eucalyptus pruinosa</i> subsp. <i>indeterminate</i>		
MYRTACEAE	<i>Eucalyptus pruinosa</i> subsp. <i>pruinosa</i>	Yes	
POACEAE	<i>Eulalia aurea</i>		
EUPHORBIACEAE	<i>Euphorbia alsiniflora</i>		
EUPHORBIACEAE	<i>Euphorbia stevenii</i>		
CONVOLVULACEAE	<i>Evolvulus alsinoides</i> var. <i>indeterminate</i>	Yes	Yes
CYPERACEAE	<i>Fimbristylis corynocarya</i>		
CYPERACEAE	<i>Fimbristylis dichotoma</i>		
CYPERACEAE	<i>Fimbristylis microcarya</i>		
CYPERACEAE	<i>Fimbristylis neilsonii</i>		
CYPERACEAE	<i>Fimbristylis simulans</i>		
CYPERACEAE	<i>Fimbristylis tetragona</i>		
EUPHORBIACEAE	<i>Flueggea virosa</i> subsp. <i>melanthesoides</i>		
FABACEAE	<i>Glycine tomentella</i>		
AMARANTHACEAE	<i>Gomphrena canescens</i> subsp. <i>indeterminate</i>	Yes	

			Regional site
GOODENIACEAE	<i>Goodenia ramelii</i>	Yes	Yes
PROTEACEAE	<i>Grevillea prasina</i>		
PROTEACEAE	<i>Grevillea refracta</i>	Yes	Yes
PROTEACEAE	<i>Grevillea wickhami</i>	Yes	Yes
HERNANDIACEAE	<i>Gyrocarpus americanus</i>		
PROTEACEAE	<i>Hakea arborescens</i>		
PROTEACEAE	<i>Hakea chordophylla</i>		
BORAGINACEAE	<i>Heliotropium tenuifolium</i>		Yes
MALVACEAE	<i>Hibiscus brachysiphonius</i>	Yes	Yes
MALVACEAE	<i>Hibiscus krichauffianus</i>	Yes	Yes
MALVACEAE	<i>Hibiscus sturtii</i> var. <i>indeterminate</i>	Yes	
MALVACEAE	<i>Hibiscus trionum</i> var. <i>vesicarius</i>	Yes	
VIOLACEAE	<i>Hybanthus aurantiacus</i>	Yes	
FABACEAE	<i>Indigofera haplophylla</i>		Yes
FABACEAE	<i>Indigofera linnaei</i>		Yes
FABACEAE	<i>Indigofera trifoliata</i>		
FABACEAE	<i>Indigofera trita</i>		
CONVOLVULACEAE	<i>Ipomoea plebeia</i>	Yes	
POACEAE	<i>Iseilema fragile</i>		
POACEAE	<i>Iseilema vaginiflorum</i>	Yes	
STERCULIACEAE	<i>Keraudrenia nephrosperma</i>	Yes	Yes
CYPERACEAE	<i>Lipocarpha microcephala</i>		
FABACEAE	<i>Macroptilium atropurpureum</i>		
CHENOPODIACEAE	<i>Maireana georgei</i>		
ASCLEPIADACEAE	<i>Marsdenia viridiflora</i> subsp. <i>tropica</i>	Yes	
MYRTACEAE	<i>Melaleuca glomerata</i>		
MYRTACEAE	<i>Melaleuca viridiflora</i>	Yes	Yes
CUCURBITACEAE	<i>Mukia maderaspatana</i>		
COMMELINACEAE	<i>Murdannia graminea</i>		
MIMOSACEAE	<i>Neptunia monosperma</i>		
LAMIACEAE	<i>Ocimum tenuiflorum</i> var. <i>anisodorum</i>		
CONVOLVULACEAE	<i>Operculina aequisejala</i>		
POACEAE	<i>Panicum decompositum</i> var. <i>indeterminate</i>		
EUPHORBIACEAE	<i>Petalostigma banksii</i>		
EUPHORBIACEAE	<i>Petalostigma nummularium</i>		
EUPHORBIACEAE	<i>Petalostigma pubescens</i>	Yes	
EUPHORBIACEAE	<i>Petalostigma quadriloculare</i>	Yes	
CAESALPINIACEAE	<i>Petalostylis cassioides</i>	Yes	Yes

			Regional site
EUPHORBIACEAE	<i>Phyllanthus maderaspatensis</i> var. <i>angustifolius</i>	Yes	
PITTOSPORACEAE	<i>Pittosporum angustifolium</i>		
POLYGALACEAE	<i>Polygala eriocephala</i>		Yes
PORTULACACEAE	<i>Portulaca filifolia</i>		
VERBENACEAE	<i>Premna serratifolia</i>	Yes	
RUBIACEAE	<i>Psydraz attenuata</i> var. <i>myrmecophila</i>		
AMARANTHACEAE	<i>Ptilotus conicus</i>		Yes
AMARANTHACEAE	<i>Ptilotus exaltatus</i> var. <i>indeterminate</i>		
AMARANTHACEAE	<i>Ptilotus fusiformis</i> var. <i>fusiformis</i>	Yes	Yes
AMARANTHACEAE	<i>Ptilotus polystachyus</i> var. <i>indeterminate</i>		
FABACEAE	<i>Rhynchosia minima</i>		Yes
SANTALACEAE	<i>Santalum lanceolatum</i>		
POACEAE	<i>Schizachyrium crinizonatum</i>		
CHENOPODIACEAE	<i>Sclerolaena bicornis</i> var. <i>bicornis</i>		
CHENOPODIACEAE	<i>Sclerolaena cornishiana</i>		
CHENOPODIACEAE	<i>Sclerolaena lanicuspis</i>		
POACEAE	<i>Sehima nervosum</i>	Yes	
CAESALPINIACEAE	<i>Senna artemisioides</i> subsp. <i>indeterminate</i>		
CAESALPINIACEAE	<i>Senna glutinosa</i> subsp. <i>indeterminate</i>		Yes
CAESALPINIACEAE	<i>Senna obtusifolia</i>		
CAESALPINIACEAE	<i>Senna venusta</i>	Yes	Yes
POACEAE	<i>Setaria apiculata</i>		
POACEAE	<i>Setaria surgens</i>		
MALVACEAE	<i>Sida cordifolia</i>	Yes	Yes
MALVACEAE	<i>Sida fibulifera</i>	Yes	Yes
MALVACEAE	<i>Sida filiformis</i>		Yes
MALVACEAE	<i>Sida laevis</i>		
MALVACEAE	<i>Sida platycalyx</i>		
MALVACEAE	<i>Sida</i> sp. Suplejack Station (T.S.Henshall 2345)		
SOLANACEAE	<i>Solanum echinatum</i>	Yes	Yes
SOLANACEAE	<i>Solanum esuriale</i>		
SOLANACEAE	<i>Solanum</i> sp. Juicy fruit (P.K.Latz 18938)		
RUBIACEAE	<i>Spermacoce leptoloba</i>		
POACEAE	<i>Sporobolus australasicus</i>		
POACEAE	<i>Sporobolus pyramidalis</i>		
ASTERACEAE	<i>Streptoglossa odora</i>		
FABACEAE	<i>Tephrosia brachycarpa</i>		Yes

			Regional site
COMBRETACEAE	<i>Terminalia arostrata</i>		
COMBRETACEAE	<i>Terminalia bursarina</i>		
POACEAE	<i>Themeda triandra</i>		
MENISPERMACEAE	<i>Tinospora smilacina</i>	Yes	
AIZOACEAE	<i>Trianthema triquetra</i>		
ZYGOPHYLLACEAE	<i>Tribulopsis angustifolia</i>	Yes	
POACEAE	<i>Triodia basedowii</i>		Yes
POACEAE	<i>Triodia pungens</i>	Yes	Yes
POACEAE	<i>Urochloa holosericea subsp. indeterminate</i>		
POACEAE	<i>Urochloa piligera</i>		
MIMOSACEAE	<i>Vachellia farnesiana</i>		
POACEAE	<i>Yakirra australiensis var. australiensis</i>	Yes	Yes

Muckaty Station fauna list (data taken from NT Government database)

FAMILY	Scientific name	Common name
Meliphagidae	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
Accipitridae	<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk
Boidae	<i>Antaresia stimsoni</i>	Stimson's Python
Otididae	<i>Ardeotis australis</i>	Australian Bustard
Artamidae	<i>Artamus cinereus</i>	Black-faced Woodswallow
Boidae	<i>Aspidites melanocephalus</i>	Black-headed Python
Boidae	<i>Aspidites ramsayi</i>	Woma Python
Psittacidae	<i>Barnardius zonarius</i>	Australian Ringneck
Cacatuidae	<i>Cacatua roseicapilla</i>	Galah
Cacatuidae	<i>Cacatua sanguinea</i>	Little Corella
Chelidae	<i>Chelodina rugosa</i>	Northern Long-necked Turtle
Campephagidae	<i>Coracina maxima</i>	Ground Cuckoo-shrike
Campephagidae	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
Corvidae	<i>Corvus bennetti</i>	Little Crow
Corvidae	<i>Corvus orru</i>	Torresian Crow
Artamidae	<i>Cracticus nigrogularis</i>	Pied Butcherbird
Agamidae	<i>Ctenophorus isolepis</i>	Military Dragon
Agamidae	<i>Ctenophorus nuchalis</i>	Central Netted Dragon
Scincidae	<i>Ctenotus pantherinus</i>	Leopard Ctenotus
Scincidae	<i>Ctenotus saxatilis</i>	Rock Ctenotus
Hylidae	<i>Cyclorana cultripes</i>	Knife-footed Frog
Elapidae	<i>Demansia torquata</i>	Collared Whip Snake
Dicaeidae	<i>Dicaeum hirundinaceum</i>	Mistletoebird
Agamidae	<i>Diporiphora lalliae</i>	
Caprimulgidae	<i>Eurostopodus argus</i>	Spotted Nightjar
Falconidae	<i>Falco berigora</i>	Brown Falcon
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel
Gekkonidae	<i>Gehyra minuta</i>	Dwarf Dtella
Columbidae	<i>Geopelia cuneata</i>	Diamond Dove
Dicruridae	<i>Grallina cyanoleuca</i>	Magpie-lark
Artamidae	<i>Gymnorhina tibicen</i>	Australian Magpie
Accipitridae	<i>Haliastur sphenurus</i>	Whistling Kite
Accipitridae	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard
Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's Gecko
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle
Hirundinidae	<i>Hirundo ariel</i>	Fairy Martin
Macropodidae	<i>Lagorchestes conspicillatus</i>	Spectacled Hare-wallaby

		Common name
Muridae	<i>Leggadina forresti</i>	Desert Short-tailed Mouse
Pygopodidae	<i>Lialis burtonis</i>	Burton's Legless Lizard
Meliphagidae	<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater
Meliphagidae	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
Meliphagidae	<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater
Meliphagidae	<i>Lichenostomus virescens</i>	Singing Honeyeater
Meliphagidae	<i>Lichmera indistincta</i>	Brown Honeyeater
Hylidae	<i>Litoria rubella</i>	Red Tree-frog
Agamidae	<i>Lophognathus gilberti</i>	Gilbert's Dragon
Macropodidae	<i>Macropus rufus</i>	Red Kangaroo
Thylacomyidae	<i>Macrotis lagotis</i>	Bilby
Maluridae	<i>Malurus lamberti</i>	Variegated Fairy-wren
Maluridae	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren
Psittacidae	<i>Melopsittacus undulatus</i>	Budgerigar
Accipitridae	<i>Milvus migrans</i>	Black Kite
Strigidae	<i>Ninox novaeseelandiae</i>	Boobook Owl
Myobatrachidae	<i>Notaden nichollsi</i>	Desert Spadefoot Toad
Columbidae	<i>Ocyphaps lophotes</i>	Crested Pigeon
Macropodidae	<i>Onychogalea unguifera</i>	Northern Nailtail Wallaby
Pachycephalidae	<i>Pachycephala rufiventris</i>	Rufous Whistler
Pardalotidae	<i>Pardalotus rubricatus</i>	Red-browed Pardalote
Muridae	<i>Pseudomys desertor</i>	Desert Mouse
Elapidae	<i>Pseudonaja guttata</i>	Speckled Brown Snake
Dicruridae	<i>Rhipidura leucophrys</i>	Willie Wagtail
Pardalotidae	<i>Smicronis brevirostris</i>	Weebill
Gekkonidae	<i>Strophurus taeniatus</i>	White-striped Gecko
Elapidae	<i>Suta punctata</i>	Little Spotted Snake
Passeridae	<i>Taeniopygia guttata</i>	Zebra Finch
Scincidae	<i>Tiliqua multifasciata</i>	Centralian Blue-Tongued Lizard
Agamidae	<i>Tympanocryptis cephalus</i>	Pebble Dragon
Varanidae	<i>Varanus acanthurus</i>	Ridge-tailed Monitor
Varanidae	<i>Varanus gouldii</i>	Sand Goanna

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Sturt Plateau

Bioregional Description

The Sturt Plateau bioregion mostly comprises a gently undulating plain on lateritised Cretaceous sandstones. Soils are predominantly neutral sandy red and yellow earths. The most extensive vegetation is eucalypt woodland (dominated by variable-barked bloodwood *Eucalyptus dichromophloia*) with spinifex understorey, but there are also large areas of lancewood (*Acacia shirleyi*) thickets, bullwaddy (*Macropteranthes keckwickii*) woodlands, *Acacia* shrublands on deep sands, and eucalypt open forests (dominated by a range of species including Darwin stringybark *Eucalyptus tetradonta*) over tussock grass understorey. The bioregion is divided into 3 subregions.

Special values

The Sturt Plateau bioregion includes the most extensive areas of the distinctive lancewood-bullwaddy vegetation associations, with associated fauna including spectacled hare-wallaby. There are a range of small wetlands associated with sinkholes and minor depressions in the generally flat landscape.

- **Summary of overall condition and trend**

Most of the bioregion is generally in moderate to good condition, due at least in part to the lack of intensive development. There are pervasive, but generally minor impacts associated with weeds, feral animals, pastoralism and changed fire regimes. All 3 subregions are rated as continental stress class 5.

- **Summary of priority management/conservation priorities**

Notwithstanding the recent establishment of a conservation reserve selected to include lancewood-bullwaddy associations, the existing reserve system is meagre and does not include representation of the range of environments within the bioregion. Additional reservation could greatly enhance this system.

At least as important is the enhancement of integrated management of weeds, feral animals, and fire. The bioregion is targetted for intensification of development, including subdivision of existing pastoral properties, horticultural development, and more widespread planting of exotic pasture grasses. The biodiversity costs of such intensification may need to be balanced by increased protection of undeveloped areas and conservation management planning on pastoral lands.

- **Wetlands**

- *Nationally important wetlands*

The nationally significant Lake Woods wetlands (NT013: wetland types B6, B13, B14, B10 and B1) occurs on the border of this bioregion and the Mitchell Grass Downs bioregion. It is in generally good condition, albeit affected adversely by weeds (principally *Parkinsonia*), and grazing by livestock and feral animals.

Mataranka thermal pools (NT003: wetland type B17) occurs on the border of this bioregion and the Gulf Falls and Uplands bioregion. It is in generally good condition, although somewhat affected by tourist developments and feral animals.

- *Other wetlands of subregional significance*

There are a number of small wetlands associated with the intermittent, land-locked drainage systems in the south of the bioregion.

- **Riparian zones**

There are no large perennial watercourses in the bioregion. The major drainage system is the Newcastle Creek system in the south, although the bioregion also includes smaller headwater areas of the larger Roper, Daly and Victoria River systems. Riparian zones are generally in fair to good condition, affected mostly by access by livestock and feral animals and weeds.

- **Ecosystems at risk**

No ecosystems in this bioregion have been assessed formally for risk category. However, riparian areas and wetlands are probably at risk. The current fire regime may be disadvantageous to lancewood-bullwaddy associations, but the extent of this risk has not been assessed.

- **Species at risk**

6 species occurring in the bioregion are listed as threatened at national or Territory level. Of these species, the bioregion is probably a significant stronghold for the northern shrike-tit, and possibly also for the bilby (because foxes are relatively uncommon so far north).

Number of taxa in the Sturt Plateau bioregion listed as threatened at national and/or NT level (*nb this table includes only species definitely recorded from the bioregion (rather than putative occurrences based on modelling) and presumed to be still extant in the bioregion*).

taxa	National		Northern Territory	
	endangered	vulnerable	endangered	vulnerable
birds	1	2	1	4
mammals	0	1	0	1

There is also some evidence that there is broad scale decline affecting at least some groups of mammals and birds in this bioregion, in addition to those species currently listed as threatened.

- **Other flora values for eucalypts and acacias**

1. *Endemism*

There are no endemic acacia species and one endemic eucalypt in this bioregion: *Eucalyptus* (Killarney D138706) from STU3.

2. *Richness*

Richness The Sturt Plateau subregions have low to moderate richness of *Acacia* (3-35 species) and *Eucalyptus* (10-40 species).

- **Birds**

There were insufficient records from this bioregion to confidently ascribe trends to any bird species or guilds for the period between the two bird Atlases.

- **Mammals**

Of 39 mammal species recorded from this bioregion, 1 is regionally extinct, 1 has declined severely, 1 has declined and 36 are stable.

Management Responses

- **Reserve consolidation**

The existing reserve system is neither comprehensive nor adequate, and appreciable enhancement is needed to achieve these goals. Such addition may be especially needed if land use intensification proceeds.

- **Off park conservation for species and ecosystem recovery**

There is some conservation management occurring on some pastoral properties in the bioregion, principally through enclosure fencing of wetland and riparian areas. There is also potential for formal agreements to maintain water-remote lightly-grazed areas in environments otherwise favoured for grazing.

- **Integrated NRM**

A priority for the region is the enhanced integrated management of feral animals, fire and weeds.

There is also a need to be more accountable for the deliberate introduction of exotic pasture grasses (particularly buffel grass) to achieve higher stocking rates. Such introductions cause long-term detriment to the conservation values of those properties and, often, to neighbouring lands.

Further Information and Gaps

- **Major data gaps and research priorities for bioregion**

A conservation plan for the Sturt Plateau bioregion is currently being prepared. This included a comprehensive survey of the bioregion's fauna and flora, and an assessment of conservation values. A gap to be filled in this project is the availability of environmental mapping at appropriate scale.

Currently in this bioregion, there is no substantial monitoring program which includes as a major goal the assessment of trends in biodiversity conservation, and in threatening processes and their management. Such a program should be a management priority.

- **Other information**

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Tanami

Bioregional Description

The Tanami bioregion comprises mainly red Quaternary sandplains overlying Permian and Proterozoic strata which are exposed locally as hills and ranges. The sandplains support mixed shrub steppes of *Hakea suberea*, desert bloodwoods, acacias and grevilles over *Triodia pungens* hummock grasslands. *Acacia* shrublands over hummock grass communities occur on the ranges. Alluvial and lacustrine calcareous deposits occur throughout. In the north they are associated with Sturt Creek drainage, and support *Chrysopogon* and *Iseilema* short-grasslands often as savannas with River Gum. The climate is arid tropical with summer rain. The Tanami bioregion is divided into three subregions.

Special values

The Tanami bioregion comprises large areas of desert communities little affected by intensive development and at least superficially largely in good condition. The sandplains support threatened species including bilby, marsupial mole and mulgara. There are also impermanent but significant wetland systems.

- **Summary of overall condition and trend**

Most of the bioregion is generally in good condition, with little intensive use. However, feral predators (foxes, cats) and other factors have caused the regional extinction of 13 mammal species (including central rock-rat and mala), and the decline of many other mammals. Fire regimes have changed substantially over the last century, following less intricate Aboriginal management over large areas, leading to broad-scale detriment in many vegetation communities. Some weeds are also increasing, with at least localised impacts of buffel grass and *Parkinsonia*. The three subregions are all rated as continental stress class 5.

- **Summary of priority management/conservation priorities**

There are three main priorities for natural resource management in the Tanami: (1) remedial actions (e.g. enclosure fencing) in some pastoral lands largely on the periphery of the region (most notably in the wetland system of Sturt Creek); (2) resources and capacity building for Aboriginal land owners to become more effective managers of NRM (mostly fire, weeds and ferals) problems over the extensive areas of Aboriginal lands; and (3) development and ongoing support for IPAs or other cooperatively managed conservation areas.

- **Wetlands**

- *Nationally important wetlands*

The bioregion includes two nationally significant wetlands: Lake Surprise (Yinapaka) (NT019: wetland type A6) and the Lake Gregory system (WA096: wetland types B7, B8 and B2). Parts of the Lake Gregory system have been degraded by livestock, but management may be expected to improve as the area has recently been included within the large (4,346 km²) Paruku IPA.

- *Other wetlands of subregional significance*

The bioregion also contains many smaller ephemeral wetlands and watercourses, which are intermittently of at least regional significance.

- **Riparian zones**

The largest river system in the bioregion is Sturt Creek (which flows into Lake Gregory). Other ephemeral watercourses include the Lander and Hanson Rivers and Winnecke Creek. Condition is generally good, although there are at least localised impacts from feral animals and livestock, and from weeds.

- **Ecosystems at risk**

There has been no formal assessment of the conservation status of ecosystems across most of the bioregion. At least parts of some wetland communities (e.g. Lake Wilson, Lake Gregory) have been degraded by livestock and/or feral animals. Changed fire regimes have led to floristic changes and/or demographic changes for some plant species in many communities across much of the bioregion.

- **Species at risk**

10 species still occurring in this bioregion are listed as threatened at federal or State/Territory level.

Number of taxa in the Tanami bioregion listed as threatened at national and/or NT/WA level (*nb this table includes only species definitely recorded from the bioregion (rather than putative occurrences based on modelling) and presumed to be still extant in the bioregion*).

taxa	National		Northern Territory	
	endangered	vulnerable	endangered	vulnerable
plants	0	0	0	1
reptiles	0	1	0	1
birds	0	3	0	3
mammals	1	3	0	4

- **Other flora values for eucalypts and acacias**

1. *Endemism*

There are no endemic eucalypt species and three endemic acacia species in this bioregion: *Acacia abbreviata*, *A. crassifruca* and *A. sp.* (Tanami A91044), all from subregion 1. There is little information about the status of these species, but all are likely to have been detrimentally affected by changed fire regimes

2. *Richness*

Tanami 1 subregion is rich for *Acacia* (76 species), and moderately rich for *Eucalyptus* (33 species). Reflecting their smaller size and less intensive collecting, the two other subregions have low to moderate richness of *Acacia* (26 and 31 species) and *Eucalyptus* (19 and 19 species).

- **Birds**

Although there were relatively few records in the two Atlas periods, there was some evidence for increase of waterfowl and some granivorous and nectarivorous species. This trend may simply reflect better rainfall conditions during the second Atlas period. Over a longer term, the night parrot has probably become regionally extinct, or at least declined substantially.

- **Mammals**

The mammal fauna of the Tanami bioregion has been substantially reduced: of 50 species reported, 13 are regionally extinct, 1 has severely declined, 6 have declined and 30 are stable.

Management Responses

- **Reserve consolidation**

Notwithstanding the important recent establishment of an IPA around Lake Gregory, the existing reserve system in this bioregion is meagre and far from comprehensive. Enhancement of this system is a priority, especially in the far eastern part (subregion 3) and in the central Tanami Desert itself.

- **Off park conservation for species and ecosystem recovery**

There is little existing NRM specifically for threatened species or ecosystem recovery. Notable exceptions are some enclosure fencing to allow recovery of riparian/wetland areas (Birringudu and Lake Gregory area), and a long-running but now defunct enclosure and protective management for mala at Sangster's Bore in the Tanami Desert. Enhancement of the IPA system and agreements on pastoral stations may provide scope for additional similar intensive management actions for threatened species and susceptible ecosystems.

- **Integrated NRM**

The major NRM issues in the bioregion relate to pervasive insidious threatening processes (weeds, feral animals, changed fire regimes), whose management requires additional resources and support, capacity building among landowners, and better integration across tenures and jurisdictions. There has been some improvement in this management in recent years, through the Central Land Council's land management units, the development of the IPA process and broad-scale monitoring and management of fire by the Bushfires Council (in the NT), however the resources currently available are insufficient to check these processes across this vast and poorly accessed region.

Further Information and Gaps

- **Major data gaps and research priorities for bioregion**

Most of the large NT portion of subregion 1 has been sampled comprehensively for vertebrates, although this work is now more than 15 years old. There has been far less systematic sampling for fauna in the WA portion of in the two other subregions, and very little systematic floristic sampling.

Management would also benefit from more detailed environmental mapping, in particular vegetation mapping at the scale of 1:250,000 or better.

Currently in this bioregion, there is no substantial monitoring program which includes as a major goal the assessment of trends in biodiversity conservation, or in the extent and impacts of threatening processes (with the exception of some mapping of fire regimes and irregular aerial surveys of feral animals). Such a program should be a management priority.

- **Other information**

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