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Yampi Sound Training Area – Flora and Fauna Survey Dry Season 2008

Regional Biodiversity Monitoring and Remediation Program (NT1651)

- Final Report
- 5 February 2009

Yampi Sound Training Area Fauna and Flora Survey Report, Dry Season 2008

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Executive Summary

Spotless Services Australia (SSA) and Defence Support Northern Territory / Kimberley (DS-NT/K) have contracted Sinclair Knight Merz (SKM) and EcOz Environmental Services to conduct biodiversity surveys of four Defence training areas within the Northern Territory (NT) and Kimberley region. This report presents the findings of one of these surveys, for the Yampi Sound Training Area (YSTA), which was surveyed by four teams of ecologists over two weeks during September 2008.

YSTA covers an area of some 5,660 km^2, and is located approximately 80 km to the North of Derby, Western Australia. YSTA supports high floral and faunal diversity and sits astride three biogeographic regions; the North Kimberley, Central Kimberley and Dampierland bioregions. It hosts a range of vegetative communities that provide a diversity of habitat for terrestrial vertebrates.

The flora and fauna survey at YSTA were designed to gather baseline information on flora and fauna from a range of land systems. This report comprises:

- Results of a desktop review of the region conducted prior to the survey;
- Clearly documented methodologies and survey site locations;
- Results of, and discussion of the fauna and flora survey findings; and
- Details for species of conservation significance that were recorded during the survey, or could potentially occur in the region (as identified during the desktop assessment).

The desktop review was conducted utilising a wide range of available reference material, government and private databases, and previous survey reports.

Eight field survey sites were selected based on accessibility and representation of the variety of land systems across YSTA. Fauna and flora were surveyed at each site. Fauna survey methodology was based on the documented and broadly accepted NT Fauna Survey Guidelines produced by the Biodiversity Conservation Division of the NT Government (NRETA, 2008). At each of the eight survey sites, six fauna survey quadrats were established, and vertebrate fauna species were trapped, searched for, and recorded over a three day and three night trapping period.

Habitat types identified as significant were also proposed as survey sites. These habitat types selected were rainforest pockets; grasslands, littoral zones, blacksoil plains, sandstone woodland communities, granite outcrops, fire protected sandstone communities, and isolated topographic high points on King Leopold Range.

The fauna survey identified a total of 191 indigenous vertebrate species, including 16 incidental species records observed whilst travelling between sites. This comprised 9 Amphibians, 49 Reptiles, 109 Birds and 25 Mammals including 6 bat species.

An additional five introduced fauna species were recorded at YSTA including cattle *Bos Taurus*, donkey *Equus asinus*, horse *Equus caballus*, pig *Sus scrofa* and dingo *Canis lupus* (though debate remains as to whether this species should be considered introduced, given their introduction to mainland Australia approximately 4000 years ago. Regardless, many difficult

to distinguish hybrids between dingos and domestic dogs now occur in the wild). Evidence of minor soil and/or vegetation disturbance from introduced species was noted at some sites, but significant damage was not evident within the areas surveyed. The impact of the introduced species on native fauna could not be inferred using data from this survey only.

A total of 8 species of national conservation significance were identified, each of which are listed under the Commonwealth *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*. These species are the Northern Quoll *Dasyurus hallucatus*, Golden-backed Tree-rat *Mesembriomys macrurus*, Golden Bandicoot *Isoodon auratus*, Freshwater Crocodile *Crocodylus johnstoni*, Saltwater Crocodile *Crocodylus porosus*, Oriental Plover *Charadrius veredus*, White-bellied Sea Eagle *Haliaeetus leucogaster*, and the Rainbow Bee-eater *Merops ornatus*. Five species of significance were also identified, each of which are listed under either the Western Australian *Wildlife Conservation Act, 1950* or the International Union for the Conservation of Nature (IUCN) Red List. These species are the Orange Leaf-nosed Bat *Rhinonicteris aurantia* (Rare, *Wildlife conservation Act*) Northern Brush-tailed Phascogale *Phascogale pirata* (Vulnerable, IUCN), Grey Falcon *Falco hypoleucos* (Near Threatened, IUCN), Peregrine falcon *Falco Peregrinus* (Schedule 4, *Wildlife Conservation Act*) and Bush Stone-curlew *Burhinus grallarius* (Near Threatened, IUCN).

Flora investigations were limited to observations of dominant species and communities present. This included species of note, such as weed species and those with conservation status. No species of conservation significance were recorded during the investigation, although a desktop study revealed a number of State listed species which may potentially occur at YSTA.

The presence of these threatened species and the high diversity of native species recorded at YSTA indicate that this Defence training area should continue to be monitored and managed to protect the biodiversity it contains. Recommendations arising from this survey include measures to reduce and control introduced fauna, particularly pig and cattle within areas known to support EPBC species, and ongoing monitoring for weed outbreaks. Whilst significant impacts from fire were not evident during the 2008 survey, it is also recommended than an ecological burning plan be developed for the site to reduce the risk of potentially large scale impacts from wildfires (or as a result of explosives or ammunition training should they occur at the site in future). Consideration of threatened species habitats is also recommended in the event that high impact training activities are proposed for the site in future.

1. Introduction

Spotless Services Australia (SSA) and Defence Support Northern Territory / Kimberley (DS-NT/K) commissioned SKM and EcOz to conduct biodiversity surveys at four Defence training areas in the NT/K region. The four training areas of focus are: The Delamere Range Facility, Mount Bundey Training Area, Bradshaw Field Training Area and Yampi Sound Training Area (YSTA). The combined works for these areas are designed to establish biodiversity conservation programs compatible with contemporary land management practices and Defence land-use requirements. The biodiversity surveys will also assist Defence in meeting their commitments under the *EPBC Act 1999*.

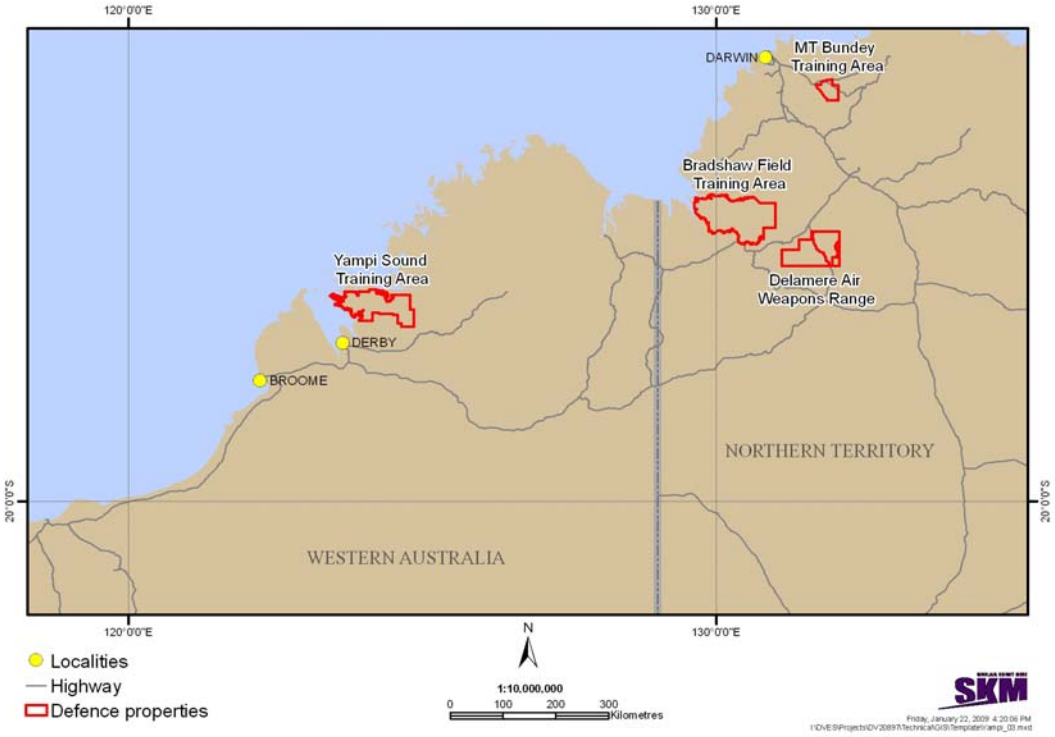
This field survey report presents results for a fauna and flora survey undertaken at YSTA, Western Australia as part of the broader biodiversity program. The survey was undertaken between 17 and 27 September, 2008. The fauna survey component of this study was conducted using standardised and broadly recognised methods as described in the *Survey methods used for fauna and flora on standard biodiversity unit survey sites* developed by the Biodiversity Conservation Division of NRETA (current in 2008). As instructed by Defence, the flora survey methodology was amended to a reduced level of recording incorportating broad habitat descriptions with dominant vegetation species. Using standardised and documented methodologies allows subsequent surveys to be directly comparable with this study, and allows data collected to be comparable with other standard flora and fauna surveys undertaken across the north of Australia as part of the broader program of works.

This survey report is divided into two components, namely:

- Summary information from the desktop review report of flora, fauna and land system types known to, or with the potential to, occur in the YSTA region (SKM, 2008), and
- Results from field surveys aimed at collecting baseline data on habitat types and fauna species present and to form a baseline for monitoring flora and changes in vegetation condition.

1.1. Locality

YSTA is located approximately 80 km north of Derby on the Yampi Peninsula in northern Western Australia (Figure 1).



- **Figure 1 YSTA Location**

Figure 2 presents the site boundary, including sector boundaries. YSTA represents an area of transition from the sandstone plateau of the north-west Kimberley, to the broad plains and pindan scrub of the south-west Kimberley. This transition is reflected in the recognition of the boundaries of regional botanical districts. YSTA covers an area spanning:

- the northern tip of the Dampier Botanical District;
- the western end of the Fitzgeralds Botanical District; and
- the south-western tip of the Gardner Botanical District (ANHSIR, 2004; Beard, 1980) .

YSTA is subject to a monsoonal climate, with the dry season between April and September and the wet season between October and March.

- **Figure 2 YSTA Site Boundary and Sector Boundaries**

1.2. Regional Biogeography

YSTA occupies an area of overlap of three distinct bio geographic regions in northern Western Australia; North Kimberley, Central Kimberly, and Dampierland (DEWHA, 2004). As a result the area has a diverse range of ecosystems, which accommodate an unusual richness of flora and fauna within the region. The geomorphology of YSTA is highly variable. Granite hills run through YSTA from the south east corner, extensive areas of sandstone form the western and northern boundary, with scattered basalt extrusions along the northern side. The west is dominated by broken quartzite hills whilst the central and southern areas are dominated by plains and hills of red clay rich soils, red pindan sands and blacksoil plains (Barrett *et al* 2001).

1.3. History

YSTA was purchased by the Department of Defence in 1978 as a training area. Prior to being purchased as Defence land, YSTA operated as two separate pastoral stations (Kimbolton and Oobagooma Stations) that were originally pastoral leases taken up around 1900. The ruin of the Oobagooma homestead is located at the site of the first Kimberley port, through which access was gained to the Halls Creek goldfields.

1.3.1. History of Defence Activity

YSTA is largely undeveloped Defence land, where the main Defence activities are associated with care and maintenance of infrastructure at the property. An unsealed track from the Gibb River Road passes through Meda Station and provides access to Oobagooma and Kimbolton in the southwest of the range. At present there is little capacity for cross country driving due to limited road/track infrastructure.

YSTA has received some limited use by the 1st Brigade Mechanised Unit from Robinson Barracks in Darwin, NORFORCE (North-West Mobile Force regiment of the Australian Army), and the Special Air Service Regiment (SASR). High Explosive Impact Areas have been delineated. However, no use of high explosive weapons has occurred on the range to date.

1.4. Heritage Values

It is noted that the Yampi Sound Training Area is listed on the Commonwealth Heritage List (Register of the National Estate) as a place of natural heritage significance. The EPBC Act provides for the listing of natural, historic or Indigenous places that are of outstanding national heritage value to the Australian nation as well as heritage places on Commonwealth lands and waters or under Australian Government control. The National Heritage List includes natural, historic and Indigenous places of outstanding heritage value whilst the

Commonwealth Heritage List comprises natural, Indigenous and historic heritage places on Commonwealth lands and waters or under Australian Government control.

Once a heritage place is listed under the EPBC Act, special requirements come into force to ensure that the values of the place will be protected and conserved for future generations. The EPBC Act provides for the preparation of management plans which set out the significant heritage aspects of the place and how the values of the site will be managed. Search results for Yampi Sound Training Area under the Commonwealth Heritage List are included in **Appendix G.**

1.5. Desktop Review

The desktop component of this report has been developed from a review of available reports and mapping, as well as database searches covering the site.

The main data sources utilised in the desktop review were:

- the *EPBC Act 1999* Protected Matters Database Search Tool;
- the Western Australian Department of Conservation and Land Management Database;
- EPBC Listed Threatened Species & Ecological Communities Database 2007-08 (HLA 2007) for Defence sites
- previous survey information from YSTA; and
- published scientific papers and reference books.

The results of the desktop review were used to identify the environmental conditions at YSTA, and fauna and flora species that are likely to inhabit the region. The field survey design was updated based on the results of the desktop information and in consultation with Defence in order to:

- survey habitats that had not been surveyed previously;
- target the habitat of conservation listed species expected to inhabit the region; and
- focus on habitats sensitive to disturbance from Defence land use.

1.6. Field Survey

Eight ecologists made up four separate field teams, to survey eight survey sites. Sites were accessed via 4WD vehicles, with the exception of Sites 3 and 5, which were reached by helicopter, due to inaccessible terrain. The following resources were used for species identification and classification:

- Amphibians – A Field Guide to Australian Frogs (Barker *et al*. 1995); Reptiles and Amphibians of Australia (Cogger 2000);

- Reptiles – A Complete Guide to Reptiles of Australia (Wilson and Swan 2003); Reptiles and Amphibians of Australia (Cogger 2000); Skinks of the Northern Territory (Horner 1991);
- Birds – The Field Guide to the Birds of Australian (Pizzey and Knight 1997, and Simpson & Day 2004); and
- Mammals – The Mammals of Australia (Menkhorst & Knight 2001); Mammals of Australia (Strahan 1995); Australian Bats (Churchill 1998); Tracks, Scats and Other Traces (Triggs 1996); Field Guide to the Rodents and Dasyurids of the Northern Territory (Cole & Woinarski 2002).

Bats were surveyed using an Anabat bat detector, which was set up to record overnight at a central location within each of the eight survey sites. Kyle Armstrong of Specialised Zoological was contracted to analyse the resulting bat calls and provide a summary report. Damian J. Milne's (2002) key to the bat calls of microchiropteran bat fauna of the Top End of the Northern Territory was used to analyse the calls, along with a literature source on Australian Bats (Churchill 1998).

Fieldwork was undertaken under approved permits as follows:

- Ethics Clearance, granted by the Charles Darwin University Animal Ethics Committee (Renewal of ethics Clearance for Project Reference No. A05027)
- License to take flora for scientific purposes, granted by the Department of Environment and Conservation (license numbers SL008167, SL008168, SL008169)
- License to take fauna for scientific purposes, granted by the Department of Environment and Conservation (license number SF006372)

These permits encompassed the entire fieldteams activities.

1.6.1. Fauna Survey

Eight field survey sites were selected and agreed by Defence prior to the field survey based upon desktop information available for the site (SKM, 2008). Sites were selected based on accessibility and representation of the variety of land systems across YSTA. A description of survey sites, and eastings and northings, are listed in Table 1, below. The habitat types targeted were rainforest pockets; grasslands, littoral zones, blacksoil plains, sandstone woodland communities, granite outcrops, fire protected sandstone communities, and isolated topographic high points on King Leopold Range. Due to access difficulties, Site 8 was relocated to a different sector from that proposed in the Desktop Report (SKM, 2008). Final survey site locations are shown in Figure 3 and central points of each surveyed site are listed in Table 1, below. Detailed GPS locations for individual survey quadrats are provided in Appendix B.

Table 1 Terrestrial Flora & Fauna Monitoring Sites YSTA

Site	Landform	Vegetation Structure	Easting	Northing	WGS84_X	WGS84_Y
Y01	Gently sloping Floodplains and backplains	Low Open Woodland to Woodland	604362	8144091	123° 58' 45.45" E	16° 47' 2.11" S
Y02	Undulating Plains and gently sloping plateaus	Woodland	613212	8146215	124° 3' 43.99" E	16° 45' 51.52" S
Y03	Plains and Lower Hill Slopes on basic volcanics	Woodland with some Tussock Grass Woodland	640117	8174005	124° 18' 46.46" E	16° 30' 42.14" S
Y04	Flat to gently undulating plains and active alluvial plains	*Astrebla* Grassland Communities	610734	8159845	124° 2' 17.91" E	16° 38' 28.46" S
Y05	Hills, Ridges, Escarpments and dissected plateau tops, often with bare rocky areas	Open Woodland (Targeting Rainforest Pockets)	630559	8181617	124° 13' 22.54" E	16° 26' 36.43" S
Y06	Occurs on Broad Valleys and Plains	Woodland	594096	8150109	123° 52' 57.78" E	16° 43' 47.86" S
Y07	Siltstone and Greywacke Hills, with granite outcrops	Low Open Woodland to Wooded Hummock Grassland	585953	8166748	123° 48' 20.54" E	16° 34' 47.55" S
Y08	Hills, ranges and outcrops in River Valley	Tall open Forrest	666315	8139312	124° 33' 39.10" E	16° 49' 24.68" S

Fauna and flora were surveyed at each site between 17 and 27 September 2008 by experienced ecologists. Fauna survey methodology was based on the documented and broadly accepted NT Fauna Survey Guidelines distributed by the Biodiversity Conservation Division of the NT Government (NRETA, 2008). NT survey guidelines were adopted as Western Australia does not have prescribed standards for biological survey methodology, and consultation with the WA museum agreed that NT guidlines were applicable for YSTA and

would provide a level of consistency across the tropics of Northern Australia. Table 2, below, broadly summarises the survey components undertaken at each site.

Table 2 Survey components for 2008 fauna survey

Focus	Component
Fauna	3 nights trapping (Pitfall traps x 4, Elliott traps x 20, cage traps x 4, hair tubes x 4, and funnel traps x2)
Fauna	Nightly spotlighting and searches (2 nights)
Fauna (Bats)	Anabat surveys (excluding helicopter drop sites 5 and 6)
Fauna	Habitat descriptions for each fauna quadrat
Fauna (Reptile)	Opportunistic and active searches within each fauna quadrat (3 searches at various times of day)
Fauna (Birds)	Instantaneous bird counts (8 times within each quadrat)

Six quadrats of 50 m x 50 m were established at each of the 8 sites, with the exception of Sites 5 and 3, where only 3 quadrats were installed due to time constraints. Sites 3 and 5 were reached via helicopter due to impassable terrain. Site and quadrat locations were recorded by GPS (Datum: GDA 1994 MGA Zone 51). Locations are presented in Table 1 and plotted on the map in Figire 3. Habitat photographs of each quadrat are provided in Appendix A.

The survey teams established traps and monitored each quadrat continuously for three days and three nights. All equipment and flagging tape was removed at the end of the survey period, and the pit trap holes were filled and compacted to ground level. The layout of traps in each quadrat involved:

- 20 Elliott traps around the perimeter – 5 on each side approximately 8 m apart;
- Four Cage traps – one in each corner;
- Four Pitfall traps (with the exception of sites 3 and 5, which had only 3 due to time constraints) with 10 m drift fences – sampling various microhabitats within the quadrat;
- Two Funnel traps set against a drift fence.

This trap layout within each quadrat was based on the NT Guidelines (NRETA 2008), with the addition of funnel traps. These extra traps were added in response to Defence's Environmental Monitoring Manual (ENSR Australia 2008) requirements.

The pit traps used 20 L or 10 L plastic buckets dug to ground level and 10 m of drift-fence. Where possible, the pits were located within different microhabitats in the quadrat. The pit traps were opened for 3 nights, checked early each morning and rechecked at midday.

- **Figure 3 Survey sites and broad vegetation zones at YSTA**

Elliott traps and cage traps were rebaited each afternoon, opened overnight and closed in the mornings. The bait involved a mixture of oats, honey, peanut butter and sardine or fish oil. Trapped animals were identified and released near the capture point, no deaths or injuries were recorded. There was no need to mark captured animals since this survey intended to assess species diversity rather than species abundance.

Identification was confirmed for some captured mammals by hair analysis. A mammal identification specialist, Ryan Carter, was sent samples of bandicoot hairs, together with unidentified scats.

Bird species were recorded within an extended boundary around each quadrat, resulting in a 100 m x 100 m area (i.e. 25 m outside of the quadrat). Each quadrat was surveyed for birds six times in daylight and twice during nocturnal visits. Bird surveys ran for 15 minutes occurring in the early morning, early afternoon and early evening, with a few spread throughout the day. Each survey was considered an instantaneous count of all the birds within the quadrat. Raptors were included if they were hunting overhead. Birds that were noted outside of the time of bird survey, or outside the quadrat were noted as incidentals. This is also true of mammals, amphibians, and reptiles.

The quadrats were also actively searched for reptiles, mammals, and their scats and signs. Three daytime searches were conducted (morning, midday, late afternoon), and two nocturnal searches which used spotlighting and listening for nocturnal vertebrate species.

The active searches were for 20 person-minutes duration and involved:

- turning rocks and logs, raking through leaf litter and grass, looking under bark, behind trees, in crevices, etc;
- recording the number of individuals of each species seen; and
- recording scats, bones and other signs where they could be confidently attributed to species.

Opportunistic observations made while travelling around the project area between the survey sites were also recorded.

1.6.2. Fauna Habitat Descriptions

Floristic and geological information was recorded for each fauna quadrat as described below. Thus, six descriptions were made for each land system, so that vertebrate species records could be attributed to a particular sub-habitat.

The habitat of each fauna quadrat was described, measured, and recorded on data sheets. Information recorded (as detailed in **Appendix E**) included:

- GPS Coordinates using a hand-held 12-satellite GPS set to GDA 1994 (MGA Zone 51) (accuracy around +/- 5 m);
- General Site description;
- Description of physical environment;
- Description of the level of disturbance, if any;

- Vegetation classification and species identified;
- Fire history and impact;
- Evidence of weeds and feral animals;
- Soil, rock and groundcover description;
- Digital photograph numbers; and
- Any other relevant information.

1.6.3. Flora Monitoring

At the request of Defence, the proposed flora survey methodology was revised. The flora survey component of this study involved observations of dominant vegetation types of the upper, mid and ground stratum at each quadrant location within each site. Basal density of woody plant species was recorded using a Bitterlich gauge at each of the four corners and at the centre of the plot. Additionally, other vegetation records were made, such as notable weed species. Field identifications of plant species were made using a variety of books and reference materials. Plant specimens that could not be identified in the field were sampled and preserved for identification by Tim Willing, a botanist experienced with the flora of YSTA.

1.6.4. Disturbance Monitoring

In order to provide an indication of the suitability of Defence activities within different land system or habitat types, disturbance was monitored within the quadrats. Where possible, the type of disturbance was categorised according to military or non-military, and further categorisation given depending on the apparent cause of the disturbance, including notes on the source and scope of the disturbance. Disturbance from fire was noted, in addition to the type and extent of any erosion present within the quadrats.

1.7. Evaluation of Conservation Significance

Nationally listed 'threatened' species constitute a Matter of National Environmental Significance under the *EPBC Act 1999*. In accordance with this Act, a person cannot undertake an action that will have a significant impact on a 'threatened' species without prior approval of the Commonwealth.

Western Australia also classifies certain species under schedules 1-4 of the *Wildlife Conservation Act, 1950* (as amended), which are presented in the Wildlife Conservation (Specially Protected Fauna) Notice, 2008. Schedule 1 encompasses "Fauna that is rare or is likely to become extinct"; Schedule 2, "Fauna presumed to be extinct"; Schedule 3, "Birds protected under an international agreement"; and Schedule 4, "Other protected fauna". Species that fall under these Schedules are not currently regarded as holding significant

conservation status under this legislation alone, however, efforts to improve ecological knowledge and determine more detailed information on these species is regarded as important.

Species listed on the IUCN Red list of threatened species database have also been included in the list of species with conservation significance. This includes species classified as as extinct in the wild, critically endangered, endangered or vulnerable as assessed against International Union for the Conservation of Nature (IUCN) categories.

2. Results

2.1. Desktop Review

2.1.1. Broad Habitat Descriptions

Within YSTA, 17 different land-units have been recognised (Speck and Lazarides 1964), with considerable variation in habitat expected even within these divisions (Martin 1995). These land-units have been simplified by Martin (1995) into the following six general habitat types. Full descriptions of the vegetation and land systems of the YSTA can be found in Orr (1995) and Tunstall *et al* (1996).

Woodland Plains

Areas of *Eucalyptus* spp. and *Acacia* spp. dominated plains occur across the lowlands particularly in the south and central regions of the YSTA. Tropical woodlands dominated by *Eucalyptus* spp. grow on the foothills and plains in the northern part of the property, while the sand plain country south of the Robinson River, is generally dominated by *Acacia* spp., and is known as pindan country.

Riverine

Along the major and some minor watercourses, especially the Robinson, King, Stewart and Keighty rivers, a narrow band of riverine woodland occurs. This habitat is dominated by *Corymbia bella* occurring on raised sandy levee banks, with a dense grassy understory.

Littoral

Coastal environments, including mangroves, beaches, estuaries, mudflats, coastal thickets and islands.

Grasslands

Treeless plains dominated by grass to approximately one metre high and generally occurring near coastal situations, such as floodplains of the major rivers.

Rocky Hills

A number of variants of this habitat are present. The most common is a quartzite dominated series of hills and ranges, such as the Kimbolton Range and McLarty Range. Low, open woodland dominates the vegetation, with spinifex ground cover on the plateaux. This habitat type occurs across the northern and eastern sections of the property. In the west of the property, extensive granite boulder ranges are present, including outliers such as Boulder Hill, where large round granite boulders produce cave and crevice habitat. In the Secure Bay area, extensive black granite boulder outcrops and hillsides are present near the coast. The only vegetation on these hills are occasional shrubs and vine thickets.

Rainforest Pockets

Rainforest pockets, or vine thickets, are small in size, and are generally restricted to small gullies and gorges near the coast, where permanent freshwater is present. They are most

numerous around Cascade and Cone Bays in the west and Secure Bay in the north. These patches form a low closed canopy of various shrub and tree species.

2.1.2. Fauna

YSTA lies at the abutment of the North Kimberley, Central Kimberley and Dampierland bioregions and thus hosts a diversity of habitats with the potential to support a diverse fauna assemblage. However, surveys to date have been limited, primarily because of the remoteness of the site and limitations on vehicle access, and the vertebrate fauna at the site remains poorly documented. Two fauna studies have been undertaken at the site to date, by the Western Australian Museum (WAM 2001) and Dames and Moore (Martin 1995). The 1995 survey yielded a high proportion of newly recorded species: of the 60 amphibian, mammal and reptile species recorded during a five-day survey, 43% were new records, suggesting many more species remain to be discovered at the site.

The Western Australian Museum survey (WAM 2001) recorded 6 species of amphibians (bringing the total known from the site to 15), 25 species of reptiles (moving the total to 58 species), and 18 species of mammal (for a total of 26 species). Combined YSTA Fauna Species lists from WA records, 1995 survey, 2001 survey and this survey are provided in **Appendix F**. Birds were not a focus of the 2001 survey but 84 species were nonetheless recorded from the Kimbolton Homestead area of the site.

2.1.3. Flora

YSTA features high floral diversity (Barrett *et al* 2001). Approximately one third of floral species found in the Kimberley region are thought to be represented in YSTA (Barrett *et al* 2001). High floral diversity combined with relatively low weed abundance indicates high habitat value for fauna occupying YSTA, and high conservation values.

Previous vegetation surveys (Orr 1995; Barrett *et al* 2001) undertaken in YSTA have identified:

- At least two endemic flora species;
- approximately one third of all Kimberley floral species occur in YSTA; and
- a variety of vegetative communities.

Vegetative communities in YSTA that have been identified by previous surveys include:

- Rainforest: Dominant species include *Alstonia* spp., *Carallia brachiata* and *Timonius timon*.
- Vine thickets: Dominant species include *Adansonia gregorii*, *Bauhinia cunninghamii*, *Ficus opposita* and *Ampelocissus acetosa*.
- Woodlands: Dominant species include *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Callitris* spp. and *Santalum* spp.

- Blacksoil plains: Dominant species include *Sarga* spp., *Xerochloa* spp. and *Heteropogon* spp.
- Pindan lowlands: Dominant species include *Eucalyptus* spp. and *Corymbia* spp.

The most heavily represented plant families identified for the YSTA are the families Fabaceae, Poaceae, Cyperaceae, Myrtaceae, Mimosaceae and Euphorbiaceae (Barrett *et al* 2001). The vegetation communities occurring at different land-types at YSTA are summarised in *Yampi Sound Training Area Desktop Flora and Fauna Review* (SKM, 2008).

The YSTA features several regionally important flora species and at least two species that are currently considered to be endemic. *Corymbia* sp. nov. and *Solanum* sp. nov. (not fully described) were identified by Barrett *et al* (2001) as being endemic to YSTA. The 2001 vegetative survey also identified the western form of *Cycas furfuracea* as being present only within YSTA. *Callitris intratropica*, a regionally rare species, has been recorded within YSTA. *C. intratropica* has previously been described as being highly susceptible to fire and slow to recover. Therefore stands of this species found in YSTA that have so far avoided significant damage are thought to be regionally important (Start *et al* 2001).

2.1.3.1. Threats to Flora

Disturbance of vegetation in YSTA by fire, feral animals or competition by weeds are thought to be the most significant threats to flora in this region (Barrett *et al* 2001). Start *et al* (2001) suggested that rainforest communities present in YSTA are susceptible to fire and are probably more at risk from severe fire events than other vegetation communities. Disturbance of vegetation in YSTA by feral animals is relevant for all vegetation communities, as is competition for resources induced by the spread of weeds. Currently, weeds are not considered to pose a significant threat to the majority of vegetation in YSTA (Start *et al* 2001), though spread of weeds as a result of Defence activity at the site is a potential concern for the future.

2.1.3.2. Limitations of previous Fauna and Flora studies

Time and access restrictions (seasonal and otherwise) have limited the scope and thoroughness of previous specific vegetation surveys at YSTA. These limitations affect most field studies in the Top End, and certainly also affected the current study to some degree.

2.2. Field Fauna and Flora Survey Results

A list of vertebrate fauna species recorded during this survey is presented in **Appendix C** and **Appendix F**. The fauna survey identified a total of 191 native vertebrate species from the eight survey sites at YSTA (including 6 incidental records), incorporating:

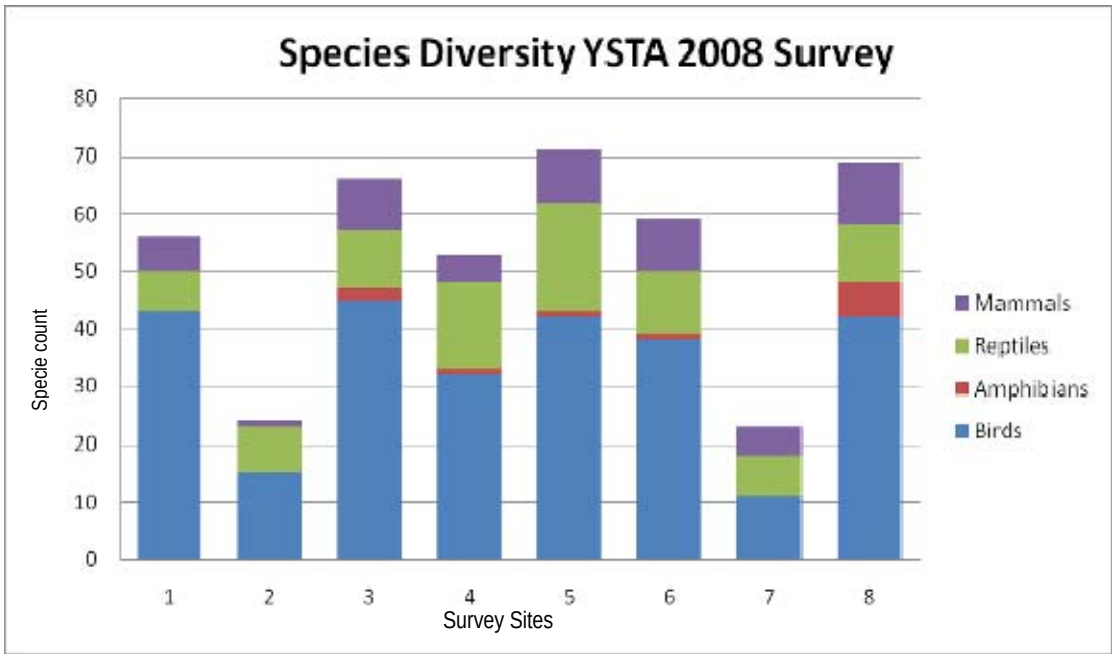
- 9 Amphibians;

- 49 Reptiles;
- 109 Birds; and
- 24 Mammals, including 6 bat species

An additional five introduced mammal species were also recorded, including cattle, donkey, horse, dingo and pig.

Appendix F presents the definitive species list for YSTA. This incorporates summarised data from previous surveys with new records from this survey, including total new species records for each fauna group.

Figure 4, below, presents the faunal diversity of birds, mammals, reptiles and amphibians at each site during the 2008 survey. Sites 3, 5 and 8 recorded the highest faunal diversity, with good representations of each faunal group, with the exception of amphibians. Sites 1, 4 and 6 recorded slightly lower faunal diversity in comparison, again with good representations of bird, mammal and reptile species. Sites 2 and 7 recorded the lowest faunal diversity, with notably lower bird species recorded than the other survey sites.



- **Figure 4 Faunal Species Diversity, YSTA 2008 Survey**

2.2.1.1. Amphibians

Nine native frog species were recorded during this survey. This included 2 species previously unrecorded from YSTA (Table 3). These were Stonemason Toadlet, *Uperoleia lithomoda* and Northern Spadefoot Toad, *Notaden melanoscaphus*, recorded from Sites 6 and 8 respectively. This brings the total number of amphibians recorded at YSTA to 18 species. All species recorded are commonly occurring within their distribution.

- **Table 3 New Amphibian Records for YSTA**

Scientific name	Common Name
Amphibians	
Notaden melanoscaphus	Northern Spadefoot Toad
Uperoleia lithomoda	Stonemason Toadlet
New Records 2008	**2**

Site 8 recorded the greatest diversity of amphibians, with a total of 6 species. A notably lower diversity occurred at the remaining sites (1 to 7); where between 0 and 2 species were recorded. Quadrats within Site 8 were closer to a permanent water source (all <300m) than other site locations, which may explain these results. The overall low diversity of amphibians may also be attributed, to some extent, to the timing of the survey, late dry season, when amphibian species are generally less active and suitable freshwater habitat is limited.

All species recorded are commonly occurring within their distribution.

2.2.1.2. Reptiles

Forty nine reptile species were recorded during the survey, including a range of skinks, dragons, blind snakes, monitors and geckos (**Appendix C**). This includes 12 confirmed new records for YSTA (Table 4). An additional 5 species could only be identified to genus level from visuals without capture, and these may represent additional new records for YSTA. A total of 86 reptile species have now been recorded at YSTA, representing a high diversity of reptiles.

- **Table 4 New Reptile Records for YSTA**

Scientific name	Common Name
Reptiles	
Antaresia childreni	Children's Python
Carlia gracilis	Slender Rainbow Skink
Carlia munda	Striped Rainbow Skink
Carlia sp.	Carlia skink
Cryptoblepharus sp.	-
Ctenotus essingtonii	Port Essington Ctenotus
Ctenotus spaldingi	Spalding's Ctenotus
Ctenotus sp.	-
Delma borea	Rusty-topped Delma
Diporiphora albilabris	White-lipped Two-line Dragon
Diporiphora pindan	-
Diporiphora sp.	-
Glaphyromorphus sp.	-
Lucasium stenodactylum	Crowned Gecko
Menetia greyii	Grey's Menetia
Oxyuranus scutellatus	Taipan

Scientific name	Common Name
Pseudechis weigeli	
Strophurus ciliaris	Spiny-tailed Gecko
Varanus storri	Storr's Monitor
New Records 2008	**15 (additional 5 unidentified)**

Sites 4 and 5 recorded the greatest diversity of reptiles, with 15 and 19 species respectively. 3 additional species were recorded incidentally with YSTA during this survey. These were the Frilled Lizard *Chlamydosaurus kingie,* Saltwater Crocodile (*Crocodylus porosus)* and the Freshwater Crocodile *(Crocodylus johnstoni).* Both the Freshwater and Saltwater Crocodile are protected under the EPBC Act 1999, and discussed further in Section 4.1. All other species recorded are commonly occurring within their distribution.

2.2.1.3. Birds

A total of 109 bird species were observed within the eight survey sites and from incidental observations across YSTA. The complete bird list from the site is provided in **Appendix C** including species diversity per site. Bird species richness was relatively consistent between Sites 1, 3, 4, 5, 6 and 8, the highest being 45 species recorded at Site 3. However, Sites 2 and 7 recorded a notably reduced bird diversity of 15 and 11 species respectively. Site 2 comprised relatively homogeneous habitat between each quadrat surveyed, and within the immediate surrounding environment, which may address the lower diversity of birds recorded. This is particularly evident in comparison to Sites 3, 5 and 8, which comprised variable habitat types and Ecotones (Transition zones) which favour higher faunal (and floral) diversity.

Some of the most common species observed were Rainbow lorikeet *Merops ornatus*, Red-winged Parrot *Aprosmictus erythropterus*, Rainbow Bee-eater, Red-backed Fairy wren *Malurus melanocephalus*, Banded Honeyeater *Certhionyx pectoralis*, Silver-crowned Friarbird *Philemon argenticeps*, White-bellied Cuckoo-shrike *Coracina papuensis*, and Rufous Whistler *Pachycephala rufiventris.*

32 new bird records were noted during the survey (Table 5), bringing the total number of species recorded from YSTA to 140. Four species recorded from this survey are considered to have conservation significance, including the Oriental Plover *Charadrius veredus* (recorded from Site 4), Rainbow Bee-eater *Merops ornatus* (recorded from Site 1 and Sites 4 to 7) and White-bellied sea eagle *Haliaeetus leucogaster* (recorded from Site 5). All of these species are listed as 'migratory' under the EPBC Act. Peregrine Falcon *Falco Peregrinus* (recorded from Site 1) is also State listed under the *Wildlife and Conservation Act, 1950*, as 'Other Protected Fauna'. The conservation status of these species is discussed further in Section 4.1.

- **Table 5 New Bird records for YSTA**

Scientific name	Common Name	Scientific name	Common Name
Birds			
Acrocephalus australis	Australian Reed-Warbler	*Lalage leucomela*	Varied Triller
Alcedo azurea	Azure Kingfisher	*Lichenostomus virescens*	Singing Honeyeater
Anas superciliosa	Pacific Black Duck	*Lonchura castaneothorax*	Chestnut-breasted Mannikin
Anthus novaeseelandiae	Australian Pipit	*Lophoictinia isura*	Square-tailed Kite
Ardeotis australis	Australian Bustard	*Malurus lamberti rogersi*	Variegated Fairy Wren
Aviceda subcristata	Pacific Baza	*Melanodryas cucullata*	Hooded Robin
Canopophila albogularis	Rufous-banded Honeyeater	*Myzomela obscura*	Dusky Honeyeater
Charadrius veredus	Oriental Plover	*Neochmia phaeton*	Crimson Finch
Chlamydera nuchalis	Great Bowerbird	*Ocyphaps lophotes*	Crested Pigeon
Colluricincla woodwardi	Sandstone Shrike-thrush	*Oriolus flavocinctus*	Yellow Oriole
Dendrocygna eytoni	Plumed Whistling-Duck	*Phalacrocorax melanoleucos*	Little Pied Cormorant
Eurostopodus argus	Spotted Nightjar	*Poephila acuticauda*	Long-tailed Finch
Falco hypoleucos	Grey Falcon	*Poephila personata*	Masked Finch
Falco Peregrinus	Peregrine Falcon	*Porzana tabuensis*	Spotless Crake
Haliaeetus leucogaster	White-bellied Sea-eagle	*Todiramphus pyrrhopygia*	Red-backed Kingfisher
Ixobrychus flavicollis	Black Bittern	*Turnix pyrrhothorax*	Red-chested Button Quail
Jabiru mycteria	Jabiru	*Turnix velox*	Little Button-quail
New Records 2008	**34**		

2.2.1.4. Mammals

Twenty four species of native mammals were recorded at YSTA during the survey (**Appendix C**). Mammal diversity ranged from 2 species recorded at Site 1, to 9 species recorded at Site 8. 7 new mammal records were gained from the survey, including Ningbing Antechinus *Pseudantechinus ningbing*, Northern Brush-tailed Phascogale *Phascogale pirata*, Antilopine Wallaroo *Macropus antilopinus*, and Northern Nailtail Wallaby *Onychogalea unguifera*, with an additional three bat species, discussed below and presented in Table 6.

A total of six bat species were recorded from Anabat vocalisation recordings. Three new bat records for YSTA included Yellow Sheath-tailed bat *Saccolaimus flaviventris*, Northern free-tailed bat *Chaerephon jobensis* and Northern bent-winged bat *Miniopterus schreibersii orianae*. An additional species was recorded, however its identification could not be confirmed due to the vocalisations being similar, and therefore not distinguished reliably. These were the calls of the either the hoary wattled bat *Chalinolobus nigrogriseus*, little broad-nosed bat *Scotorepens greyii* or northern broad-nosed bat *Scotorepens sanborni*.

- **Table 6 New Mammal Records for YSTA**

Scientific name	Common Name
Mammals	
Chaerephon jobensis	Northern free-tailed bat
Macropus antilopinus	Antilopine Wallaroo
Miniopterus schreibersii orianae	Northern bent-winged bat
Onychogalea unguifera	Northern Nailtail Wallaby
Phascogale pirata	Northern Brush-tailed Phascogale
Pseudantechinus ningbing	Ningbing Antechinus
Saccolaimus flaviventris	Yellow-bellied sheath-tailed bat
New Records 2008	**7**

The Pale Field Rat *Rattus tunneyi*, was the most commonly captured mammal, occurring at 6 of the 8 sites and in the greatest abundance at sites 3 to 8. Northern Quolls *Dasyurus hallucatus* were recorded at 6 sites, (sites 3 to 8). Common Rock Rats *Zyzomys argurus* were found at 4 out of the 8 sites, including Sites 4, 5, 7 and 8.

Less common mammals captured included Northern Brush-tailed Phascogale *Phascogale pirata* (captured at Sites 6 and 8), Golden Bandicoot *Isoodon auratus* (from Sites 6 and 7), Golden-backed Tree Rat *Mesembriomys macrurus* (from Sites 5 and 8), Sugarglider *Petaurus breviceps* (from Sites 7 and 8), Ningbing Antechinus *Pseudantechinus ningbing* (from Site 7), Little Red Flying-fox *Pteropus scapulatus* (from Site 1), Western Chestnut Mouse *Pseudomys nanus* (Site 5), and the identification of a Nabarlek *Petrogale concinna* from a scat collected from Site 3.

Four species recorded from this survey are considered to have conservation significance. These were the Northern Quoll *Dasyurus hallucatus*, Golden Bandicoot *Isoodon auratus auratus*, Golden-backed Tree-rat *Mesembriomys macrurus* and the Orange Leaf-nosed bat *Rhinonicteris aurantius*. The conservation status of these species is discussed further in Section 4.1.

2.2.1.5. Feral Animals

Sightings and/or evidence of introduced fauna species were recorded during the 2008 field survey including cattle (Sites 2 and near Site 8), horse (Sites 2 and 7), donkey (Site 8), and pig (Site 2). Generally, impacts from introduced fauna are considered low, particularly in areas with rocky, steep terrain and narrow gullies, as commonly occur within the north eastern areas of the Secure Bay Sector. Donkey numbers were considered to be low in the areas surveyed and although dung was noted at several sites, no evidence of recent impact was recorded. Impact from recent cattle grazing was also considered to be low and predominantly confined to the southern portion of YSTA.

YSTA caretaker (at the time of survey), Bert Goodchild, advised that he estimated that approximately 50 to 100 cattle were present in the southern portion of the property, from the Meda Station boundary to just north of Kimbolton. Although observations from flora and fauna survey sites recorded only minor impact, more significant impact was noted during opportunistic observations made in the vicinity of permanent wetlands and watercourses. Moderate grazing of riparian vegetation was noted along with pugging/poaching of soils and cattle dung at these areas which include the Robinson River east of Oobagooma ruins.

It is believed that the cattle extant in the southern part of the Training Area derive from Meda Station which adjoins the YSTA south western boundary (Goodchild, pers.comm.). Up until recent times, Meda Station has not depastured cattle in the northern portion of the station meaning there has been effectively an unstocked buffer zone between the two properties. Meda station is currently expanding its stock water regime into this area which will result in a greater likelihood of cattle putting pressure on the boundary fence. There are potentially more cattle in the Hawkstone Sector in the south east of the training which adjoins Napier Downs Station. This area was not surveyed and is not often traversed by caretaker staff.

Cattle, donkeys and other feral herbivores can impact on biodiversity in a number of ways including:

- selective grazing leading to changes in species composition, cover, density and structure of native vegetation (Fatchen & Lange 1979; Mitchell & Willcox, 1988);
- suppression of regeneration (Mitchell & Willcox, 1988);
- direct impact on soils – reduced litter cover and ground storey vegetation exposing soils to erosion;
- trampling and pugging of wetlands leading to compaction, destabilisation of stream banks (Kauffman *et al*, 2004);
- increased turbidity, nutrient and microbial loads in aquatic environments (Jensen & Robertson, 2001);
- decline in habitat quality leading to a decline in fauna species richness (James *et al*, 1999) and
- facilitate the spread of weed species through increased soil disturbance, depletion of ground storey vegetation and distribution of seeds in dung.

2.2.2. Fauna Survey Limitations

- The results of the fauna surveys are only a ‘snapshot’ in time, and cannot describe seasonal variation or migrations.
- Scats cannot always be correctly attributed to species, however where they can be confidently identified, they provide an accurate indication of the presence and habitat preferences of certain species (Telfer *et al* 2006).
- Detection of nocturnal species by spotlight potentially only detects about 25% of the animals present (e.g. Goldingay 2004), and is affected by environmental factors such as temperature and wind (Wayne *et al.* 2005).

- Read & Moseby (2001a) concluded that environmental factors affect the capture rates of small reptiles. Unfortunately, planning logistics for fauna surveys around specific environmental conditions is very difficult. Planning to survey in the early dry season allows the best chance of favourable environmental conditions.
- The trap types and trapping methodologies utilised in this study do not necessarily provide an unbiased or complete indication of species diversity within an area (Cunningham *et al.* 2005. Read & Moseby 2001b, Thompson *et al.* 2005).
- Although using the Anabat to record bat calls is a non-intrusive means of bat detection and identification, it can only record presence of some bat species. Furthermore, even expert users may identify only as few as 10% of call files to species level (Milne 2002).

2.2.3. Flora

Whilst standardised flora monitoring was not undertaken during this survey (as requested by Defence prior to this survey) a number of species were recorded as part of the habitat assessment at each quadrat. This included observations by field botanist Tim Willing, and the confirmation and identification of collected voucher specimens.

Appendix D presents Flora species records for each site location and fauna quadrat monitored.

No species of conservation significance were recorded during the survey. Species potentially occurring at YSTA listed within Western Australia as “declared rare” and “priority” flora are discussed in Section 3.2.

2.2.4. Habitat Types

All tabulated habitat data are available in **Appendix E**. Summary habitat information is presented below in Table 3. Site locations were chosen to reflect the varied habitats present at YSTA, which is reflected in the habitat observations. These include floodplains, undulating hillsides, rocky outcrops, varying soil types and geologies, together with a range of dominant vegetation types, such as open woodlands, tall closed forests and vine thickets.

Table 7 Habitat Summary for Survey Sites

Site	Site/Habitat Descriptions	Vegetation Summary	Soils and Rock Summary	Landform & soil drainage
1	Flat, tall open forest merging with open shrubland and closed grassland	Box woodland comprising *Eucalyptus tectifica, Terminalia platyphylla* and *Melaleuca nervosa*, with *Sesbania cannabina, Acacia holosericea* and *Chrysopogon pallidus* understorey.	Grey clay loam, silty loam,	Flat, poorly drained ox-bow lake formation
2	Flat sand plains and tall open forest mingled with open shrubland and grassland	Open *Eucalyptus miniata* (woollybutt) woodland, with *Corymbia greeniana*, and *Planchonia careya* and *Sorghum stipodeum* understory	Reddish Sands	Rapid/moderately well draining flat sandplains
3	Flat, lowlying site, with sandstone hills and basalt hills; Sections of rocky slopes with open woodland and dense grassy understory	Tall open forest dominated by *Corymbia dichromophloia* and *Eucalyptus tetrodonta* with *Themeda* and *Heteropogon* understorey.	Brown clay loam, sandstone.	Moderate to well drained soils, flat landscape.
4	Open low tree woodland abutting granite outcrop and cracking black clay gilgai plains; transition zone from granite knobs to Astrebla grassland	Spare shrubland to low open woodland, comprising *Bauhinia cunninghamii, Eucalyptus tectifica* with *Hakea arborescens, Astrebla pectinata* and *Heteropogon triticeus* understorey.	Medium heavy cracking clays varying from yellowish brown to black in colouration. Less than 2% cover of small stones	Very poor drainage, seasonal inundation expected most years within flat floodplain
5	Closed forrest/Vine thicket (Q1) within dry rocky creek; and open woodlands consisting hilltop flat site (Q2) with choc chip rock formations; and Gently sloping hillside site (Q3), below rock cliffs	*Bauhinia cunninghamii and Albizia lebbeck* dominated overstorey in vine thicket/creek bed, with *Pachygone ovate* and *Celtis australiensis* understorey. *Corymbia bella, Erythrophleum chlorostachys* and *Adansonia gregorii ove*rstory within hillside and hilltop quadrat, with *Corymbia setose, Dichanthium fecundum* and *Cochlospermum fraseri understorey.*	Reddish to orange clay sands, granite, choch-chip boulders with some quartz, and sandstones.	Varying drainage: Quadrats 1 and 3 with well draining/rapid draining soils; Quadrant 2 with poor drainage a seasonal inundation
6	Open woodland	Eucalyptus miniata woodland with *Acacia plectocarpa* and *Corymbia polycarpa* and an understorey dominated by *Verticordia cunninghamii, Grevillea agrifolia* and *Heteropogon contortus*	Loamy sand, varying from grey to reddish brown in colouration	Rapid draining flats and hillocks.
7	*E. miniata* woodland; Spinifex grassland and quartzite slope	*Eucalyptus miniata, Corymbia cadophora* with *Grevillea agrifolia* dominated open woodlands and tall open forests, with *Corymbia cadophora, Sarga stipoidea* and *Pandanus* spiralis understorey. Quadrats 3 and 4 dominated by sparse spinefex, *Triodia sp.*grasslands.	Sandstone, quartzite, Silcrete, with loamy sands, and clayey sands.	Variable drainage, poor to moderate within flat quadrats to rapid draining sections within sloping quadrats.
8	Tall open forrest and open woodlands with shrublands in Trent Valley	Eucalyptus miniata dominated woodlands, with *Corymbia dendromerinx* and *Adansonia gregorii.* Understorey with *Hibiscus superbus, Corymbia cadophora, Cycas furfuracea, Cymbopogon procerus*and *Eriachne ciliate*	Quartz sandstones, with sandy loams and loam soils.	Rapid draining sections within lower slopes of valley.

3. Species of Conservation Significance

The conservation significance of fauna, flora, and ecological communities recorded during the in-field survey and during desktop investigations from the project area and surrounds were assessed with reference to:

- Species listed as threatened nationally under the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999*
- Species listed as migratory under the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999*
- Species listed on the *Wildlife Conservation Act, 1950* (as amended) within Western Australia.
- Species listed on the International Union for Conservation of Nature (IUCN) Red List of Protected Species.
- Ecological communities listed under the *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999*, as *Vulnerable*, *Endangered*, and *Critically Endangered.*
- Ecological communities listed under the WA Department of Environment and Conservation's *Threatened Ecological Community* (TEC) Database.

Further information regarding the *EPBC Act*, IUCN red list and the *Wildlife Conservation Act* are discussed in Section 1.7.

3.1. Fauna with conservation status

No amphibian species of conservation status were found during this survey. However, reptile, bird and mammal which hold conservation status were recorded at the site during this survey.

Table 8, below, presents fauna species recorded from the 2008 YSTA survey which have conservation status. This table also includes potentially occurring species based on known distributions and habitat preference, identified from a desktop study, and those previously recorded from investigations at YSTA. **Appendix F** presents the definitive species records for YSTA, including potentially occurring species identified from a desktop study. Conservation status for each species is also presented in **Appendix F**.

Table 8 Listed species found or likely to occur at YSTA.

Scientific Name	Common Name	Recorded during 2008 survey	Previously Recorded	Potentially occurring	Conservation Status
Reptiles					
Crocodylus porosus	Saltwater Crocodile	✓	✓		Migratory (EPBC), Schedule 4 (WA)
Crocodylus johnstoni	Freshwater Crocodile	✓	✓		Listed (EPBC), Schedule 4 (WA)
Birds					
Ardea alba	Great Egret, White Egret		✓		Migratory (EPBC)
Burhinus grallarius	Bush Stone-curlew	✓	✓		Near Threatened (IUCN)
Ephippiorhynchus asiaticus	Black-necked Stork		✓		Near Threatened (IUCN)
Geophaps smithii smithii	Partridge Pigeon (Eastern)		✓		Vulnerable (EPBC)
Merops ornatus	Rainbow Bee-eater	✓	✓		Migratory (EPBC)
Haliaeetus leucogaster	White-bellied Sea-Eagle	✓			Migratory (EPBC)
Charadrius veredus	Oriental Plover, Oriental Dotterel	✓			Migratory (EPBC)
Apus pacificus	Fork-tailed Swift			✓	Migratory (EPBC)
Ardea ibis	Cattle Egret			✓	Migratory (EPBC)
Erythrotriorchis radiatus	Red Goshawk			✓	Vulnerable (EPBC)
Erythrura gouldiae	Gouldian Finch			✓	Endangered (EPBC) / Rare (WA)
Falcunculus frontatus whitei	Crested Shrike-tit			✓	Vulnerable (EPBC) / Rare (WA)
Fallcunculus frontatus whitei	Crested Shrike-tit (northern)			✓	Migratory (EPBC)
Glareola maldivarum	Oriental Pratincole			✓	Migratory (EPBC)
Hirundo rustica	Barn Swallow			✓	Migratory (EPBC)
Petrophassa smithii blaauwi	Western Partridge Pigeon			✓	Migratory (EPBC)
Poecilodryas superciliosa	Derby White-browed Robin			✓	Migratory (EPBC)
Rostratula benghalensis s. lat.	Painted Snipe			✓	Migratory (EPBC)
Rostratula benghalensis s. lat.	Australian Painted Snipe			✓	Vulnerable (EPBC) / Rare (WA)

Scientific Name	Common Name	Recorded during 2008	Previously Recorded	Potentially occurring	Conservation Status
Sterna albifrons	Little Tern			✓	Migratory (EPBC)
Numenius minutes	Little Curlew, Little Whimbrel			✓	Migratory (EPBC)
Falco hypoleucos	Grey Falcon	✓			Near Threatened (IUCN)
Falco Peregrinus	Peregrine Falcon	✓			Schedule 4 (WA)
Mammals					
Dasyurus hallucatus	Northern Quoll	✓	✓		Endangered (EPBC) / Endangered (IUCN)
Isoodon auratus auratus	Golden Bandicoot	✓	✓		Vulnerable (EPBC) (IUCN) / Rare (WA)
Mesembriomys macrurus	Golden-backed Tree-rat	✓	✓		Vulnerable (EPBC)
Rhinonicteris aurantia	Orange Leaf-nosed Bat		✓		Rare (WA)
Phascogale pirata	Northern Brushtailed Phascogale	✓			Vulnerable (IUCN)

Conservation Status Key: IUCN = International, EPBC = Commonwealth legislation),WA=State (Species listed on the Wildlife Conservation Act, 1950)

The in-field survey conducted here recorded 10 species with conservation status. This included the following three mammals:

- Golden Bandicoot *Isoodon auratus auratus*, recorded at Sites 6 and 7, which is listed as *Vulnerable* under the commonwealth legislation (*EPBC Act*) and *Rare* under the *Wildlife Conservation Act (1950)*.
- Golden backed Tree rat *Mesembriomys macrurus*, recorded from sites 5 and 8, which is listed as *Vulnerable* under the commonwealth legislation (*EPBC Act*) and *Vulnerable* under the *Wildlife Conservation Act (1950)*.
- Northern Quoll *Dasyurus hallucatus*, recorded from Sites 3 to 8, with good capture rates (up to 7 individuals in a single night at some sites) which is an endangered species under the *EPBC Act* and IUCN Red List.

Three migratory bird species were also recorded, which fall under the *EPBC Act* as Migratory. These were Oriental Plover *Charadrius veredus* recorded from Site 4; Rainbow Bee-eater *Merops ornatus* recorded at site 1 and sites 4 to7; and White bellied Sea Eagle *Haliaeetus leucogaster*, recorded from Site 5.

Two reptile species with conservation status were recorded from incidental observations. These are the Saltwater Crocodile (*Crocodylus porosus)* listed as migratory species, and the

Freshwater Crocodile *(Crocodylus johnstoni),* which are both protected under the *EPBC Act* (1999) and also under Schedule 4 of the *Wildlife Conservation Act* (1950) of Western Australia.

Two species also hold conservation significance at State or International level. These were Brushtailed Phascogale *Phascogale tapoatafa*, listed as *Vulnerable* under the IUCN Red List and Schedule 1 of the *Wildlife Conservation Act, 1950*; and Peregrine Falcon *Falco Peregrinus* which is listed on Schedule 4 of the *Wildlife Conservation Act, 1950.*

Previously records at YSTA also identified an additional two EPBC Migratory species. These were Great Egret *Ardea Alba* which is a migratory bird, recorded during the 2001 YSTA survey; and Partridge Pigeon, recorded during the 1995 and 2001 surveys, which is listed as *Vulnerable* under the *EPBC Act* and *Rare* under the State legislation (*Wildlife Conservation Act, 1950*).

3.2. Threatened Flora

No nationally listed flora species were found to occur on YSTA, through an EPBC search and from field surveys. State 'declared rare' species for YSTA is limited to *Eucalyptus mooreana* (Schedule 1 of theWildlife Conservation Act, 1950), which was not recorded during the flora monitoring, nor were any other plant species of conservation significance.

4. Conclusion & Recommendations

A diverse range of representative habitats across YSTA were surveyed during this study. Resulting data revealed a high diversity of bird, reptile, and mammal fauna, although relatively low observations for amphibians. The survey revealed 61 species not recorded within the YSTA area during the previous two surveys, including 33 birds, 19 reptiles, 2 amphibians and 7 mammals. The high number of new records for the site indicates that further survey effort may continue to yield additional species records for the site.

A number of species with conservation significance were identified during the field survey. Of particular importance are the EPBC threatened Northern Quoll, Golden-backed Tree-rat, Golden Bandicoot, and the EPBC listed *Migratory* species: Saltwater Crocodile; Oriental Plover; White-bellied Sea Eagle; and Rainbow Bee-eater. Freshwater Crocodiles are also protected under the EPBC Act. A further 5 species are listed under Western Australian State legislation (*Wildlife Conservation Act, 1950*), and the IUCN Red List. These were Orange Leaf-nosed Bat, Northern Brush-tailed Phascogale, Grey Falcon, Peregrine Falcon and Bush Stone-curlew.

The findings of this survey combined with results from two previous studies at YSTA present a solid baseline fauna dataset for the site. The methodology adopted within this survey is recommended to be adopted for future surveys, to allow direct comparison with existing data, particularly if future monitoring aims to measure environmental impacts at the site and potentially detect change over time. However, should standardised methodologies change be altered over time, this should be taken into consideration for any proposed future monitoring programs.

As well as providing useful baseline data, the information presented here provides a valuable input into government fauna databases. For example, this information is expected to be particularly useful to evaluate the impacts of cane toads, should they extend their distribution into Western Australia and YSTA. A number of species, such as the Northern Quoll, are thought to have been significantly impacted by cane toads in the Northern Territory (Oakwood, 2004), yet they remain present in good numbers within YSTA. A decline in their numbers within YSTA following the introduction of cane toads would lend further weight to the argument that they are directly responsible for declining numbers of native fauna.

In general, little or no evidence of military-based disturbance, or disturbance from introduced species was noted at the survey sites assessed (though a number of introduced species were recorded). Continued monitoring of YSTA will help to ensure the protection of the diversity of native fauna species residing in the Defence training area, including those of conservation significance.

4.1. Recommendations

Recommendations for ongoing protection of the significant biodiversity values present within YSTA would include:

- Further investment into collection of baseline fauna data for the site to continue to build upon the knowledge base for the site. Given the vast size of YSTA, it is highly unlikely

that a good understanding of the ecological diversity currently exists for the site, a fact which was highlighted by the high number of new species records collected during this survey. Further survey effort is likely to continue to build on the current understanding of the site's biological values and may potentially uncover further nationally listed protected species. Whilst future surveys undertaken at existing sites of high habitat value are likely to identify additional species records, consideration of sites with low habitat value and lower species diversity should be incorporated into monitoring events for representative purposes and to allow monitoring of potential weed outbreaks across the site.

- Regular surveillance to monitor populations of introduced fauna, particularly cattle and pigs. Mustering and/or shooting programs to continue to maintain a high level of control. In addition, regular inspection and maintenance of the southern boundary fence is essential. An assessment of cattle numbers in the Hawkstone Sector is also recommended.
- Investment into documenting the flora values of the site. The current survey scope was altered to remove detailed vegetation survey, however, numerous threatened flora species are likely to be present across the site, and documented information regarding locations of these species will be critical should high impact training activities be proposed for the site in future. In addition, although weed species are not currently considered a significant threat at the site, a good understanding of the location and extent of any weed outbreaks will assist in informing adaptive management of potentially threatening processes at the site.
- Preparing an ecological burning plan for YSTA, based on research into sustainable burning regimes for the diversity of ecosystems across the site. Burning regimes should aim to produce a mosaic of burnt and unburnt areas, rather than large-scale, high intensity burns to reduce impacts from wildfires, particularly within sensitive habitats, such as rainforrests. Mosaic burns will result in habitats regenerating at different rates providing a variety of transitional habitat types and conditions, as opposed to large scale burns which leave large areas with little or no viable habitat, and a largely homogeneous landscape during regeneation.
- Consideration of threatened species habitats in the event that high impact training activities are proposed for the site in future. Defence are required under the EPBC Act to avoid impacts upon Protected Matters. Therefore known EPBC listed species habitats should be avoided where practicable, for example rocky outcroppings where Northern Quolls are known to den, and closed forest and vine thicket areas (e.g. site 5) which support Golden-backed Tree-rats and Golden Bandicoots.

5. References

ANHSIR, 2004. Botanical Districs of Australia. Available online from: http://www.anbg.gov.au/cpbr/anhsir/anhsir-manual/botanical-districts.html

Barrett, R.L., Barrett, M.D., Start, A.N. and Dixon, K.W. (2001). *Flora of the Yampi Sound Defence Training Area (YSTA), Derby, Western Australia*. Australian Heritage Commission. Botanic Gardens and Parks Authority.

Barrett G, Silcocks A, Barry S, Cunningham R, Poulter R (2003). *The New Atlas of Australian Birds*. Australasian Ornithologists Union, Victoria, Australia.

Beard, J.S. (1980) A new phytogeographic map of Western Australia. *Western Australian Herbarium Research Notes* 3: 45.)

Churchill S (1998). *Australian Bats*. Reed, NSW.

Cogger H (2000). *Reptiles & Amphibians of Australia*. Reed, NSW.

Cole J & Woinarski J (2002). *Field Guide to the Rodents and Dasyurids of the Northern Territory*. Surrey Beatty & Sons, NSW.

Department of the Environment, Water, Heritage and the Arts (2004). Australian Heritage Database. Available online from: http://www.environment.gov.au/cgi-bin /ahdb /search.pl?mode=place_detail;search=state%3DWA%3Blist_code%3DCHL%3Blegal_status%3D35%3Bkeyword_PD%3D0%3Bkeyword_SS%3D0%3Bkeyword_PH%3D0;place_id=105418

Department of the Environment, Water, Heritage and the Arts (2004). Australian National Herbarium Specimen Information Register (ANHSIR). Available online from: http://www.anbg.gov.au/cpbr/anhsir/anhsir-manual/botanical-districts.html#wa

ENSR Australia (2008). *Environmental Monitoring Manual NT/K Region – Final.* Prepared by ENSR Australia (HLA ENSR). Report for Spotless P&F on behalf of Department of Defence.

Fatchen, T.J. & Lange, R.T. (1979). *Piosphere pattern and dynamics in a chenopod shrubland grazed by cattle. In Studies of the Australian Arid Zone. IV. Chenopod Shrublands.* (Eds. R.D. Graetz and K.M.W. Howes) pp. 160-69. CSIRO: Melbourne.

Goldingay R L & Sharpe D J (2004). *How effective is spotlighting for detecting the squirrel glider*. Wildlife Research 31(4): 443-449.

HLA (2007). *EPBC listed Threatened Species & Ecological Communities Database 2007-08.*

Horner P (1991). *Skinks of the Northern Territory*. Northern Territory Government Printing Office, Darwin.

James, C.D., Landsberg, J., Morton, S.R., (1999*). Provision of watering points in the Australian arid zone: a review of effects on biota.* Journal of Arid Environments. 41: p 87-121.

Jansen, A & Robertson, A.I., (2001). *Relationship between livestock management and the ecological condition of riparian habitats along an Australian floodplain river*. Journal of Applied Ecology, 38, p 63-75

Kauffman, J. Boone, Thorpe, A.S. & Brookshire, E.N.J. (2004) *Livestock exclusion and belowground ecosystem responses in riparian meadows of Eastern Oregon.* Ecological Applications, Ecological Society of America. 14(6) pp 1671-1679.

Martin, K. (1995). *Terrestrial Vertebrate Fauna of the Yampi Sound training Area, Western Australia.* Dames and Moore, 1995.

Menkhorst P and Knight F (2001). *A Field Guide to the Mammals of Australia*. Oxford University Press, Melbourne.

Milne D J (2002). *Key to the bat calls of the Top End of the Northern Territory*. Parks and Wildlife Commission of the Northern Territory, Technical Report No. 71.

Mitchell, A.A. & Wilcox, D.G. (1988). Arid Shrubland Plants of Western Australia. University of Western Australia Press, Nedlands.

NRETA (2008). *Survey methods used for fauna and flora on standard Biodiversity Unit survey sites.* Biodiversity Unit of the Dept of Natural Resources, Environment and the Arts. Most recent version: April 2008.

Oakwood, M (2004). *The Effect of Cane Toads on a Marsupial Carnivore, the Northern Quoll, Dasyurus hallucatus.* Report to Parks Australia North.

Orr, T.M. (1995). *Vegetation survey of the Yampi Sound Training Area, Notes to accompany map "Vegetation of Yampi Sound Training Area: scale 1:100,000.*

Pizzey G & Knight F (2006). *The Field Guide to the Birds of Australia (Seventh Edition)*. Published by Angus and Robertson.

Read J L & Moseby KE (2001a). *Factors affecting pitfall capture rates of small ground vertebrates in arid South Australia. I. The influence of weather and moon phase on capture rates of reptiles*. Wildlife Research 28 (1): 53-60.

Read J L & Moseby KE (2001b). *Factors affecting pitfall capture rates of small ground vertebrates in arid South Australia. II. Optimum pitfall trapping effort.* Wildlife Research 28(1): 61-71.

Simpson K., & Day N. (2004). *Field guide to the birds of Australia*. 7th Edition. Published by Penguin Group

Sinclair Knight Merz (2008). *Yampi Sound Training Area Desktop Flora and Fauna Review*. Unpublished report prepared by SKM and Ecoz Environmental to Defence.

Start, A. N., Handasyde, T. and Barrett, R.L. (2001). *Environmental management issues on the Yampi Sound Defence Training Area (YSTA), Derby, Western Australia.* Prepared for the Australian Heritage Commission.

Speck, N. H. & Lazarides, M. (1964). *Vegetation and pasture of the West Kimberley area*. Land Research Series 9:140-174.

Strahan R (1995). *The Mammals of Australia.* Reed Books, NSW.

Telfer W R, Griffiths A D & Bowman D M J S (2006). *Scats can reveal the presence and habitat use of cryptic rock-dwelling macropods.* Australian Journal of Zoology 54: 325-334.

Thompson S A, Thompson G G & Withers P C (2005). *Influence of pit-trap type on the interpretation of fauna diversity.* Wildlife Research 32(2): 131-137.

Triggs B (1996). *Tracks, Scats and Other Traces: A Field Guide to Australian Mammals*. Oxford University Press.

Tunstall, B., Marks, A., and Powell, N. (1996). *Soil survey of the Yampi Sound Training Area*.Technical Memorandum. Division of Water Resources. CSIRO Australia

WAM (2001). *Assessment of vertebrate fauna of the Yampi Sound Defence Training Area (YSTA), Derby, WA.* Report prepared for the Australian Heritage Commission, Canberra, by the Western Australian Museum.

Wayne A F, Cowling A, Rooney J F, Ward C G, Wheeler I B, Lindenmayer D B & Donelly C F (2005). *Factors affecting the detection of possums by spotlighting in Western Australia.* Wildlife Research 32(8): 689-700.

Wildlife Conservation Act 1950, Schedule 1

Wilson S & Swan G (2003). *A Complete Guide to Reptiles of Australia*. Reed New Holland, Sydney.

Wyrwoll, K.H. (2001) *Report to the Australian Heritage commission Assessment of Geomorphological values, Yampi Sound Training Area.* Department of Geography, University of Western Australia.

Appendix A Photopoint Images

Appendix B Fauna Monitoring Quadrat Coordinates

Site	Quadrat	Easting	Northing	WGS84_X	WGS84_Y
1	1	603634	8144687	123° 58' 20.76" E	16° 46' 42.84" S
	2	603658	8144821	123° 58' 21.55" E	16° 46' 38.47" S
	3	604040	8145262	123° 58' 34.38" E	16° 46' 24.06" S
	4	604177	8145413	123° 58' 38.98" E	16° 46' 19.13" S
	5	604388	8145740	123° 58' 46.06" E	16° 46' 8.45" S
	6	604298	8145792	123° 58' 43.01" E	16° 46' 6.77" S
2	1	612840	8145009	124° 3' 31.65" E	16° 46' 30.83" S
	2	613116	8145009	124° 3' 40.97" E	16° 46' 30.78" S
	3	613774	8144188	124° 4' 3.34" E	16° 46' 57.38" S
	4	613998	8144125	124° 4' 10.92" E	16° 46' 59.39" S
	5	614683	8143364	124° 4' 34.20" E	16° 47' 24.03" S
	6	614949	8143287	124° 4' 43.19" E	16° 47' 26.49" S
3	1	640999	8174910	124° 19' 16.00" E	16° 30' 12.51" S
	2	641043	8174372	124° 19' 17.61" E	16° 30' 30.00" S
	3	640889	8174635	124° 19' 12.35" E	16° 30' 21.48" S
4	1	610853	8158932	124° 2' 22.08" E	16° 38' 58.14" S
	2	610773	8158932	124° 2' 19.38" E	16° 38' 58.16" S
	3	610475	8158944	124° 2' 9.32" E	16° 38' 57.82" S
	4	610432	8158961	124° 2' 7.87" E	16° 38' 57.27" S
	5	610303	8158290	124° 2' 3.63" E	16° 39' 19.12" S
	6	610268	8158199	124° 2' 2.46" E	16° 39' 22.09" S
5	1	629324	8180664	124° 12' 41.10" E	16° 27' 7.68" S
	2	629372	8180828	124° 12' 42.68" E	16° 27' 2.33" S
	3	629455	8181116	124° 12' 45.42" E	16° 26' 52.94" S
6	1	592346	8149885	123° 51' 58.72" E	16° 43' 55.40" S
	2	592224	8149896	123° 51' 54.60" E	16° 43' 55.06" S
	3	592242	8150309	123° 51' 55.15" E	16° 43' 41.62" S
	4	592158	8150449	123° 51' 52.29" E	16° 43' 37.07" S
	5	592637	8149805	123° 52' 8.56" E	16° 43' 57.96" S
	6	592652	8149819	123° 52' 9.07" E	16° 43' 57.50" S
7	1	592010	8165387	123° 51' 45.12" E	16° 35' 31.01" S
	2	592125	8165366	123° 51' 49.00" E	16° 35' 31.68" S
	3	592276	8164884	123° 51' 54.16" E	16° 35' 47.34" S
	4	592401	8164831	123° 51' 58.39" E	16° 35' 49.05" S
	5	592086	8165908	123° 51' 47.60" E	16° 35' 14.05" S
	6	592209	8165984	123° 51' 51.74" E	16° 35' 11.56" S
8	1	581978	8157543	123° 46' 7.60" E	16° 39' 47.59" S
	2	581937	8157460	123° 46' 6.23" E	16° 39' 50.30" S
	3	581853	8157984	123° 46' 3.32" E	16° 39' 33.25" S
	4	581881	8157956	123° 46' 4.27" E	16° 39' 34.16" S
	5	581991	8158209	123° 46' 7.95" E	16° 39' 25.92" S
	6	581937	8158275	123° 46' 6.12" E	16° 39' 23.78" S

Appendix C Fauna species recorded at YSTA 2008 Survey

Key: * Species identified from scat or tracks

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
FROGS											
Hylidae	Copland's Rock Frog	*Litoria coplandi*			x						
Hylidae	Peters' Frog	*Litoria inermis*					x			x	
Hylidae	Pale Frog	*Litoria pallida*								x	
Hylidae	Roth's Tree-frog	*Litoria rothii*								x	
Hylidae	Red Tree-frog	*Litoria rubella*				x					
Hylidae	Wotjulum Frog	*Litoria wotjulumensis*			x					x	
Limnodynastidae	Northern Spadefoot Toad	*Notaden melanoscaphus*								x	
Myobatrachidae	Bilingual Froglet	*Crinia bilingua*								x	
Myobatrachidae	Stonemason Toadlet	*Uperoleia lithomoda*						x			
Frog Totals			0	0	2	1	1	1	0	6	0
REPTILES											
Agamidae	White-lipped Two-line Dragon	*Diporiphora albilabris*					x				
Agamidae	Robust Dragon	*Diporiphora bennettii*			x		x	x		x	
Antaresia	Children's Python	*Antaresia childreni*									x
Agamidae		*Diporiphora magna*						x			
Agamidae		*Diporiphora pindan*		x		x			x		
Agamidae		*Diporiphora spp.*				x					
Chlamydosaurus	Frilled Lizard	*Chlamydosaurus kingii*									x
Crocodylus	Freshwater Crocodile	*Crocodylus johnstoni*									x
Crocodylus	Saltwater Crocodile	*Crocodylus porosus*									x
Cheluidae	Northern Long-necked Turtle	*Chelodina rugosa*						x			
Gekkonidae	Northern Dtella	*Gehyra australis*	x	x			x				
Elapidae	Orange-naped Snake	*Furina ornata*						x			
Elapidae	Taipan	*Oxyuranus scutellatus*			x						
Elapidae	*King Brown Snake*	*Pseudechis australis*					x				
Elapidae		*Pseudechis weigeli*									x
Gekkonidae	Northern Spotted Rock Dtella	*Gehyra nana*				x	x				
Gekkonidae		*Gehyra occidentalis*				x			x		
Gekkonidae	Bynoe's gecko	*Heteronotia binoei*	x			x	x				
Gekkonidae	Crowned Gecko	*Lucasium stenodactylum*	x	x						x	x
Gekkonidae	Spiny-tailed Gecko	*Strophurus ciliaris*		x							
Pygopodidae	Rusty-topped Delma	*Delma borea*			x		x				
Pygopodidae	Burton's Legless Lizard	*Lialis burtonis*					x				

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
Scincidae	Two-spined Rainbow Skink	*Carlia amax*							x		
Scincidae	Slender Rainbow Skink	*Carlia gracilis*				x	x				
Scincidae		*Carlia johnstonei*			x						
Scincidae	Striped Rainbow Skink	*Carlia munda*	x		x				x		
Scincidae	Three-keeled Rainbow Skink	*Carlia triacantha*					x		x	x	
Scincidae	Carlia skink	*Carlia sp.*			x	x	x			x	
Scincidae	Aboreal Snake-eyed Skink	*Cryptoblepharus plagiocephalus*	x		x			x			
Scincidae		*Cryptoblepharus sp.*			x	x	x				
Scincidae	Port Essington Ctenotus	*Ctenotus essingtonii*				x	x				
Scincidae	Plain Ctenotus	*Ctenotus inornatus*	x			x	x		x		
Scincidae	Robust Ctenotus	*Ctenotus robustus*				x		x			
Scincidae	Spalding's Ctenotus	*Ctenotus spaldingi*					x				
Scincidae		*Ctenotus sp.*				x					
Scincidae	Smooth-Tailed Skink	*Glaphyromorphus isolepis*					x	x		x	x
Scincidae		*Glaphyromorphus sp.*					x				
Scincidae	Two-Toed Lerista	*Lerista bipes*		x				x		x	
Scincidae	Grey's Menetia	*Menetia greyii*	x			x		x			x
Scincidae	Main's Skink	*Menetia maini*			x					x	
Scincidae	Ornate Snake-Eyed Skink	*Notoscincus ornatus*						x	x	x	
Scincidae	Red-tailed Snake-Eyed Skink	*Morethia ruficauda*		x			x	x		x	
Scincidae	Storr's Snake-eyed Skink	*Morethia storri*			x						
Scincidae	Common Blue-Tongued Lizard	*Tiliqua scincoides*					x				
Varanidae	Ridge-tailed Monitor	*Varanus acanthurus*				x					
Varanidae	Long-Tailed Rock Monitor	*Varanus glebopalma*								x	
Varanidae	Spotted Tree Monitor	*Varanus scalaris*		x							
Varanidae	Storr's Monitor	*Varanus storri*		x							
Varanidae		*Varanus sp.*				x					
Reptile Totals			7	8	10	15	19	11	7	10	7
BIRDS											
Acanthizidae	Weebill	*Smicrornis brevirostris*		x	x	x	x	x			
Acanthizidae	White-throated Gerygone	*Gerygone olivacea*			x			x		x	
Accipiitridae	Square-tailed Kite	*Lophoictinia isura*	x								
Accipitidae	Black Kite	*Milvus migrans*	x			x					
Accipitridae	White-bellied Sea-eagle	*Haliaeetus leucogaster*					x				
Accipitridae	Black-breasted Buzzard	*Hamirostra melanosternon*	x			x					
Accipitridae	Whistling Kite	*Haliastur sphenurus*	x					x			

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
Accipitridae	Pacific Baza	*Aviceda subcristata*								x	
Accipitridae	Brown Goshawk	*Accipiter fasciatus*					x		x		
Acrocephalidae	Australian Reed-Warbler	*Acrocephalus australis*			x						
Alcedinidae	Azure Kingfisher	*Ceyx azureus*									x
Anatidae	Pacific Black Duck	*Anas superciliosa*									x
Anatidae	Wandering Whistling-Duck	*Dendrocygna arcuata*									x
Anatidae	Plumed Whistling-Duck	*Dendrocygna eytoni*									x
Ardeidae	Black Bittern	*Ixobrychus flavicollis*			x						
Ardeidae	Nankeen Night Heron	*Nycticorax caledonicus*									x
Artamidae	Black-faced Woodswallow	*Artamus cinereus*	x				x				
Artamidae	Little Woodswallow	*Artamus minor*		x		x					
Artamidae	Pied Butcherbird	*Cracticus nigrogularis*	x	x	x	x	x	x		x	
Burhinidae	Bush Stone-curlew	*Burhinus grallarius*						x		x	x
Cacatuidae	Red-tailed Black-cockatoo	*Calyptorhynchus banksii*				x		x			
Cacatuidae	Sulphur-crested Cockatoo	*Cacatua galerita*			x		x			x	
Cacatuidae	Little Corella	*Cacatua sanguinea*					x	x			
Cacatuidae	Cockatiel	*Nymphicus hollandicus*	x								
Campephagidae	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	x		x	x					
Campephagidae	White-bellied Cuckoo-shrike	*Coracina papuensis*		x	x	x	x	x	x	x	
Campephagidae	White-winged Triller	*Lalage tricolour*	x				x				
Campephagidae	Varied Triller	*Lalage leucomela*	x								
Charadriidae	Oriental Plover	*Charadrius veredus*				x					
Ciconiidae	Jabiru	*Jabiru mycteria*									x
Cisticolidae	Golden-headed Cisticola	*Cisticola exilis*			x		x		x		
Climacteridae	Black-tailed Treecreeper	*Climacteris melanurus*				x	x	x		x	
Columbidae	Common Bronzewing	*Phaps chalcoptera*					x	x			
Columbidae	Diamond Dove	*Geopelia cuneata*	x		x						
Columbidae	Peaceful Dove	*Geopelia placida*	x		x	x		x	x	x	
Columbidae	Bar-shouldered Dove	*Geopelia humeralis*	x		x		x	x		x	
Columbidae	Crested Pigeon	*Ocyphaps lophotes*	x								
Columbidae	White-quilled Rock-Pigeon	*Petrophassa albipennis*			x					x	
Corvidae	Torresian Crow	*Corvus orru*	x			x				x	
Cuculidae	Pheasant Coucal	*Centropus phasianinus*			x		x	x			
Dicaeidae	Mistletoebird	*Dicaeum hirundinaceum*			x		x			x	

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
Dicruridae	Spangled Drongo	*Dicrurus bracteatus*					x				
Estrildidae	Double-barred Finch	*Taeniopygia bichenovii*	x				x			x	x
Estrildidae	Long-tailed Finch	*Poephila acuticauda*				x					
Estrildidae	Masked Finch	*Poephila personata*									x
Estrildidae	Crimson Finch	*Neochmia phaeton*			x					x	x
Estrildidae	Chestnut-breasted Mannikin	*Lonchura castaneothorax*									x
Eurostopdidae	Spotted Nightjar	*Eurostopodus mysticalis*					x				
Falconidae	Nankeen Kestral	*Falco cenchroides*	x								
Falconidae	Brown Falcon	*Falco berigora*	x	x		x					
Falconidae	Grey Falcon	*Falco hypoleucos*			x						
Falconidae	Australian Hobby	*Falco longipennis*		x	x						
Falconidae	Peregrine Falcon	*Falco Peregrinus*	x								
Gruidae	Brolga	*Grus rubicunda*									x
Halcyonidae	Blue-winged Kookaburra	*Dacelo leachii*	x		x		x	x		x	
Halcyonidae	Red-backed Kingfisher	*Todiramphus pyrrhopygia*	x			x		x		x	
Halcyonidae	Sacred Kingfisher	*Todiramphus sanctus*		x			x				
Hirundinidae	Petrochelidon nigricans	*Tree Martin*									x
Maluridae	Red-backed Fairy Wren	*Malurus melanocephalus*	x	x	x	x	x	x		x	
Maluridae	Variegated Fairy Wren	*Malurus lamberti*			x					x	
Maluridae	Variegated Fairy Wren	*Malurus lamberti rogersi*			x				x		
Megaluridae	Rufous Songlark	*Cincloramphus mathewsi*				x					
Megaluridae	Tawny Grassbird	*Megalurus timoriensis*			x						
Meliphagidae	Singing Honeyeater	*Lichenostomus virescens*	x		x						
Meliphagidae	Yellow-tinted Honeyeater	*Lichenostomus flavescens*	x	x				x	x	x	
Meliphagidae	White-gaped Honeyeater	*Lichenostomus unicolor*	x		x		x			x	x
Meliphagidae	Bar-breasted Honeyeater	*Ramsayornis fasciatus*								x	
Meliphagidae	Rufous-banded Honeyeater	*Canopophila albogularis*								x	
Meliphagidae	Rufous-throated Honeyeater	*Conopophila rufogularis*					x	x			
Meliphagidae	Dusky Honeyeater	*Myzomela obscura*					x				
Meliphagidae	Banded Honeyeater	*Certhionyx pectoralis*	x		x	x	x	x		x	
Meliphagidae	Brown Honeyeater	*Lichmera indistincta*	x		x		x				
Meliphagidae	White-throated Honeyeater	*Melithreptus albogularis*			x		x	x			
Meliphagidae	Silver-crowned Friarbird	*Philemon argenticeps*	x		x	x	x	x		x	
Meliphagidae	Little Friarbird	*Philemon citreogularis*	x		x	x	x			x	

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
Meropidae	Rainbow Bee-eater	*Merops ornatus*	x			x	x	x	x		x
Monarchidae	Magpie-lark	*Grallina cyanoleuca*	x			x	x	x			
Monarchidae	Leaden Flycatcher	*Myiagra rubecula*			x		x	x		x	
Monarchidae	Restless Flycatcher	*Myiagra inquieta*			x	x		x			x
Motacillidae	Australian Pipit	*Anthus novaeseelandiae*				x					
Neosittidae	Varied Sittella	*Daphoenositta chrysoptera*	x					x			
Oriolidae	Oriolus flavocinctus	*Yellow Oriole*			x					x	
Oriolidae	Olive-backed Oriole	*Oriolus sagittatus*	x		x		x			x	
Otididae	Australian Bustard	*Ardeotis australis*	x								
Pachycephalidae	Rufous Whistler	*Pachycephala rufiventris*	x	x	x		x	x	x	x	
Pachycephalidae	Grey Shrike-thrush	*Colluricincla harmonica*	x					x		x	
Pachycephalidae	Sandstone Shrike-thrush	*Colluricincla woodwardi*								x	
Pardalotidae	Striated Pardalote	*Pardalotus striatus*		x							
Petroicidae	Jacky Winter	*Microeca fascinans*		x							
Petroicidae	Lemon-bellied Flycatcher	*Microeca flavigaster*				x	x	x			
Petroicidae	Melanodryas cucullata	*Hooded Robin*						x		x	
Phalacrocoracidae	Little Pied Cormorant	*Microcarbo melanoleucos*			x						x
Phasianidae	Brown Quail	*Coturnix ypsilophora*				x	x	x		x	
Podargidae	Tawny Frogmouth	*Podargus strigoides*								x	
Pomatostomidae	Grey-crowned Babbler	*Pomatostomus temporalis*	x	x		x				x	
Psittacidae	Rainbow Lorikeet	*Trichoglossus haematodus*	x		x	x	x	x		x	
Psittacidae	Red-winged Parrot	*Aprosmictus erythropterus*	x	x	x	x	x	x		x	
Psittacidae	Northern Rosella	*Platycercus eximius*	x		x			x			
Ptilonorhynchidae	Great Bowerbird	*Chlamydera nuchalis*			x	x	x			x	
Rallidae	Spotless Crake	*Porzana tabuensis*			x						
Rhipiduridae	Grey Fantail	*Rhipidura albiscapa*					x				
Rhipiduridae	Northern Fantail	*Rhipidura rufiventris*			x			x	x	x	
Rhipiduridae	Willie Wagtail	*Rhipidura leucophrys*	x	x	x	x	x	x	x	x	
Strigidae	Barking Owl	*Ninox connivens*								x	
Threskiornithidae	Straw-necked Ibis	*Threskiornis spinicollis*	x								x
Threskiornithidae	Australian White Ibis	*Threskionis molluca*	x								x
Turnicidae	Red-chested Button Quail	*Turnix pyrrhothorax*			x			x	x		
Turnicidae	Little Button-quail	*Turnix velox*						x			
Tytonidae	Southern Boobook	*Ninox novaeseelandiae*			x	x	x			x	
Bird Totals			43	15	45	32	42	38	11	42	19

Family	Common name	Scientific name	Site YO1	Site Y02	Site Y03	Site Y04	Site Y05	Site Y06	Site Y07	Site Y08	Incidentals
MAMMALS											
Bovidae	Cattle (Introduced)	Bos taurus		x							
Canidae	Dingo	*Canis lupus*				x				x	
Dasyuridae	Northern Quoll	*Dasyurus hallucatus*			x	x	x	x	x	x	
Dasyuridae	Northern Brush-tailed Phascogale	*Phascogale pirata*						x		x	
Dasyuridae	Ningbing Antechinus	*Pseudantechinus ningbing*							x		
Emballonuridae	Yellow-bellied sheath-tailed bat	*Saccolaimus flaviventris*	x		x					x	
Emballonuridae	Common sheath-tailed bat	*Taphozous georgianus*	x		x		x			x	
Equidae	Donkey (Introduced)	*Equus asinus*								x	
Equidae	Horse (Introduced)	*Equus caballus*		x*					x*		
Macropodidae	Agile Wallaby	*Macropus agilus*	x								
Macropodidae	Antilopine Wallaroo	*Macropus antilopinus*			x*						
Macropodidae	Common Wallaroo	*Macropus robustus*				x	x				
Macropodidae	Northern Nailtail Wallaby	*Onychogalea unguifera*									x
Macropodidae	Short-eared Rock-wallaby	*Petrogale brachyotis*					x				
Macropodidae	Nabarlek	*Petrogale concinna*			x*						
Muridae	Delicate Mouse	*Pseudomys delicatulus*		x							
Muridae	Western Chestnut Mouse	*Pseudomys nanus*					x				
Muridae	Golden-backed Tree-rat	*Mesembriomys macrurus*					x			x	
Muridae	Pale Field Rat	*Rattus tunneyi*			x	x	x	x	x	x	
Muridae	Common Rock-rat	*Zyzomys argurus*				x	x		x	x	
Molossidae	Northern free-tailed bat	*Chaerephon jobensis*						x		x	
Peramelidae	Golden Bandicoot	*Isoodon auratus*						x	x		
Peramelidae	Northern Brown Bandicoot	*Isoodon macrourus*			x			x		x	
Petauridae	Sugar Glider	*Petaurus breviceps*						x		x	
Pteropodidae	Little Red Flying-fox	*Pteropus scapulatus*	x								
Suidae	Pig (Introduced)	*Sus scrofa*		x							
Vespertilionidae	Gould's wattled bat	*Chalinolobus gouldii*	x			x					
Vespertilionidae	Northern bent-winged bat	*Miniopterus schreibersii*	x		x			x		x	
Vespertilionidae	Northern cave bat	*Vespadelus caurinus*			x		x				
Native Mammal Total			6	1	9	5	9	9	5	11	1
Native Fauna Total			56	22	66	53	71	58	22	67	22

Key: * Species identified from scat or tracks

Appendix D Flora Monitoring Results

Site/Quadrat	Upper Stratum Species	Mid Stratum Species	Lower Stratum Species
S1 Q1	*Eucalyptus camaldulensis, Terminalia platyphylla, Melaleuca nervosa , Melaleuca nervosa Terminalia platyphylla*	*Sesbania cannabina, Antidesma ghaesembilla, Thespesia thespesioides, Acacia holosericea*	*Chrysopogon pallidus, Dichanthium fecundum, Eleocharis sp.*
S3 Q2	*Eucalyptus camaldulensis, Terminalia platyphylla, Melaleuca nervosa, Adansonia gregorii*	*Sesbania cannabina, Antidesma ghaesembilla, Acacia holosericea, Bauhinia cunninghamii*	*Chrysopogon pallidus, Eragrostis eriopoda, Cynodon dactylon,*
S1 Q3	*Eucalyptus tectifica, Bauhinia cunninghamii,*	*Acacia holosericea, Brachychiton diversifolius, Adansonia gregorii, Dolichandrone heterophylla*	*Chrysopogon pallidus, Heteropogon contortus, Blumea sp., Buchnera sp, Xerochloa sp., Corchorus pumilio, Drosera derbyensis, Pterocaulon sp., Indigofera sp, Dentella sp., Gossypium australe*
S1 Q4	*Eucalyptus tectifica, Adansonia gregorii, Bauhinia cunninghamii, Brachychiton diversifolius, Ficus aculeate, Petalostigma pubescens*	*Acacia holosericea, Corymbia greeniana,*	*Chrysopogon pallidus, Heteropogon contortus, Buchnera sp, Triodia bitextura, Waltheria indica, Drosera derbyensis, Blumea sp., Gossypium austral, Dolichandrone heterophylla, Xerochloa sp*
S1 Q5	*Eucalyptus tectifica, Adansonia gregorii, Bauhinia cunninghamii,* *Brachychiton diversifolius, Corymbia greeniana, Hakea arborescens*	*Hakea subarea, Dolichandrone heterophylla*	*Tinospora smilacina, Heteropogon contortus, Buchnera sp, Drosera derbyensis, Xerochloa laniflora, akea arborescens, Corchorus sp, Waltheria indica, Aristida sp, Planchonia careya*
S1 Q6	*Eucalyptus tectifica, Bauhinia, cunninghamii, Brachychiton diversifolius*	*Acacia suberosa, Adansonia gregorii, Acacia holosericea, Planchonia careya*	*Grewia retusifolia, Dolichandrone heterophylla, Bridelia tomentosa, Blumea integrifolia , Xerochloa barbata, Buchnera linearis, Drosera derbyensis, Neptunia gracilis, Chrysopogon pallidus*
S2 Q1	*Eucalyptus miniata*	*Erythrophleum chlorostachys, Distichostemon hispidulus, Petalostigma pubescens, Acacia platycarpa, Grevillea pyramidalis*	*Sorghum stipodeum, Scaevola browniana, Acacia nuperrima, Acacia tumida, Aristida holathera, Stemodia lythrifolia, Bulbostylis barbata, Polymeria ambigua, Cartonema spicatum, Eriachne triodioides, Spermacoce sp.*
S2 Q2	*Eucalyptus miniata, Corymbia greeniana*	*Petalostigma pubescens, Acacia tumida, Distichostemon hispidulus, Premna acuminate, Grevillea pyramidalis, Erythrophleum chlorostachys, Buchanania obovata, Persoonia falcata*	*Sorghum stipodeum, Bulbostylis barbata, Acacia nuperrima, Eriachne triodioides, Eriachne ciliate, Sebastiania chamaelea, Scaevola revolute, Crotalaria brevis, Trianthema pilosa (dead), Chrysopogon pallidus, Spermacoce sp., Cartonema spicatum (dead)*
S2 Q3	*Eucalyptus miniata, Corymbia greeniana*	*Planchonia careya, Petalostigma pubescens, Distichostemon hispidulus, Acacia tumida, Acacia platycarpa, Buchanania obovata, Clerodendrum floribundum*	*Sorghum stipodeum, Chrysopogon pallidus, Acacia nuperrima, Crotalaria brevis, Eragrostis speciosa, Phyllanthus trachygyne, Cartonema spicatum, Eriachne triodioides, Bulbostylis barbata, Scaevola revolute, Eriachne ciliate, Premna acuminate, Sebastiania chamaelea, Grevillea pyramidalis, Waltheria indica*
S2 Q4	*Eucalyptus miniata, Corymbia greeniana,*	*Acacia tumida, Acacia platycarpa, Persoonia falcate, Distichostemon hispidulus, Buchanania obovata, Petalostigma pubescens, Planchonia careya, Wrightia saligna, Grevillea refracta, Grevillea pyramidalis, Clerodendrum floribundum*	*Sorghum stipodeum, Chrysopogon pallidus, Eriachne triodioides (dead), Spermacoce sp., Eragrostis falcate, Scaevola revolute, Sebastiania chamaelea, Acacia nuperrima, Crotalaria brevis*
S2 Q5	*Eucalyptus miniata*	*Buchanania obovata, Distichostemon hispidulus, Acacia tumida, Acacia platycarpa, Planchonia careya, Petalostigma pubescens, Grevillea agrifolia, Clerodendrum floribundum, Brachychiton diversifolius*	*Sorghum stipodeum, Chrysopogon pallidus, Eriachne triodioides (dead), Eragrostis sp. (dead), Crotalaria brevis, Spermacoce sp. (dead), Eragrostis speciosa, Waltheria indica, Corchorus pumilio, Cartonema spicatum, Thaumastochloa pubescens, Solanum dioicum, Eragrostis falcata*
S2 Q6	*Eucalyptus miniata*	*Acacia tumida, Acacia platycarpa, Distichostemon hispidulus, Petalostigma pubescens, Dolichandrone heterophylla, Buchanania obovata, Planchonia careya*	*Sorghum stipodeum, Bulbostylis barbata, Acacia nuperrima, Chrysopogon pallidus, Eragrostis falcate, Spermacoce sp., Crotalaria brevis, Cartonema spicatum, Sebastiania chamaelea*

Site/Quadrat	Upper Stratum Species	Mid Stratum Species	Lower Stratum Species
S3 Q1	*Planchonia careya, Corymbia bella, Sesbania Formosa, Acacia holosericea*	-	*Sehima nervosum, Themeda triandra, Grewia retusifolia, Passiflora foetida, Crotalaria novae-hollandiae subsp. Lasiophylla, Mnesithea rottboellioides, Alloteropsis semialata, Cyperus vaginatus*
S3 Q2	*Eucalyptus tectifica, Eucalyptus dichromophloia, Corymbia greeniana, Erythrophleum chlorostachys, Gyrocarpus americanus, Grevillea pyramidalis, Buchanania obovata, Ficus scobina, Vachellia suberosa*	-	*Sehima nervosum, Themeda triandra, Heteropogon contortus, Crotalaria novae-hollandiae subsp. novae-hollandiae, Polycarpaea corymbosa, Waltheria indica*
S3 Q3	*Erythrophleum chlorostachys, Adansonia gregorii, Ficus scobina, Corymbia greeniana*	-	*Sehima nervosum, Heteropogon contortus, Sorghum stipodeum, Polycarpaea longiflora*
S4 Q1	*Bauhinia cunninghamii*	*Hakea arborescens, Terminalia arostrata, Grevilla sp, Petalostigma pubescens, Brachychiton tuberculatus, Grevillea dimidiate, Ficus opposita*	*Heteropogon triticeus, Astrebla pectinata, Mnesithea rottboellioides, Grewia retusifolia*
S4 Q2	*Eucalyptus tectifica, Bauhinia cunninghamii, Terminalia arostrata, Adansonia gregorii, Erythrophleum chlorostachys, Corymbia flavescens*	*Hakea arborescens, Melaleuca viridiflora,*	*Heteropogon triticeus, Crotalaria novae-hollandiae subsp. novae-hollandiae*
S4 Q3	*Eucalyptus tectifica*	*Bauhinia cunninghamii, Petalostigma pubescens, Cochlospermum fraseri*	*Heteropogon triticeus, Stemodia lythrifolia, Pterocaulon sphacelatum*
S4 Q4	*Eucalyptus tectifica, Corymbia flavescens*	*Hakea arborescens, Planchonia careya*	*Leptochloa neesii, Pterocaulon sphacelatum, Grewia retusifolia, Heteropogon triticeus, Astrebla lappacea, Pterocaulon serratum, Crotalaria novae-hollandiae subsp. novae-hollandiae*
S4 Q5	-	*Acacia suberosa, Aeschynomene indica*	*Chrysopogon pallidus, Eragrostis setifolia, Astrebla pectinata*
S4 Q6	-	*Acacia suberosa, Aeschynomene indica*	*Astrebla pectinata, Chrysopogon pallidus, Eragrostis setifolia*
S5 Q1	*Bauhinia cunninghamii, Albizia lebbeck, Mimusops elengi, Strychnos lucida, Adansonia gregorii, Lophostemon lactifluus*	*Pachygone ovate, Celtis australiensis, Bridelia tomentosa, Claoxylon hillii, Atalaya hemiglauca,*	-
S5 Q2	*Corymbia bella, Erythrophleum chlorostachys, Corymbia greeniana, Corymbia dichromophloia*	*Hakea arborescens, Grevillea mimosoides, Cochlospermum fraseri, Buchnera linearis, Dichanthium fecundum*	*Buchnera linearis, Dichanthium fecundum*
S5 Q3	*Corymbia bella, Erythrophleum chlorostachys, Adansonia gregorii, Eucalyptus dichromophloia*	*Corymbia setose, Petalostigma pubescens, Buchanania obovata, Dichanthium fecundum*	*Dichanthium fecundum*
S6 Q1	*Corymbia polycarpa, Melaleuca dealbata, Acacia plectocarpa, Acacia holosericea*	*Verticordia cunninghamii, Acacia plectocarpa, Petalostigma pubescens, Grevillea agrifolia, Planchonia careya*	*Leptochloa neesii, Sarga stipoidea, Stemodia lythrifolia, Acacia lycopodiifolia, Xyris complanata, Fimbristylis dichotoma*
S6 Q2	*Corymbia polycarpa, Acacia plectocarpa, Melaleuca dealbata, Acacia holosericea*	*Verticordia cunninghamii, Acacia plectocarpa, Grevillea agrifolia, Planchonia careya*	*Heteropogon contortus, Sarga stipoidea, Fimbristylis dichotoma, Leptochloa neesii, Acacia lycopodiifolia, Acacia holosericea, Acacia plectocarpa, Stemodia lythrifolia*
S6 Q3	*Eucalyptus miniata*	*Eucalyptus miniata, Erythrophleum chlorostachys, Buchanania obovata, Planchonia careya, Persoonia falcate, Petalostigma pubescens*	*Distichostemon hispidulus, Acacia lycopodiifolia, Tephrosia spechtii, Cymbopogon procerus, Crotalaria brevis, Sarga stipoidea, Heteropogon contortus, Canavalia rosea, Grewia retusifolia*
S6 Q4	*Eucalyptus miniata*	*Acacia tumida, Buchanania obovata, Petalostigma pubescens, Eucalyptus miniata*	*Grewia retusifolia, Canavalia rosea, Acacia lycopodiifolia, Dichanthium fecundum, Sarga stipoidea, Crotalaria brevis, Grewia retusifolia, Distichostemon hispidulus*
S6 Q5	*Eucalyptus miniata*	*Cochlospermum fraseri, Calytrix achaeta, Grevillea mimosoides, Buchanania obovata, Acacia tumida, Petalostigma pubescens, Planchonia careya, Terminalia canescens, Corymbia cadophora, Erythrophleum chlorostachys*	*Sarga stipoidea, Acacia lycopodiifolia, Canavalia rosea, Heteropogon contortus, Grewia retusifolia*

Site/Quadrat	Upper Stratum Species	Mid Stratum Species	Lower Stratum Species
S6 Q6	*Eucalyptus miniata, Erythrophleum chlorostachys*	*Eucalyptus miniata, Petalostigma pubescens, Corymbia cadophora, Cochlospermum fraseri, Buchanania obovata, Acacia tumida, Grevillea mimosoides, Terminalia canescens, Calytrix achaeta, Persoonia falcata*	*Acacia lycopodiifolia, Sarga stipoidea, Distichostemon hispidulus, Canavalia rosea, Grewia retusifolia, Heteropogon contortus*
S7 Q1	*Eucalyptus tectifica, Eucalyptus miniata, Corymbia cadophora*	*Erythrophleum chlorostachys, Grevillea agrifolia, Corymbia cadophora, Eucalyptus miniata, Acacia platycarpa, Petalostigma pubescens*	*Sarga stipoidea , Acacia lycopodiifolia, Eriachne sp., Distichostemon hispidulus, Grewia retusifolia*
S7 Q2	*Eucalyptus miniata*	*Eucalyptus miniata, Corymbia cadophora, Acacia platycarpa, Erythrophleum chlorostachys*	*Sarga stipoidea, Acacia lycopodiifolia, Distichostemon hispidulus, Grewia retusifolia*
S7 Q3	*Triodia sp., Grevillea agrifolia, Triumfetta sp.*	-	-
S7 Q4	*Triodia sp. Triumfetta sp, .*	*Triodia sp, Grevillea refracta, Cycad, Pandanus spiralis*	-
S7 Q5	*Eucalyptus miniata, Corymbia cadophora,*	*Corymbia cadophora, Cycad*	*Sarga stipoidea, Acacia lycopodiifolia, Lemongrass, Triodia sp.*
S7 Q6	*Corymbia cadophora, Grevillea refracta, Petalostigma pubescens, Owenia vernicosa, Eucalyptus tectifica*	*Grevillea refracta*	*Sarga stipoidea, Triodia sp.*
S7 Q1	*Eucalyptus miniata, Adansonia gregorii*	*Buchanania obovata, Petalostigma pubescens, Erythrophleum chlorostachys, Acacia plectocarpa, Planchonia careya, Brachychiton diversifolius, Corymbia dendromerinx, Corymbia polycarpa, Grevillea agrifolia, Timonius timon, Tephrosia sp. ?, Acacia stigmatophylla, Bridelia tomentosa, Acacia neurocarpa*	*Cycas furfuracea, Sarga stipoidea, Dentella asperata, Atylosia cinerea, Heteropogon contortus, Spermacoce sp., Scaevola browniana*
S7 Q2	*Corymbia polycarpa, Adansonia gregorii, Corymbia dendromerinx, Adansonia gregorii*	*Petalostigma pubescens, Bauhinia cunninghamii, Corymbia dendromerinx, Stenocarpus acacioides, Erythrophleum chlorostachys, Flueggea virosa, Hakea arborescens, Bridelia tomentosa, Acacia neurocarpa, Acacia tumida, Erythroxylum ellipticum, Grevillea mimosoides, Canarium australianum*	*Buchnera linearis, Sarga stipoidea, Grewia retusifolia, Heteropogon contortus, Triodia sp., Chrysopogon pallidus*
S7 Q3	*Eucalyptus miniata, Corymbia dendromerinx, Corymbia polycarpa, Timonius timon,*	*Erythrophleum chlorostachys, Pandanus spiralis, Cycas furfuracea, Timonius timon, Buchanania obovata, Bridelia tomentosa, Acacia platycarpa, Terminalia hadleyana, Grevillea heliosperma, Canarium australianum*	*Solenostemon scutellarioides, Passiflora foetida, Phragmites vallatoria, Cymbopogon sp., Triumfetta sp., Opilia amentacea, Trichodesma zeylanicum*
S7 Q4	*Eucalyptus miniata*	*Hibiscus superbus, Antidesma ghaesembilla, Acacia plectocarpa, Melastoma affine, Acacia neurocarpa, Acacia platycarpa, Erythrophleum chlorostachys, Pandanus spiralis, Acacia gracillima, Passiflora foetida, Alphitonia incana, Adansonia gregorii, Distichostemon hispidulus, Cycas furfuracea, Canarium australianum, Petalostigma pubescens, Denhamia obscura, Buchanania obovata*	*Sarga stipoidea, Blechnum orientale, Dichanthium fecundum*
S7 Q5	*Eucalyptus miniata*	*Corymbia cadophora, Erythrophleum chlorostachys, Adansonia gregorii, Denhamia obscura, Cycas furfuracea, Corymbia dendromerinx, Brachychiton diversifolius, Owenia vernicosa, Persoonia falcate, Bridelia tomentosa, Acacia stigmatophylla, Terminalia hadleyana, Vitex glabrata, Flueggea virosa, Exocarpos latifolius*	*Cymbopogon procerus, Eriachne ciliate, Chamaesyce sp., Triumfetta sp, Phragmites vallatoria*
S7 Q6	*Eucalyptus miniata, Adansonia gregorii*	*Corymbia dendromerinx, Terminalia hadleyana, Cycas furfuracea, Acacia stigmatophylla, Bridelia tomentosa, Ficus aculeate, Buchanania obovata*	*Cymbopogon procerus, Eriachne ciliate, Atylosia cinerea, Triodia bitextura, Euphorbia sp., Ampelocissus acetosa*

Appendix E Fauna Habitat Description Summary

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																	Flora Monitoring												
		GPS Location				Disturbance		Geology							Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral /Introd Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S1 Q1	Old infilled oxbow south of Oobagooma Airstrip	603 634	814 4687	Oxbow (Creek/River)	4-very poor drainage, seasonal inundation expected most years	20-40% This year	2	n/a	n/a	Grey Clay loam	15	10	70	0	n/a		Tall open forest merging with open shrubland and closed grassland	10	5	70	12-16	3-7	0-0.5	13	5	0.3	-	-	-
S1 Q2	Old infilled oxbow south of Oobagooma Airstrip	603 658	814 4821	Oxbow (Creek/River)	4-very poor drainage, seasonal inundation expected most years	20-40% This year	2	n/a	n/a	Grey Clay loam	20	15	70	1	n/a	1.8m	Tall open forest merging with open shrubland and closed grassland	10	5	70	12-15	3-7	0-0.5	13	5	0.3	-	-	-
S1 Q3	Flat with open box woodland south of Oobagooma Airstrip	604 040	814 5262	Flat	3-poor drainage (seasonally water-logged most years or short periods)	20-40% This year	2	n/a	n/a	Yellow Brown Silty loam	15	30	50	0	Tower Common (two large ones)	1.5m	Open woodland merging with Shrubland and Closed Grassland	5	12	50	7-12	3-5	0-0.5	9	4	0.3	-	-	-
S1 Q4	Flat with very open woodland, south of Oobagooma Airstrip	604 177	814 5413	Flat	3-poor drainage seasonally water-logged most years or short periods)	40-60% This year	2	n/a	n/a	Yellow Brown Silty loam	20	30	50	0	n/a	1.5m	Open woodland merging with Shrubland and Closed Grassland	5	8	50	7-10	3-5	0-0.5	8	4	0.3	-	-	-
S1 Q5	Open flat sloping west to dried out oxbow SW of Oobagooma Airstrip	604 388	814 5740	Flat	3-poor drainage seasonally water-logged most years or short periods	60-80% This year	1	n/a	n/a	Yellow Brown Silty loam	20	30	50	0	Tower, Odd	1.5m	Open woodland merging with Shrubland and Closed Grassland	<5	5	50	7-12	3-4	0-0.6	8	4	1.3	-	-	-
S1 Q6	Flat open box woodland near Cecil Roderick's camp, south of Oobagooma Airstrip	604 298	814 5792	Flat	3-poor drainage seasonally water-logged most years or short periods	This year	1	n/a	n/a	Yellow Brown Silty loam	10	80	10	0	Odd	1.5m	Open woodland	5	2		10	2-5		10	3		-	-	-

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																Flora Monitoring											
		GPS Location				Disturbance		Geology							Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral /pest Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S2 Q1	Open woollybutt woodland on reddish soils south side of Kimbolton access road	612 840	814 5032	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	40-60% Last year	0	NA	NA	Reddish Sand	20	10	5	0	Dome, odd	0.1	Tall open forest mingled with open shrubland and grassland	5	5	35	10-13	5-7	0.1-2.5	11	5	1.5	-	-	-
S2 Q2	Open woollybutt woodland on reddish soils North side of Kimbolton access road	613 116	814 5009	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	40-60% Last year	0	NA	NA	Reddish Sand	20	10	5	0	Dome, odd	-	Tall open forest mingled with open shrubland and grassland	5	5	35	10-13	5-7	0.1-2.5	11	5	1.5	-	-	-
S2 Q3	Open woollybutt woodland on reddish soils south side of Kimbolton access road	613 774	814 4188	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	- Last year	0	NA	NA	Reddish Sand	20	10	5	0	Dome, odd	-	Tall open forest mingled with open shrubland and grassland	5	5	30	12-15	5-7	0.1-3	13	6	1.5	-	-	-
S2 Q4	Open woollybutt woodland on reddish soils North side of Kimbolton access road	613 998	814 4125	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	40-60% 2+ years	0	NA	NA	Reddish Sand	20	15	8	0	Dome, odd	0.8	Tall open forest mingled with open shrubland and grassland	8	10	30	12-16	3-7	0.1-2.5	13	4	0.8	-	-	-
S2 Q5	Open woollybutt woodland on reddish soils south side of Kimbolton access road	614 683	814 3364	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	60-80% Last year	4	NA	NA	Reddish Sand	20	30	10	0	Dome, odd	-	Tall open forest mingled with open shrubland and grassland	5	8	30	12-15	5-7	0.1-2.5	13	5	2	-	-	-
S2 Q6	Open woollybutt woodland on reddish soils North side of Kimbolton access road	614 949	814 3287	Flat sand-plain	1-drainage rapid (good slope/ sandy soil)	60-80% Last year	0	NA	NA	Reddish Sand	20	30	10	0	NA Absent	NA	Tall open forest mingled with open shrubland and grassland	5	5	50	12-15	3-7	0.1-3	13	4	2	-	-	-
S3 Q1	Between conver-gence of 2 small creeks still flowing. Some riparian vegetation surroundd-ing open woodland, Dense, grassy understory	640 999	817 4910	Flat	2-drains moderatly well, occasional seasonal water-logging	40-60% 2+ years	0	2-10% pebbles, 10-20% small stones, 10-20% stones, 10-20% small rocks , 2-10% small rocks, <2% big rocks, <2% boulder, <2% outcrop	sandstone	Brown, clay loam	10	0	90	0	None	NA	Open woodland	5	15	80-90	7-15	2-7	0.3-1.5	10	4	1	0.25	1	12

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																Flora Monitoring												
		GPS Location				Disturbance		Geology						Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral Hoofed Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
3Q2	Flat, lowlying. Sandstone hills north, basalt hills south	641 043	817 4372	Flat	2-drains moderately well occasional seasonal water-logging	0-20% 2+ years	0	2-10% pebbles, 2-10% small stones, 10-20% small rocks	sandstone	Brown, clay loam	10	0	90	0	None	NA	Open woodland	10	20	90	7-12	2-6	0.2-1.2	10	5	1	0.25	1	13 live , 4 dead
S3Q3	Rocky slopes with open woodland and dense grassy understory	640 889	817 4635	Simple slope	1-drainage rapid (good slope/ sandy soil)	40-60% 2+ years	0	2-10% pebbles, 2-10% small stones, 10-20% stones, 10-20% small rocks, 10-20% small rocks, 10-20% big rocks, 10-20% boulder, 10-20% outcrop	sandstone	Brown, clay loam	5	0	85	10	None	NA	Isolated trees	5	5	85-90	6-10	2-5	0.6-1.5	8	4	1	0.25	1	8 live, 3 dead
S4Q1	Open low tree woodland abutting granite outcrop and cracking clay gilgai plains	610 853	815 8932	Flat	4-very poor drainage, seasonal inundation expected most years	Last year	2	<2% rocks, <2% big rocks, <2% boulders, 2-10% outcrop	NA	Medium heavey clay	60	10	70	0	Dome, Sparse	1	Sparse shrubland	1	10	70	10	2 - 4	0.2 - 1.2	10	4	1	-	-	-
S4Q2	Open E. tectifica woodland on cracking clay soils, transition zone from granite knobs to Astrebla grassland	610 773	815 8932	Flat Floodplain	4-very poor drainage, seasonal inundation expected most years	40-60% This year and last year (surro-unded by fire scars)	2	<2% small rocks, 2-10% rocks, 2-10% big rocks, 2-10% boulders, 2-10% outcrop	NA	Yellowish Brown, Cracking clay	5	60	30	0	Dome, Sparse	1.5	Open Woodland	5	10	50	8 - 11	2 - 6	<1	10	3	0.5	-	-	-
S4Q3	Low open woodland over black speargrass on medium red clay soils and Astrebla on black cracking clay	610 475	815 8944	Flat	3-poor drainage seasonally waterlogged most of the years or short periods	20-40%	2	<2% small stones, <2% big rocks, <2% boulders, 2-10% outcrop	NA	Grey, Medium heavy cracking clay	5	40	60	<5	Absent	N/A	Low open woodland	<5	10	>65	10 - 12	1 - 3	<1	10	2	<1	-	-	-
S4Q4	Open E. tectifica woodland on heavy clay soils adjacent to granite outcrop and cracking black soils plain. Some Gilgai in plot with Astrebla	610 432	815 8961	Flat	4-very poor drainage, seasonal inundation expected most years	80-100% This year (May?)	3	<2% rocks, <2% big rocks, <2% boulders 2-10% outcrop	NA	Grey, Medium heavy cracking clay	5	50	50	0	Dome, Common	N/A	Open Woodland	5 - 10	<5	45 (patchy Burn)	12	1 - 3	-	12	2		-	-	-

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																Flora Monitoring											
		GPS Location				Disturbance		Geology						Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral /pest Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S4Q5	Open shrubland dominated by Acacia suberosa over Astrebla grasses, gilgai depressions on cracking black clay soil.	610 303	815 8290	Flat Flood-plain	4-very poor drainage, seasonal inundation expected most years	Very recent , this year - patchy	3	<2% small stones	<2% small stones, 6-10% stones	Black, Cracking clay	5	40	60	<5	Dome, Odd	-	Open shrubland	-	5 - 10	60	-	2 - 5	<0.5	-	2 - 3	<0.5	-	-	-
S4Q6	Open shrubland dominated by Acacia suberosa over Astrebla grasses, gilgai depressions on cracking black clay soil.	610 268	815 8199	Flat	4-very poor drainage, seasonal inundation expected most years	60-80% Very recent , this year	3	None	<2% stones	Black, Cracking clay	5	40	60	<5	Dome, Odd	-	Sparse shrubland	-	10	60	-	2 - 5	<0.5	-	3	<0.5	-	-	-
S5Q1	Vine thicket with a dry rocky creek line, approx 300m from base of cliffs. Low dense canopy. Grey rock surface, broken.	629 324	818 0664	Creek/ river	1 = drainage rapid (good slope/ sandy soil)	0, unburnt	0	2-10% stones, 20-50% small rocks, 50-90% rocks, 2-10% big rocks	Granite	Orange Clay/ sand	20	0	80	<5	None	-	Closed forest	20	50	85	9 - 12	3 - 5	0 - 1	11	4	0.75	0.9	5	58
S5Q2	Hilltop flat with choc chip rock formations variable undulating slope	629 372	818 0828	Crest - Hilltop	3 = poor drainage (seasonal waterlogged most years or short periods	0, unburnt	0	<2% pebbles, <2%, small stones, 2-10% stones, 2-10% small rocks, 50-90% rocks, 20-50% big rocks, 2-10% boulders	Choc chip boulders (dark rock) small amounts of quartz	Reddish Clay/ sand	25	<5	95	0	Dome, Odd	-	Open Woodland	25	5 - 10	85	5 - 10	1 - 2	0.5 - 1.5	7	2	0.85	0.9	5	47
S5Q3	Gently sloping hillside, below rock cliffs (scree slopes under ridge cliffs)	629 455	818 1116	Upper slope	1 = drainage rapid (good slope/ sandy soil)	0, unburnt	0	20-50% rocks, 50-90% big rocks, <2% boulders <2% outcrop	Sandstone and Quartz	Reddish Clay/ sand	20	<5	90	0	Dome, Odd	2	Open Woodland	15	20	80	10 - 15	2 - 4	0.5 - 1	10	3	0.5	0.5	5	65

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																	Flora Monitoring												
		GPS Location				Disturbance		Geology							Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral /pest Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S6Q1	Open woodland	592 346	814 9885	Flat	1 = drainage rapid	- 2 + years	0	None	NA	Grey, Loamy sand	20	20	50	0	Dome, Sparse	0.8	Woodland	60	10	50	7 - 14	1.5 - 4	0.2 - 0.5	8	2	0.3	0.9	5	101
S6Q2	Open woodland	592 224	814 9896	Flat	1 = drainage rapid	0% 2 + years	0	None	NA	Greyish, Loamy sand	20	10	70	0	Dome, Sparse	0.6	Woodland	40	15	60	5 - 12	1.5 - 3	0.2 - 1.2	8	2	0.4	0.9	5	73
S6Q3	Extensive E. miniata open woodland plain	592 242	815 0309	Flat	1 = drainage rapid	20-40% This year	0	<2% pebbles, <2% small stones, <2% stones, <2% small rocks	NA	Reddish Brown, Loamy sand	70	20	10	0	Dome, Sparse	0.8	Tall Open Woodland	15	10	10	10 - 15	2 - 4.5	0.15 - 1.5	13	3	0.5	0.5	5	67
S6Q4	Extensive E. miniata woodland west of Kimbolton track	592 158	815 0449	Flat	1 = drainage rapid	20-40% This year	1	<2% pebbles, <2% small stones, <2% stones, <2% small rocks	NA	Reddish Brown, Loamy sand	70	20	10	0	Dome, Sparse	0.5	Tall Open Woodland	20	10	-	10 - 16	1 - 4	0.2 - 0.5	14	2	0.3	0.5	5	87
S6Q5	E. miniata open woodland low hill	592 637	814 9805	Hillock	1 = drainage rapid	20-40% This year	0	2-10% Pebbles, 10-20% Small Stones 10-20% Stones, 20-50% small rocks	NA	Reddish Brown, Loamy sand	10	10	10	70	Dome, Common	1	Open Woodland	15	8	8	9 - 15	1.8 - 6	0.15 - 1	11	4	0.2	0.9	5	69
S6 Q6	Site is survey site on E. miniata open woodland stoney gental slope	592 652	814 9819	Hillock	1 = drainage rapid	0% This year	0	<2% pebbles, 2-10% small stones, 10-20% Stones, 20-50% small rocks, 2-10% rocks	N/A	Reddish Brown, Loamy sand	10	10	10	70	Dome, Sparse	1	Tall Open Woodland	10	10	8	10 - 16	2 - 6	0.1 - 1	14	3	0.2	0.9	5	49
S7 Q1	*E. miniata* woodland	592 010	816 5387	Flat	1-Drainage rapid (good slope/ sandy soil)	0-20% 2+ Years	0	2-10% pebbles, 2-10% small stones, 2-10% stones, <2% small rocks, <2% rocks	Sandstone	Yellowish Brown, Sand	80	0	60	0	Dome, Sparse	0.5	Woodland	30	10	30	10	2-5	0.5 - 2	10	4	1	0.9	5	54

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																Flora Monitoring												
		GPS Location				Disturbance		Geology						Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral /pest Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S7Q2	*E. miniata* woodland	592 125	816 5366	Flat	1-Drainage rapid (good slope/ sandy soil)	0% 2+ Years	0	2-10% pebbles, 2-10% small stones, 2-10% stones, 2-10% small rocks, <2% rocks	Sandstone	Yellow loamy sand	70	20	20	0	Dome, Sparse	1.2	Tall Open Forest	20	10	10	14	2-6	0.5 - 1.5	14	3	0.8	0.9	5	72
S7Q3	-	592 276	816 4884	Flat	2-Drains moderately well, occasional seasonal waterlog-ging	0% 2+ Years	1	2-10% pebbles, 10-20% small stones, 10-20% stones, 2-10% small rocks	Silcrete	Yellowish Brown Loamy sand	10	40	30	20	Dome, Common	1.2	Sparse Grassland	25		5	0.8	-	0.2 - 0.3	0.8	-	0.25	-	-	-
S7Q4	Spinifex grassland	592 401	816 4831	Flat	3-Poor drainage seasonally waterlogged most years or short periods	0% 2+ Years	0	2-10% pebbles, 2-10% small stones, 10-20% stones, 2-10% small rocks	Silcrete	Yellowish Brown Clayey sand	10	20	40	30	Dome, Sparse	1	Sparse Grassland	20	15	-	1	0.2 - 0.4	-	1	0.3	-	-	-	-
S7Q5	Lower slope of quartzite	592 086	816 5908	Lower Slope	1-Drainage rapid (good slope/ sandy soil)	0% 2+ Years	0	2-10% pebbles, 2-10% small stones, 2-10% stones, 20-50% Small rocks	Quartzite? (pale metamorph-osed sandstone)	Brown Sandy Loam	30	20	20	60	-	-	Open Woodland	10	5	10	8	2-4	0.5-1.5	8	2.5	1	0.9	5	27
S7Q6	Mid-slope of quartzite escarpment	592 209	816 5984	Mid-slope	1-Drainage rapid (good slope/ sandy soil)	0-20% 2+ Years	0	2-10% pebbles, 2-10% small stones, 2-10% stones, 10-20% small rocks	Quartzite?	Brown Loamy sand	10	10	15	80	Dome, Sparse	0.5	Open Woodland	10	5	15	6	2-4	0.3-1.2	6	3	0.7	0.9	5	20
S8Q1	Trent River Valley WNW of Kimbolton	581 978	815 7543	Flat above stoney creek	2	0% Not burnt in last 2 years	0	2-10% rocks, 10-20% big rocks	Quartz	Reddish-brown, Loam	5	0	30	0	Dome, Odd	2	Tall Open Forest	5	5	30	12-15	5-7	0-1	13	6	0.5	-	-	-

YAMPI FAUNA QUADRAT HABITAT DESCRIPTIONS																Flora Monitoring											
		GPS Location				Disturbance		Geology						Termite observations			Stratum (% cover)			Height Range (m)			Average Height (m)			Bitterlich gauge		
Site and Quadrat	Site description	Easting	Northing	Landform	Soil Drainage Potential	Fire Impact and History	Disturbance from Feral Hoofed Animals	Rock Size	Rock Type	Soil texture and Colour	Vegetation/ Litter %	Bare Soil %	Ground Cover %	Gravel %	Termite Mound	Termite Mound max. ht. (m)	Habitat Type	Upper	Mid	Lower	Upper	Mid	Lower	Upper	Mid	Lower	Wedge size (cm)	Number of Sweeps	Totals
S8Q2	Trent River Valley WNW of Kimbolton	581 937	815 7460	Flat above stoney creek	2	0% Not burnt in last 3 years	0	2-10% small stones 2-10% rocks	Quartz	Reddish-brown, Loam	5	10	20	10	Dome, Odd	1	Tall Open Forest	5	5	30	12-15	5-7	0-1	13	6	0.5	-	-	-
S8Q3	Lower slope of quartzite hill	581 853	815 7984	Lower Slope	1	0-20% Not burnt in last 3 years	0	10-20% big rocks, 2-10% boulders 10-20% outcrop	Quartz sandstone	Black, Sandy Loam	20	0	10	0	Against tree base, Odd	1	Tall Open Forest merging with Open Shrubland	10	5	10	12-15	5-8	0-1	12	6	0.8	-	-	-
S8Q4	Lower slope of quartzite hill	581 881	815 7956	Lower Slope	1	0-20% Not burnt in last 3 years	0	10-20% big rocks, 10-20% boulders	Quartz sandstone	Black, Sandy Loam,	10	0	15	0	Absent	n/a	Open Woodland merging with Shrubland	5	10	15	8-12	5-8	0-2	10	6	1	-	-	-
S8Q5	Side of quartzite ridge (rock scree) overlooking Y-shaped valley	581 991	815 8209	Lower Slope	1	0% Not burnt in last 3 years	0	60-80% rocks, 10-20% big rocks	Quartz sandstone	Dark Brown, Loam (skeletal)	5	0	20	0	Dome, Scattered	1	Open Woodland with Open Shrubland	5	5	15	8-12	3-7	0-1	9	5	0.8	-	-	-
S8Q6	Side of quartzite ridge (rock scree) overlooking Y-shaped valley	581 937	815 8275	Lower Slope	1	0-20% Not burnt in last 3 years	0	10-20% rocks, 20-50% big rocks, 10-20% outcrop	Quartz sandstone	Dark Brown, Loam - skeletal	15	0	25	0	Absent	n/a	Open Woodland	5	5	15	8-12	3-7	0-2	10	4	1	-	-	-

Appendix F Combined Fauna Species Records, YSTA

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Amphibians								
Crinia bilingua	Bilingual Froglet	1	x	x	x			
Cyclorana australis	-			x				
Cyclorana longipes	-			x				
Limnodynastes convexiusculus	Marbled Frog	1						
Limnodynastes ornatus	Ornate Burrowing Frog		x	x				
Litoria bicolor	Northern Dwarf Tree-frog	1						
Litoria caerulea	Green Tree-frog		x					
Litoria coplandi	Copland's Rock Frog	2	x		x			
Litoria inermis	Peters' Frog	3	x		x			
Litoria nasuta	Rocket Frog	2	x	x				
Litoria pallida	Pale Frog	1	x		x			
Litoria rothii	Roth's Tree-frog	3	x	x	x			
Litoria rubella	Red Tree-frog	2	x		x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Litoria splendida	Magnificent Tree-frog	1						
Litoria wotjulumensis	Wotjulum Frog	4	x		x			
Notaden melanoscaphus	Northern Spadefoot Toad				x			
Uperoleia aspera	-	1	x					
Uperoleia lithomoda	Stonemason Toadlet				x			
Total Amphibians Recorded	**18**							
New Records 2008	**2**							
Reptiles								
Antaresia childreni	Children's Python				x			
Acanthophis praelongus	Northern Death Adder	1						
Aspidites melanocephalus	Black-headed Python		x					
Boiga irregularis	Brown Tree Snake	1						
Carlia amax	Two-spined Rainbow Skink	4	x	x	x			
Carlia gracilis	Slender Rainbow Skink				x			
Carlia johnstonei	-	2			x			
Carlia munda	Striped Rainbow Skink				x			
Carlia rufilatus	Red-Sided Rainbow Skink			x				
Carlia triacantha	Three-keeled Rainbow Skink	1	x	x	x			
Carlia sp.	Carlia skink				x			
Chelodina rugosa	Northern Long-necked Turtle	3			x			
Chlamydosaurus kingii	Frilled Lizard	1			x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Crocodylus johnstoni	Freshwater Crocodile	1	x	O	x	**Listed**	**O**	
Crocodylus porosus	Saltwater Crocodile		x	O	x	**Migratory**	**O**	
Cryptoblepharus carnabyi	Carnaby's Snake-Eyed Skink			x				
Cryptoblepharus megastictus	Spotted Snake-Eyed Skink		x					
Cryptoblepharus plagiocephalus	Aboreal Snake-eyed Skink	6	x		x			
Cryptoblepharus sp.	-				x			
Ctenophorus caudicinctus	Ring-tailed Dragon		x					
Ctenotus burbidgei	-	1						
Ctenotus colletti	-			x				
Ctenotus essingtonii	Port Essington Ctenotus				x			
Ctenotus inornatus	Plain Ctenotus	7	x	x				
Ctenotus pantherinus ocellifer	Leopard Ctenotus		x					
Ctenotus robustus	Robust Ctenotus	2	x	x				
Ctenotus serventyi	-	1	x	x				
Ctenotus spaldingi	Spalding's Ctenotus				x			
Ctenotus yampiensis	-		x					
Ctenotus sp.	-				x			
Delma borea	Rusty-topped Delma				x			
Demansia papuensis	Papaun Whip Snake	3	x					
Dendrelaphis punctulata	Green Tree Snake	3	x					
Diplodactylus stenodactylus	-	1	x					

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Diporiphora sp.	-	2						
Diporiphora albilabris	White-lipped Two-line Dragon				x			
Diporiphora bennettii	Robust Dragon	9	x		x			
Diporiphora magna	-			x	x			
Diporiphora pindan	-				x			
Diporiphora sp.	-				x			
Emydura sp.	-	1						
Emydura australis	North-west Red-faced Turtle	1						
Furina ornata	Orange-naped Snake	1			x			
Gehyra australis	Northern Dtella			x	x			
Gehyra nana	Northern Spotted Rock Dtella	1	x		x			
Gehyra occidentalis	-	7	x	x	x			
Gehyra pilbara	Pilbara Dtella	2						
Gehyra sp.	-			x				
Gehyra variegata	Tree Dtella	1	x					
Gehyra xenopus	-	1						
Glaphyromorphus isolepis	Smooth-Tailed Skink	10	x	x	x			
Glaphyromorphus sp.	-				x			
Heteronotia binoei	Bynoe's gecko	7	x	x	x			
Lerista bipes	Two-Toed Lerista	1	x		x			
Lerista greeri	-			x				
Lerista separanda	-	1	x					
Lialis burtonis	Burton's Legless Lizard	2	x	x	x			
Liasis olivaceus	Olive Python			O				
Lophognathus gilberti	Gilbert's Dragon	6	x	x				
Lucasium stenodactylum	Crowned Gecko				x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Menetia greyii	Grey's Menetia				x			
Menetia maini	Main's Skink	1			x			
Morethia ruficauda	Red-tailed Snake-Eyed Skink	3		x	x			
Morethia storri	Storr's Snake-eyed Skink		x		x			
Natator depressus	Flatback Turtle	2						
Notoscincus ornatus	Ornate Snake-Eyed Skink	4	x		x			
Oedura gracilis	-	2						
Oedura obscura	-	1						
Oxyuranus scutellatus	Taipan				x			
Pogona minor mitchelli	Dwarf Bearded Dragon		x					
Proablepharus tenuis	Slender Snake-Eyed Skink	1		x				
Pseudechis australis	King Brown Snake	1	x		x			
Pseudechis weigeli					x			
Pseudonaja nuchalis	Western Brown Snake		x					
Ramphotyphlops troglodytes	-			x				
Strophurus mcmillani	-	1						
Strophurus ciliaris	Spiny-tailed Gecko				x			
Tiliqua scincoides	Common Blue-Tongued Lizard		x	x	x			
Varanus acanthurus	Ridge-tailed Monitor	2	x		x			
Varanus glebopalma	Long-Tailed Rock Monitor	1			x			
Varanus gouldii	Sand Goanna		x					
Varanus mertensi	Mertens' Water Monitor	1	x					
Varanus mitchelli	Mitchell's Water Monitor	1						
Varanus panoptes	Floodplain Monitor			x				
Varanus scalaris	Spotted Tree Monitor	3	x	x	x			
Varanus storri	Storr’s Monitor				x			
Total Reptiles Recorded	**86**							

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
New Records 2008	**19**							
Birds								
Accipiter cirrocephalus	Collared Sparrowhawk			x				
Accipiter fasciatus	Brown Goshawk		x	x	x			
Acrocephalus australis	Australian Reed-Warbler				x			
Aegotheles cristatus	Australian Owlet-Nightjar		x					
Alcedo azurea	Azure Kingfisher		x	x				
Alcedo azurea	Azure Kingfisher				x			
Anas superciliosa	Pacific Black Duck				x			
Anthus novaeseelandiae	Australian Pipit				x			
Aprosmictus erythropterus	Red-winged Parrot		x	x	x			
Aquila audax	Wedge-tailed Eagle			x				
Ardea Alba	Great Egret			x		**Migratory**		
Ardea novaehollandiae	White-faced Heron		x					
Ardea pacifica	Pacific Heron		x					
Ardeotis australis	Australian Bustard				x			
Artamus cinereus	Black-faced Woodswallow		x		x			
Artamus cyallcpterus	Dusky Woodswallow		x					
Artamus minor	Little Woodswallow		x	x	x			
Artamus personatus	Masked Woodswallow		x					
Aviceda subcristata	Pacific Baza				x			
Burhinus grallarius	Bush Stone-curlew			x	x			**Near Threatened**
Cacatua galerita	Sulphur-crested Cockatoo		x	x	x			
Cacatua roseicapilla	Galah		x	x				
Cacatua sanguinea	Little Corella		x	x	x			
Cacomantis variolosus	Brush Cuckoo		x	x				

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Calyptorhynchus banksii	Red-tailed Black Cockatoo		x	x	x			
Canopophila albogularis	Rufous-banded Honeyeater				x			
Centropus phasianinus	Pheasant Coucal			x	x			
Charadrius veredus	Oriental Plover				x	**Migratory**		
Chlamydera nuchalis	Great Bowerbird				x			
Cierthionyx pectoralis	Banded Honeyeater			x				
Cincloramphus mathewsi	Rufous Songlark			x	x			
Cisticola Exilis	Golden-headed Cisticola			x	x			
Climacteris melanura	Black-tailed Treecreeper		x	x	x			
Colluricincla harmonica	Grey Shrike-thrush		x	x	x			
Colluricincla woodwardi	Sandstone Shrike-thrush				x			
Conopophila rufogularis	Rufous-throated Honeyeater			x	x			
Coracina novaehollandiae	Black-faced Cuckoo-shrike		x	x	x			
Coracina papuensis	White-bellied Cuckoo-shrike		x	x	x			
Corvus orru	Torresian Crow		x	x	x			
Coturnix ypsilophora	Brown Quail		x	x	x			
Cracticus nigrogularis	Pied Butcherbird		x	x	x			
Cracticus torquatus	Grey Butcherbird		x	x				
Dacelo leachii	Blue-winged Kookaburra		x	x	x			
Daphoenositta chrysoptera	Varied Sittella			x	x			
Dendrocygna arcuata	Wandering Whistling Duck			x	x			
Dendrocygna eytoni	Plumed Whistling-Duck				x			
Dicaeum hirundinaceum	Mistletoebird		x		x			
Dicrurus bracteatus	Spangled Drongo		x		x			
Elanus axillaris	Black-shouldered Kite		x					
Elseyornis melanops	Black-fronted Dotterel		x	x				
Entomyzon cyanotis	Blue-faced Honeyeater		x					

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Ephippiorhynchus asiaticus	Black-necked Stork		x	x				**Near Threatened**
Eurostopodus argus	Spotted Nightjar				x			
Eurystomus orientalis	Dollarbird			x				
Falco berigora	Brown Falcon		x	x	x			
Falco cenchroides	Australian Kestrel		x		x			
Falco hypoleucos	Grey Falcon				x			**Near Threatened**
Falco longipennis	Australian Hobby		x		x			
Falco Peregrinus	Peregrine Falcon				x		**O**	
Geopelia cuneata	Diamond Dove		x		x			
Geopelia humeralis	Bar-shouldered Dove		x	x	x			
Geopelia striata	Peaceful Dove		x	x	x			
Geophaps smithii blaauwi	Partridge Pigeon		x	x		**Vulnerable**	**R**	**Near Threatened**
Gerygone olivacea	White-throated Gerygone			x	x			
Grallina cyanoleuca	Magpie-lark		x	x	x			
Grus rubicunda	Brolga		x	x	x			
Gymnorhina tibicen	Australian Magpie		x	x				
Haliaeetus leucogaster	White-bellied Sea-eagle				x	**Migratory**		
Haliastur sphenurus	Whistling Kite		x	x	x			
Hamirostra melanosternon	Black-breasted Buzzard		x	x	x			
Hirundo ariel	Fairy Martin		x					
Hirundo nigricans	Tree Martin			x	x			
Irediparra gallinacea	Comb-crested Jacana			x				
Ixobrychus flavicollis	Black Bittern				x			
Jabiru mycteria	Jabiru				x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Lalage leucomela	Varied Triller				x			
Lalage tricolor	White-winged Triller		x		x			
Lichenostomus flavescens	Yellow-tinted Honeyeater		x	x	x			
Lichenostomus unicolor	White-gaped Honeyeater		x	x	x			
Lichenostomus virescens	Singing Honeyeater				x			
Lichmera indistincta	Brown Honeyeater		x	x	x			
Lonchura castaneothorax	Chestnut-breasted Mannikin				x			
Lophoictinia isura	Square-tailed Kite				x			
Malurus lamberti	Variegated Fairy-wren		x	x	x			
Malurus lamberti rogersi	Variegated Fairy Wren				x			
Malurus melanocephalus	Red-backed Fairy-wren		x	x	x			
Manorina flavigula	Yellow-throated Miner		x	x				
Megalurus timoriensis	Tawny Grassbird			x	x			
Melanodryas cucullata	Hooded Robin				x			
Melithreptus albogularis	White-throated Honeyeater		x	x	x			
Melopsittacus undulatus	Budgerigar		x					
Merops ornatus	Rainbow Bee-eater		x	x	x	**Migratory**		
Microeca fascinans	Jacky Winter		x	x	x			
Microeca flavigaster	Lemon-bellied Flycatcher		x		x			
Milvus migrans	Black Kite		x	x	x			
Mirafra javanica	Horsefield’s Bushlark			x				
Myiagra inquieta	Restless Flycatcher*		x	x	x			
Myiagra rubecula	Leaden Flycatcher		x	x	x			
Myzomela obscura	Dusky Honeyeater				x			
Neochmia phaeton	Crimson Finch				x			
Ninox connivens	Barking Owl		x	x	x			
Ninox novaeseelandiae	Southern Boobook			x	x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Nycticorax caledonicus	Nankeen Night Heron		x		x			
Nymphicus hollandicus	Cockatiel		x		x			
Ocyphaps lophotes	Crested Pigeon				x			
Oriolus flavocinctus	Yellow Oriole				x			
Oriolus sagittatus	Olive-backed Oriole		x	x	x			
Pachycephala rufiventris	Rufous Whistler		x	x	x			
Pardalotus striatus	Striated Pardalote		x	x	x			
Pelecanus conspicillatus	Australian Pelican		x					
Petrophassa albipennis	White-quilled Rock-pigeon		x		x			
Phalacrocorax melanoleucos	Little Pied Cormorant				x			
Phaps chalcoptera	Common Bronzewing			x	x			
Philemon argenticeps	Silver-crowned Friarbird		x		x			
Philemon citreogularis	Little Friarbird		x	x	x			
Platycercus venustus	Northern Rosella		x	x	x			
Podargus strigoides	Tawny Frogmouth			x	x			
Poephila acuticauda	Long-tailed Finch		x					
Poephila acuticauda	Long-tailed Finch				x			
Poephila personata	Masked Finch				x			
Pomatostomus temporalis	Grey-crowned Babbler		x	x	x			
Porphyrio porphyrio	Purple Swamphen			x				
Porzana tabuensis	Spotless Crake				x			
Psitteuteles versicolor	Varied Lorikeet			x				

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Ptilonorhynchus nuchalis	Great Bowerbird		x	x				
Ramsayornis fasciatus	Bar-breasted Honeyeater		x	x	x			
Rhipidura leucophrys	Willie Wagtail		x	x	x			
Rhipidura rufiventris	Northern Fantail		x	x	x			
Scythrops novaehollandiae	Channel-billed Cuckoo			x				
Smicrornis brevirostris	Weebill		x	x	x			
Taeniopygia bichenovii	Double-barred Finch		x		x			
Threskiornis molucca	Australian White Ibis			x	x			
Threskiornis spinicollis	Straw-necked Ibis		x		x			
Todiramphus pyrrhopygia	Red-backed Kingfisher				x			
Todiramphus sanctus	Sacred Kingfisher		x	x	x			
Trichoglossus haematodus	Rainbow Lorikeet		x	x	x			
Turnix pyrrhothorax	Red-chested Button Quail				x			
Turnix velox	Little Button-quail				x			
Vanellus Miles	Masked Lapwing			x				
Total Birds Recorded	**140**							
New Records 2008	**33**							
Mammals								
Bos taurus	Cattle (Introduced)				x			
Canis lupus dingo	Dingo		x	O	x			
Chaerephon jobensis	Northern free-tailed bat				x			
Chalinolobus gouldii	Gould's Wattled Bat			O	x			

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Chalinolobus nigrogriseus	Hoary Wattled Bat	x		x				
Dasyurus hallucatus	Northern Quoll		x	x	x	**Endangered**	**R**	**Endangered**
Equus asinus	Donkey (Introduced)				x			
Equus caballus	Horse (Introduced)				x			
Felis catus	Cat	x	x					
Hydromys chrysogaster	Water-rat			O				
Isoodon auratus	Golden Bandicoot	x	x		x	**Vulnerable**	**R**	**Vulnerable**
Isoodon macrourus	Northern Brown Bandicoot	x	x	O	x			
Leggadina lakedownensis	Northern Short-tailed Mouse	x	x					
Macroderma gigas	Ghost Bat		x	O				
Macropus agilis	Agile Wallaby		x		x			
Macropus antilopinus	Antilopine Wallaroo				x			
Macropus robustus	Common Wallaroo		x	O	x			
Melomys burtoni	Grassland Melomys	x	x					
Mesembriomys macrurus	Golden-backed Tree-rat		x	x	x	**Vulnerable**		
Miniopterus schreibersii orianae	Northern bent-winged bat				x			
Mus musculus	House Mouse		x					
Onychogalea unguifera	Northern Nailtail Wallaby				x			
Petaurus breviceps	Sugar Glider	x	x	O	x			
Petrogale brachyotis	Short-eared Rock-wallaby	x?	x	O				
Petrogale concinna	Nabarlek		x	?O	x			
Phascogale pirata	Northern Brush-tailed Phascogale				x			**Vulnerable**
Pseudantechinus ningbing	Ningbing Antechinus				x			
Pseudomys delicatulus	Delicate Mouse		x		x			
Pseudomys nanus	Western Chestnut Mouse			x	x			
Pteropus alecto	Black Flying-fox	x						

Scientific name	Common Name	WA Records	YAMPI 1995	YAMPI 2001	YAMPI 2008	EPBC Act	Wildlife Conservation Act[1]	IUCN Red List
Pteropus scapulatus	Little Red Flying-fox	x	x	x	x			
Rattus tunneyi	Pale Field Rat	x	x	x	x			
Rattus villosissimus	Long-haired Rat	x						
Rhinonicteris aurantia	Orange Leaf-nosed bat	x	x	O			**R**	
Saccolaimus flaviventris	Yellow-bellied sheath-tailed bat				x			
Scotorepens greyi	Little Broad-nosed Bat			O				
Sus scrofa	Pig (Introduced)		x	x	x			
Tachyglossus aculeatus	Echidna		x	O				
Taphozous georgianus	Common sheath-tailed bat	x		O	x			
Trichosurus vulpecula	Common Brushtail Possum		x					
Vespadelus caurinus	Northern cave bat			x	x			
Zyzomys argurus	Common Rock-rat	x	x	x	x			
Zyzomys woodwardi	Kimberly Rock Rat	x	x					
Total Mammals Recorded	**44**							
New Records 2008	**7**							
Total Fauna Recorded	**286**							
Total New Records 2008	**61**							

Note: WA Records = from Desktop Study; Wildlife Conservation Act (1950) classifies Western Australias threatened species as: R = rare or likley to become extinct (Schedule 1); X = presumed extinct (Schedule 2); I = Protected under an international agreement (birds only) (Schedule 3); O = Fauna in need of preotection for reasons other than those listed above (Schedule 4)

Appendix G Commonwealth and National Heritage List Search Results

Yampi Defence Area, Koolan Island, WA, Australia

Photographs:	None
List:	Commonwealth Heritage List
Class:	Natural
Legal Status:	Listed place (22/06/2004)
Place ID:	105418
Place File No:	5/09/212/0031

Summary Statement of Significance:

Yampi Defence Area displays a complex mosaic of landforms in the transition from the sandstone plateaux of the north-west Kimberley, to the broad plains and pindan scrub of the south-west Kimberley. The occurrence of such diverse landscapes within a relatively limited area is unusual.

The strong relationship that exists between past orogenic events and the diverse landscape pattern of ridges and valleys is emphasised in the shape of the Yampi Fold Belt, and distinguished by the pronounced ria embayments that characterise the spectacular coastline.

Landforms originating from rocks within the Yampi Fold Belt and the terrain associated with the Late Devonian Lillyboorarоо Conglomerate are of considerable scientific importance. The erosion of the Lillyboorarоо Conglomerate, which covers the Yampi Fold Belt, has partially exposed a pre-Devonian land surface, the attributes of which have enormous potential to aid our understanding of long-term geomorphological

processes and evolution. Suggestions that the Lillyboorarоо Conglomerate remains an original valley fill deposit would attest to very low rates of erosion and long-term landscape stability, reinforcing the scientific importance of the place.

Located at the crossroads of the Dampierland, Central and Northern Kimberley biogeographic regions, Yampi Defence Area exhibits a diverse range of ecosystems, displaying an unusual richness of faunal associations and vegetation communities with over 800 plant species, approximately one third of the described Kimberley flora, being recorded. Previous surveys of the Dampier Peninsula, Walcott Inlet, and the Kimberley Rainforest Survey enable a comparison of the changing floristic composition between adjacent areas. On the basis of species richness, indications are that Yampi supports over 1000 species, including undescribed, rare and fire sensitive species that are declining elsewhere in the Kimberley. Similarly, the known distributions of vertebrates from the Yampi Peninsula, and locations to the north and south, indicate that a far richer fauna is likely to occur in the place.

Fire protected sandstone communities, typified by healthy mixed-age stands of cypress pine (CALLITRIS INTRATROPICA) once common throughout the Kimberley, are now very rare in Northern Australia and the occurrence of such stands around Secure Bay represents an important reference site for similar Kimberley plant communities that are subject to more frequent fire regimes. The extensive sandstone landforms support small isolated patches of rainforest, the south-west limit in the Kimberley of the distribution of rainforest over sandstone, creating important nodes of diversity and refugia that contain many regionally endemic plants, animals and invertebrates.

Granite landforms are of restricted distribution in the Kimberley and mostly occur in drier areas. The high concentration of granite outcrop sequences at Yampi occurs in a higher rainfall zone resulting in formation of diverse and specialised vegetation communities. Aquatic plants inhabit the ephemeral pools that form in granite depressions while rock-colonisers populate the granite fissures and scree slopes where run-off water is high.
Six plant taxa occur within the place that are endemic to the Yampi Peninsula. Yampi Defence Area is the type locality for the insectivorous plant BYBLIS FILIFOLIA, first collected in 1838 during the voyage of HMS Beagle.

The close juxtaposition of three botanical regions within the place is highlighted by the presence of numerous tropical plant species and several animal taxa that are at the southern edge of their distribution. Merging with these are many arid zone plants at the northern and western edge of their distribution, recognisable as the pindan grades

into the taller woodland structure of the north-western Kimberley. The sandstone mesa south of Kimbolton is the southernmost locality for several plant taxa restricted to the fire-protected sandstone ranges of the Kimberley.

The diversity of landforms in the place and the resultant high concentration of small refugial habitats support a regionally rich vertebrate fauna and represent the most southerly known extant population of the nationally vulnerable golden-backed tree rat (MESEMBRIOMYS MACRURUS) and the most southerly record in the Kimberley of the sugar glider (PETAURUS BREVICEPS). The bird fauna is significant as it represents a suite of species which are at or near the southern edge of their range in the semi-humid zone of the Kimberley including the green-winged pigeon (CHALCOPHAPS INDICA); the Torres Strait pigeon (DUCULA BICOLOR); and the little shrike-thrush (COLLURICINCLA MEGARHYNCHA PARVULA). The place is also an important zone of overlap between many northern and southern species and sub-species. The vertebrate fauna shows its closest similarity to those recorded from the wetter areas of the west Kimberley that lie further to the north.

The place supports several fauna and flora species that are listed as specially protected, threatened or having priority status in Western Australia in addition to four fauna species that are nationally vulnerable and one nationally endangered.

It is possible that cultural values, both indigenous and non-indigenous, of national estate significance may exist in this place. As yet, the AHC has not identified, documented nor assessed these values.

Official Values:

Criterion: A Processes

The geology of the place is characterised by the interplay of the Kimberley Basin, the Hooper Complex, the King Leopold Orogen, the Canning Basin and the Yampi Fold Belt. Their events and controls have resulted in a geomorphological pattern which is distinctive in the region. The morphotectonic expression of the Yampi Fold Belt, in particular, is manifested in the pronounced ria embayments that characterise the spectacular coastline (Wyrwoll 2001). (H)

The close juxtaposition of three botanical regions within the place is highlighted by the presence of numerous species that are at the limit of their distribution. As such, it is at the southern edge of distribution for many tropical plant and several

animal taxa and at the northern or western edge for many pindan and arid-zone plants (Barrett et al 2001. p27, How et al 2001). YSTA is the south-western limit for rainforest over sandstone (Kenneally et al 1991) and the north-western limit for the distribution of pindan as it grades into a taller woodland structure of the north western Kimberley (Barrett et al 2001). (H)

Rainforest occurs in small, isolated patches in a variety of situations in the place (Barrett et al 2001), forming nodes of diversity and refugia with many regionally endemic plants, animals and invertebrates. Their importance to biodiversity is disproportionate to their small size (McKenzie et al 1991). (H)
The bird fauna is significant as it represents a suite of species, which are at or near the southern edge of their range in the semi-humid zone of the Kimberley. These include the green-winged pigeon *(Chalcophaps indica)*; Torres Strait pigeon *(Ducula bicolor)*; and the little shrike-thrush (*Colluricincla megarhyncha parvula*) (Johnstone and Burbidge 1991). The place is an important zone of overlap between many northern and southern species and sub-species, an example of which is the variegated fairy wren (*Malurus lamberti assimilis*)and (*M.l.rogersi)* (How et al 2001). (H)
The YSTA represents the most southerly known, extant population of the golden-backed tree rat *(Mesembriomys macrurus).* The occurrence of the sugar glider (*Petaurus breviceps*) is the most southerly described for the Kimberley and its persistence in both riverine forest and coastal woodlands at Kimbolton is significant in terms of providing dispersal individuals to other woodland communities (How et al 2001). (H)

Six plant taxa appear to be endemic to the YSTA or the Yampi Peninsula. Two of these species, *Corymbia* sp. nov.(aff.*opaca*) and *Solanum* sp.nov. (aff.*oedipus*) are undescribed and were collected for the first time during the 2001 survey. The *Corymbia* has only been found on a sandstone mesa south of Kimbolton homestead that is an isolated block of King Leopold Sandstone at the south-western most occurrence of this formation. The western form of *Cycas furfuracea* occurs only in the Kimbolton region and a few adjacent islands. The other endemics are *Heliotropium calvariavis*, *H. mitchellii* and *Trachymene didiscoides* (dissected leaf-form) (Barrett et al 2001). (M)

Criterion: A Processes

The diversity of regions, landforms and the high concentration of small refugial

habitats is important in presenting opportunities for the vertebrate fauna to adapt and evolve in relatively natural ecosystems. (How et al. 2001). (M)

Healthy cypress pine (*Callitris intratropica*) stands of mixed age occur on King Leopold Sandstone within and extending outside the YSTA near Secure Bay. Seedlings and young plants of *Callitris intratropica* are very rare in northern Australia (Bowman and Panton 1993, Price and Bowman 1994). Fire protected sandstone communities typified by mixed-age stands of *Callitris intratropica* are rare and represent important reference sites for similar Kimberley plant communities that are subject to more frequent fire regimes. (Barrett et al 2001). (VH)

The sandstone mesa south of Kimbolton is the southernmost locality for several plant taxa restricted to the fire-protected sandstone ranges of the Kimberley such as *Boronia wilsonii*, the Kimberley form of *Comesperma secundum*, *Fimbristylis* sp. B (FKR), *Mitrasacme nidulifera* and a sandstone cocky apple (*Planchonia* sp. A) (Barrett et al 2001). (H)

Criterion: A Processes

The landforms of the place show a strong association with the underlying structural geology and exhibit a diversity of landscapes that are unusual within a relatively limited area. (Wyrwoll. 2001) (M)

The YSTA is regionally important because it supports a very rich vertebrate fauna, the diversity being a result of the its location at a zoogeographic crossroads where the North Kimberley, Central Kimberley and Dampierland biogeographic regions abut. The vertebrate fauna shows its closest similarity to those recorded from the wetter areas of the west Kimberley to the north. The known distributions of vertebrates from the Yampi Peninsula and locations to the north and south indicate that a far richer fauna is likely to occur in the place (How et al 2001). (H)

The YSTA contains a diverse range of ecosystems and displays unusual richness of both flora and vegetation communities. Over 800 plant species, approximately one third of the described Kimberley flora, have been recorded in the place. Previous surveys of the Dampier Peninsula, Walcott Inlet, and the Kimberley Rainforest Survey enable a comparison of the changing floristic composition between adjacent areas. On the basis of species richness, indications are that over 1000 species,

including undescribed, rare and fire sensitive species that are declining elsewhere in the Kimberley (Barrett et al 2001). (H)

Granite landforms are of restricted distribution in the Kimberley and mostly occur in drier areas. The high concentration of granite outcrop sequences associated with the wetter zone that comprise the place has resulted in diverse and specialised vegetation communities. Aquatic plants inhabit the ephemeral pools that form in granite depressions; rock-colonisers populate the granite fissures and scree slopes where run-off water is high (Barrett et al 2001). (H)

Criterion: B Rarity

Several gazetted threatened or priority animal species have been recorded at Yampi. These include the nationally endangered Gouldian finch (*Erythrura gouldiae*); and four species that are nationally vulnerable – the golden-backed tree-rat (*Mesembriomys macrurus*), the golden bandicoot (*Isoodon auratus auratus*), the flatback turtle (*Natator depressus*) and the western subspecies of the partridge pigeon (*Geophaps smithii blaauwi*); Also recorded in the YSTA are several animal species that are threatened or specially protected in WA, namely the orange leaf-nosed bat *(Rhinonicteris aurantius)* and the crocodiles *Crocodylus johnstoni* and *C. proosus.* Priority listed fauna in WA found at Yampi include the ghost bat *(Macroderma gigas),* the water rat (*Hydromys chrysogaster),* the blindsnake (*Ramphotyphlops troglodytes)* and the lizards *Ctenotus yampiensis* and *Lerista separanda* (Dames and Moore 1996, How et al 2001). (H)

A number of plant taxa listed as priority species in WA have been recorded at YSTA. These include the kurrajong *Brachychiton xanthophyllus*, *Goodenia sepalosa* var. *glandulosa*, *Minuria macrorhiza*, *Phyllanthus aridus* and *Solanum leopoldense* (Barrett et al 2001). (M)

Criterion: C Research

Landforms originating from rocks within the Yampi Fold Belt associated with the Late Devonian Lillyboorarоо Conglomerate are of considerable scientific importance. The erosion of the Conglomerate that covers the underlying Kimberley Foreland topography of the Yampi Fold Belt exposes a ‘fossil’ landscape of pre-Devonian origins. In parts, the sediments also take the form of valley fill.

suggesting little erosion over the last 350 Ma. In either case, whether an exposed ‘fossil’ landscape or an essentially unmodified landscape existing for 350 Ma, the Lillyboorarоо Conglomerate has great potential scientific importance in our understanding of long-term geomorphological processes and evolution (Wyrwoll 2001). (VH)

The place is the type locality for the insectivorous plant *Byblis filifolia*, collected by Benjamin Bynoe, the ship’s doctor aboard HMS Beagle in 1838 (Lowrie 1998). *Byblis* is the only genus in the family Byblidacea and is confined to western and northern Australia (Morley and Toelken 1983) and New Guinea (A. Lowrie pers. comm.). (M)

Description:

Yampi Defence Area occurs at the confluence of three biogeographic regions in northern Western Australia and exhibits a diversity of landforms, soils and vegetation representative of the transition from the sandstone plateaux of the wetter north-west Kimberley, to the broad plains and pindan scrub of the drier south-west Kimberley.

The sandstone landforms of the Kimberley Basin are extensive throughout the place, the various rock types differing in weathering characteristics and relief expressions. In the northern parts of the place the outcrop takes the form of broad, flat-topped ridges, incised by a network of dip slope gullies and larger strike valleys, with the underlying joint systems and fault lines exerting a major influence on the surface expression. The western boundary is predominantly broken quartzite hills.

The geomorphological divisions of the place emphasise past orogenic events and reflect the characteristic rock types present and the general absence of camouflaging surficial sediment. Three major tectonic divisions are recognised: the Hooper Complex, the Canning Basin, and the Kimberley Basin.

The Hooper Complex is the oldest tectonic division and covers a large part of the central and eastern part of the place. It is overlain with the sediments of the Kimberley Basin and is typified by granite landforms. Intrusions associated with the Hart Dolerite provide distinctive ridge outcrops of boulder fields giving a characteristic 'choc-chip' appearance to hill slopes and tops.

The strong deformation of the Kimberley Basin succession of the western parts of the

place attains its strongest expression where it forms the Yampi Fold Belt. The topographic pattern of ridges of resistant sandstone between beds of more easily eroded, softer-weathering rock types defining the intervening valleys, typifies the western margins of the place. The extension of this pattern to the coast results in pronounced rias and spectacular coastal scenery characterised by deeply indented bays, rock and islet-strewn coastal waters, cliffs and mangrove-lined sheltered waters.

The rocks associated with the Canning Basin are poorly exposed in the southern part of the place. A Devonian conglomerate - the Lillybooroora Conglomerate of the Canning Basin, unconformably overlies parts of the Kimberley Basin succession. Landforms consist of low relief alluvial plains and sandplains in the southeast consisting of red clay-rich soils; red sands and black cracking clays fringed to the west by coastal sediments. Outliers of the Conglomerate cover parts of the Yampi Fold Belt forming a characteristic dissected upland plateau in the western part.

The extensive floodplains associated with the lower reaches of the rivers draining into King Sound have a complex stratigraphy, the alluvial sequences of which may provide indications of long term palaeo-hydrological and climatic history of the wider region. The tidal range for the place is up to eleven metres and extensive tidal mudflats with associated mangal and tidal creek systems are especially prominent in the south-west and in the north around Secure Bay.

The geomorphological and geographic positioning of Yampi strongly influence the vertebrate assemblages and vegetation associations of the place. Located on the southern edge of the distribution of many tropical taxa as well as the northern edge for many pindan and arid zone taxa, the place represents an unusual diversity of flora and vegetation communities.

The nineteen distinct vegetation communities identified at Yampi include:

1. Rainforests patches occurring in protected sites amongst the sandstone, over creeklines and often merging with mangroves. Yampi is at the south-western limit of distribution for this community.
2. Vine thickets on basalt extrusions scattered throughout the western and northern areas, usually on the sides of quartzite hills.
3. Semi-open woodland on King Leopold Sandstone, a community which is dominated by Darwin woollybutt (EUCALYPTUS MINIATA) and Kimberley kurrajong (BRACHYCHITON VISCIDULUS). It occurs in the north-east corner of Yampi and grades into a quartzite woodland dominated by healthy stands of cypress pine (CALLITRIS

INTRATROPICA) west of Secure Bay. One of the significant features of this community type is the presence of numerous fire sensitive species such as BORONIA WILSONII, CRYPTANDRA INTRATROPICA, STENOCARPUS ACACIOIDES and CALLITRIS INTRATROPICA.
4. Fire sensitive mallee scrub-heath dominated by an undescribed bloodwood species and found only on a mesa SSW of Kimbolton Homestead.
5. Pindan woodland of Darwin woollybutt (E.MINIATA) with a well-developed understorey of different smaller trees and shrubs. This occurs in the southern and central areas of Yampi over red sands.
6. Open grasslands of rice grass (XEROCHLOA IMBERBIS) and tanglehead (HETEROPOGON CONTORTUS) or SORGHUM STIPOIDEUM on the black-soil plains scattered throughout the central and eastern areas.
7. Mixed woodland of Darwin box (EUCALYPTUS TECTIFICA) / pindan bloodwood (CORYMBIA DAMPIERI) which displaces the pindan vegetation on the red-brown clay soils that occur throughout the place.
8. Mangals are pervasive throughout the tidal margins of the place especially around inlets and tidal portions of rivers. Eleven mangrove species are known to occur with various vine species within the canopy.

A total of 802 plant species from 122 families are recorded for the place. Of these species, 344 were recorded from one site. The presence of a large marine swamp, uncommon in the Kimberleys, south of Kimbolton homestead represents an additional floristic community that has yet to be surveyed.

The place will probably become the Type locality for CORYMBIA sp. Nov. and Solanum sp. Nov. and other undescribed taxa collected during a survey in March 2001.

Fungi are very poorly studied in the Kimberley Region. A diverse array of fungi has been identified in EUCALYPTUS MINIATA woodland to the east of the place on Beverley Springs Station and it is expected that a similarly rich fungal flora exists in similar vegetation communities in Yampi Defence Area.

The place is known to contain 15 species of amphibians, 31 species of mammals and 66 species of reptiles. Between 180-200 species of birds are recorded from the Yampi Peninsula. Noteworthy is the large number of species confined to small refugial habitats in rainforest patches, mangals, sandstone outliers and swamps. The Yampi Peninsula is the type locality for the skink, CTENOTUS YAMPIENSIS.

The Yampi Peninsula contains one of the richest amphibian faunas recorded in the

Kimberley. The composition of the native terrestrial mammal fauna of the place is closely allied to the wetter west Kimberley areas of the Bonaparte Archipelago and Prince Regent Nature Reserve to the north. However, further intensive sampling in the pindan scrub may reveal a more prominent arid component to the mammal assemblage.

The place has a high diversity of herpetofauna representative of three bioregions. Comparisons between selected elements of the fauna of the place and the same fauna documented by previous surveys in the Kimberley region indicates that over 50 species of mammals could be expected to occur within the place. The avifauna of the Yampi Peninsula has a high diversity due in part to the wide variety of habitats and the fact that it straddles three bioregions.

The place comprises the former pastoral leases of Kimbolton and Oobagooma. Oobagooma homestead (ruins) is located at the site of the first Kimberley port, through which access was gained to the Halls Creek Goldfields.

History: Not Available

Condition and Integrity:

The vesting of the former Kimbolton and Oobagooma Stations as a Defence training area in 1978 is probably the single most important factor responsible for the integrity of the natural systems, notably through the limitation on access and minimising the effects of introduced animals.

Given that the place contains many fire sensitive species, fire is considered the most important management issue in the ongoing maintenance of heritage values.

Fire continues to have a significant impact on rainforest patch size and distribution. Wildfire has reduced the size of rainforest patches on the west side of Secure Bay. In one example, fire events since 1989 have reduced the rainforest cover by 50%, with rainforest taxa being replaced by annual grasses. Wildfires are similarly dimishing many other rainforest patches in the Kimberley region. Past Aboriginal burning practices specifically protected rainforest communities from fire.

Low weed densities are an important value of the place and the greatest concentrations of exotic species were observed in the vicinity of the Kimbolton Homestead and airstrip. They include many herbs that would have been introduced

accidentally. Most are not highly invasive or serious environmental weeds and they seem to be largely restricted to disturbed areas. HYPTIS SUAVOLENS is spreading along waterways to the north of Kimbolton Homestead. Wild passion vine, PASSIFLORA FOETIDA, is an aggressive weed and a widespread problem along many waterways and in rainforest patches.

The containment of weeds to their current low levels will be dependent on weed management policies adopted for the place, including minimising the possible introduction of new and more serious weed species.

A small number of feral cattle occur and locally high populations of pigs were observed in some riparian areas. These areas were associated with the heaviest populations of the weed HYPTIS SUAVOLENS.

Pindan communities occur on fragile red sands, which are susceptible to erosion. South of Oobagooma, large eroded areas near riverbanks are now visible on LANDSAT imagery, presumably a result of overstocking in the late 1970s.
Condition assessed 10-16 March 2001.

Location:

About 566,000ha, 35km south of Koolan Island, comprising the Defence Reserve gazetted on 10 November 1978.

Bibliography:

Barrett, R.L., Barrett, M.D., Start, A.N. and Dixon, K.W. (2001). Flora of the Yampi Sound Defence Training Area, Derby, Western Australia. Report prepared for the Australian Heritage Commission.

Bowman, D.M.J.S AND Panton, W.J. (1993). Decline of CALLITRIS INTRATROPICA in the Northern Territory: implications for pre- and post-colonisation fire regimes. Journal of Biogeography 20: 337-381.

Dames and Moore (1996). Yampi Sound Training Area - Draft Environmental Management Plan. Report prepared for the Department of Defence.

How, R.A., Cooper, N.K., Johnstone,R.E. and Smith, L.A. (2001). Assessment of Vertebrate Fauna of the Yampi Sound Defence Training Area (YSTA), Derby, WA.

Report prepared for the Australian Heritage Commission.

Johnstone, R.E. and Burbidge, A.H. (1991). The Avifauna of Imberley Rainforests in N.L. McKenzie, R.B. Johnston and P.G.Kendrick (eds.), Kimberley Rainforests of Australia. Surrey Beatty and Son, Chipping Norton.

Johnstone, R.E. and Storr, G.M. (1998). Handbook of Western Australian Birds, Volume I, Non-Passerines (Emu to Dollarbird). Western Australian Museum.

Lowrie, A.J. (1998). Carnivorous Plants of Australia, Vol. 3. University of Western Australia Press

McKenzie, N.L. (2001). Analysis of Bat Ultrasound Recordings from Yampi Defence Area. Report prepared for the Australian Heritage Commission.

McKenzie, N.L., Johnston, R.B. and Kendrick, P.G (Eds.) (1991). Kimberley Rainforests of Australia. Surrey Beatty and Son, Chipping Norton.

Morley, B.D. and Toelken, H.R. (Eds.) (1983). Flowering plants in Australia. Rigby Publishers, Willoughby NSW.

Price, O. and Bowamn, D.M.J.S. (1994). Fire-stick forestry a matrix model in support of skilful fire management of CALLITRIS INTRATROPICA R. T. Baker by North Australian Aborigines. Journal of Biogeography 21: 573-580.

Wyrwoll, K-H. (2001). Assessment of Geomorphological Values - Yampi Sound Training Area. Report prepared for the Australian Heritage Commission.