NSW GOVERNMENT
Environment, Climate Change & Water
National Parks & Wildlife Service

Budelah Nature Reserve

Plan of Management

BUDELAH NATURE RESERVE

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

Part of the Department of Environment, Climate Change and Water

November, 2010

This plan of management was adopted by the Minister for Climate Change and the Environment on 17th November 2010.

Acknowledgments

The NPWS acknowledges that this reserve is in the traditional country of the Kamilaroi people.

This plan of management is based on a draft plan prepared by the staff of the Northern Plains Region of the NSW National Parks and Wildlife Service (NPWS), part of the Department of Environment, Climate Change and Water.

Valuable information and comments were provided by local people who attended a public meeting at "Athlone" on 26 November 2006, and by representatives of the Mungindi Local Aboriginal Land Council who attended a meeting at "Athlone" on 17 January 2007 as well as the submissions received on the draft plan. Thanks also to the reserve's neighbours for their on-going co-operation.

Cover photograph of vulnerable glossy black-cockatoos in Budelah Nature Reserve by Adam Henderson, NPWS.

For additional information or any inquiries about this reserve or this plan of management, contact the NPWS Narrabri Area Office, 100 Maitland Street (PO Box 72), Narrabri 2390 or by telephone on 6792 7300.

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FOREWORD

Budelah Nature Reserve covers an area of 4,045 hectares and is located approximately 40 kilometres northeast of Mungindi and 120 kilometres northwest of Moree, in north west NSW.

Budelah Nature Reserve conserves the endangered ecological communities of Coolibah-Black Box Woodland and Carbeen Open Forest; threatened animal species such as the Glossy Black-cockatoo, Bush Stone-curlew, Australian Bustard and Barking Owl; and the historic "Athlone" homestead precinct. It is part of the traditional country of the Kamilaroi Aboriginal people and contains over 50 Aboriginal sites, including artefact scatters, scarred trees and a shell midden.

The New South Wales *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document that outlines how an area will be managed in the years ahead.

A draft plan of management for Budelah Nature Reserve was placed on public exhibition from 5th December 2008 until 23rd March 2009. The submissions received were carefully considered before adopting this plan.

The plan contains a number of actions to achieve the State Plan priority to "Protect our native vegetation, biodiversity, land, rivers and coastal waterways", including measures to improve water quality and flows in the reserve's creeks and catchments, establishment of a program to monitor the long-term health of key floodplain and riparian species, protection of threatened species and endangered ecological communities, and pest control programs.

This plan of management establishes the scheme of operations for Budelah Nature Reserve. In accordance with Section 73B of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Frank Sartor MP
Minister for Climate Change and the Environment

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1. BUDELAH NATURE RESERVE

Budelah Nature Reserve is located about 40 kilometres northeast of Mungindi, 45 kilometres west of Boomi, and 120 kilometres northwest of Moree, in north west NSW. The reserve is 4,045 hectares in size and straddles the Macintyre and Boomi Rivers. It is made up of the former property "Athlone", and part of the property "Thorndale", which were purchased in 2002 by the NSW Government and gazetted as a nature reserve in 2005. Its name is derived from Budelah Creek situated in the eastern portion of the reserve.

Prior to purchase the reserve was a property utilised for the grazing of sheep and cattle, with a small area of cultivation. It was purchased primarily for its natural values, which include the endangered ecological communities of Coolibah-Black Box Woodland and Carbeen Open Forest, and recorded threatened species such as the Glossy Black-cockatoo, Bush Stone-curlew, Australian Bustard and Barking Owl.

The reserve borders areas cleared for broad acre cropping on three sides (west, south and east). It is located in a region highly modified for agriculture with original vegetation communities remaining only in fragments, and where the natural flow regime of rivers has been substantially altered.

Budelah Nature Reserve is within the geographical area of the Darling Riverine Plains Bioregion, Moree Plains Local Government Area, the Border Rivers-Gwydir Catchment Management Authority, North West Livestock Health and Pest Authority, and the Mungindi Local Aboriginal Land Council.

2. MANAGEMENT CONTEXT

2.1 LEGISLATIVE AND POLICY FRAMEWORK

The management of nature reserves in NSW is in the context of a legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the NPW Regulation, the *Threatened Species Conservation Act 1995* (TSC Act) and the policies of the National Parks and Wildlife Service (NPWS). The policies are based on the legislative background and internationally accepted principles of park management. They relate to nature conservation, Aboriginal and historic heritage conservation, recreation, commercial use, research and communication.

Other legislation, international agreements and charters may also apply to management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) may require the assessment and mitigation of the environmental impacts of works proposed in this plan. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) also applies in relation to actions that may impact on threatened species listed under that Act.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted a plan, no operations may be undertaken within Budelah Nature Reserve except in accordance with this plan. This plan will also apply to any future additions to Budelah Nature Reserve. Should management strategies or works be proposed for the

nature reserve or any additions that are not consistent with the plan, an amendment to the plan will be required.

2.2 MANAGEMENT PURPOSES AND PRINCIPLES

Nature reserves are reserved under the NPW Act to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

Under the NPW Act, nature reserves are managed to:

- conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphological features and natural phenomena;
- conserve places, objects, features and landscapes of cultural value;
- promote public appreciation, enjoyment and understanding of the reserve's natural and cultural values; and
- provide for appropriate research and monitoring.

Nature reserves differ from national parks in that they do not have as a management principle to provide specifically for visitor use.

2.3 MANAGEMENT DIRECTIONS

Major strategies to achieve the management objectives are:

- Protection of significant vegetation communities including the endangered ecological communities of Coolibah–Black Box Woodland and Carbeen Open Forest;

- Protection of significant fauna habitats, including grassy woodlands, natural grasslands, riparian and ephemeral flood out areas, that provide habitat for significant fauna such as the threatened Bush Stone-curlew, Australian Bustard, Stripe-faced Dunnart, Barking Owl and Glossy Black-cockatoo;

- Protection of significant fauna through pest control programs;

- Protection of historic heritage, in particular the "Athlone" homestead precinct;

- Protection of Aboriginal sites in consultation with the Aboriginal community, including providing the opportunity for education of the local Aboriginal community about cultural values by local Aboriginal knowledge holders;

- Research into the reserve's natural and cultural values, particularly concerning the recovery of biodiversity since gazettal as a nature reserve; and

- Provision of the opportunity for use of the reserve for educational purposes.

3. VALUES OF THE RESERVE

The location, landforms and plant and animal communities of an area have determined how it has been used and valued. Both Aboriginal and non-Aboriginal people place values on natural areas, including aesthetic, social, spiritual, recreational and other values. These values may be attached to the landscape as a whole or to individual components, for example to plant and animal species used by Aboriginal people. This plan of management aims to conserve both natural and cultural values. For reasons of clarity and document usefulness, natural heritage, cultural heritage, threats and on-going use are dealt with individually, but their inter-relationships are recognised.

3.1 LANDFORM, GEOLOGY AND SOILS

Budelah Nature Reserve consists predominantly of level terrain at about 170 metres above sea level. It is a floodplain with only a minor variation in topography (of no greater than six metres) occurring where the floodplain meets sandy rises.

Soils in the reserve are derived from Quaternary alluvial material deposited over the last two million years over a thick layer of sediment that was laid down during the earlier Jurassic-Cretaceous era. The reserve is typically made up of heavy grey to black clay and cracking clay soils, with smaller areas of sandy clay loam. Sandy deposits left in ancient stream channels and river bends form sand rises. The “Athlone” homestead is located on one such sand rise.

The reserve fronts about six kilometres of the Macintyre River on the western boundary (the river here forms part of the QLD-NSW state border). On the eastern boundary it fronts about 10 kilometres of the Boomi River. However, a give-and-take boundary fence shares the actual river frontage. Boomangera and Budelah Creeks meander through the reserve. Minor ephemeral flood channels and lagoon areas also occur in the reserve, which fill as a result of overflow from the major watercourses, or occasionally as a result of local heavy rainfall. The reserve is located within the catchment of the Great Artesian Basin.

Natural stream flow regimes within the reserve have been altered by upstream dams and weirs. Stream flows of the Macintyre River have been modified by the Glen Lyon, Pindari and Coolmunda Dams and other in-stream structures such as weirs. Boomi River flows are largely determined by a diversion weir at its junction with the Macintyre River. Flows are released several times per year for stock and domestic purposes. Running water in the Boomangera and Budelah Creeks are the result of overflows from the Macintyre and Boomi Rivers respectively. The Macintyre River becomes the Barwon River downstream of the reserve at its junction with the Weir River.

3.2 NATIVE PLANTS

Budelah Nature Reserve is dominated by woodland, with smaller areas of grassland, shrubland and open forest. The dominant vegetation class found in the reserve is the Northwest Floodplain Woodlands. This class typically occurs on heavy clay soil floodplain with an annual average rainfall of about 500 millimetres, supplemented by occasional floods (Keith, 2004).

Seven vegetation communities have been described and mapped in Budelah Nature Reserve (Hunter, 2006). The communities are:

- Coolibah *Eucalyptus coolabah* – Belah *Casuarina cristata* Woodland (Proportion of reserve 38%);
- Mitchell Grass *Astrebla* sp. Grassland (26%);
- Dark Roly Poly *Sclerolaena muricata* var. *semiglabra* – Queensland Bluegrass *Dichantheum sericeum* var. *sericeum* Shrubby Grassland (16%);
- River Red Gum *Eucalyptus camaldulensis* – Coolibah *E. coolabah* Woodland (18%);
- Lignum *Muehlenbeckia florulenta* Thicket (1%);
- Carbeen *Corymbia tessellaris* – River Red Gum *Eucalyptus camaldulensis* Woodland (2%); and
- Poplar *Box Eucalyptus populnea* subsp. *bimbil* – Ironwood *Acacia excelsa* var. *excelsa* Woodland (0.4%).

The reserve protects four endangered ecological communities as listed under the TSC Act:

- Coolibah *Eucalyptus coolabah* – Black Box *E. largiflorens* Woodland (about 3,000 hectares);
- Carbeen *Corymbia tessellaris* Open Forest (about 75 hectares);
- Brigalow *Acacia harpophylla* Community (less than 10 hectares); and
- Myall *Acacia pendula* Woodland (less than 15 hectares).

The Brigalow *Acacia harpophylla* and Weeping Myall *Acacia pendula* Woodland communities are also listed as endangered ecological communities.

Hunter (2006) recorded a total of 200 vascular plant species in the reserve. In comparison with other key reserves sampled in north western NSW the species richness, or floral diversity, of Budelah Nature Reserve is described as being at a medium level.

Table 1 below lists threatened and significant plants recorded in the reserve. Note that the record of *Haloragis stricta* still requires full verification (Hunter, 2006).

Table 1 Threatened and significant plant species recorded in the reserve.

Common name	Scientific name	Status
A raspwort	*Haloragis stricta*	Presumed Extinct *
Purple Running Pea	*Kennedia procurrens*	Regionally Significant
River Cress	*Rorippa eustylis*	Regionally Significant

* Status under TSC Act

Much of the reserve has been affected by over 100 years of livestock grazing and a small area of former cultivation (175 hectares). Clearing has been widespread by the practice of ring barking. As a result a considerable portion of the woodlands are in an early stage of vegetative regeneration. Areas disturbed by grazing and cultivation are evident by varying degrees of unstable topsoil, minor erosion, weeds and a reduction in forb species. Some areas of former grassland have been transformed to shrubland, dominated by species such as Dark Roly Poly *Scerolaena muricata* var. *semiglabra*.

However, much of the grassland areas are in a good condition. Floodplain vegetation, including the dominant communities of Coolibah-Belah and River Red Gum-Coolibah woodlands, is likely to be affected in the long-term by the alterations in natural flow regimes of the Macintyre and Boomi Rivers. Alteration to the natural flow regimes of rivers, streams and floodplains is listed as a key threatening process in NSW under the TSC Act. Degradation of native riparian vegetation has been declared a threatening process under the *Fisheries Management Act 1994*.

The introduced Buffel Grass *Chenchrus ciliaris* dominates the under storey on the "Athlone" homestead sand rise and has partially spread over other sand rises.

The Coolibah *Eucalyptus coolabah* found in the reserve is just one member of a group of closely related species collectively known as coolabahs that occur across Australia. Land use on the northern plains of NSW is rapidly changing from grazing to broad acre cropping for the production of cotton and wheat. It is estimated that 12-20% of the Coolibah woodlands on the Moree floodplains were cleared between 1985 and 2000. The pattern of clearing across the landscape shows increasing fragmentation, with over half of the remaining woodlands surviving as patches of less than 100 hectares (Keith, 2004). The reserve is significant, therefore, in protecting in excess of 1,500 hectares of Coolibah woodlands on the northern plains of NSW. In addition, Budelah Nature Reserve is located in the Darling Riverine Plains Bioregion, which is one of the most poorly conserved in NSW. Less than 1% of the vegetation communities that are found in Budelah Nature Reserve are protected in the NPWS reserve system in the Darling Riverine Plains Bioregion (NPWS, 2001).

3.3 NATIVE ANIMALS

Budelah Nature Reserve provides habitats for a variety of native animals. A fauna survey was carried out in 2007, with over 45 species recorded so far (Henderson, 2007). Bird records have been collated since 2002, with over 120 species recorded so far (Mitchell, 2006). Bird and fauna lists are found at Appendices 1 and 2.

Common fauna species in the reserve include the Eastern Grey Kangaroo *Macropus giganteus*, Red Kangaroo *M. rufus*, Black Wallaby *Wallabia bicolor*, Lace Monitor *Varanus varius*, Bearded Dragon *Pogona barbata*, Green Tree Frog *Litoria caerulea* and Peron's Tree Frog *L. peronii*. Common bird species include the Emu *Dromaius novaehollandiae*, Crested Pigeon *Ocyphaps lophotes*, Peaceful Dove *Geopelia placida*, Sulphur-crested Cockatoo *Cacatua galerita*, Galah *Cacatua roseicapilla*, White-plumed Honeyeater *Lichenostomus penicillatus*, Willie Wagtail *Rhipidura leucophrys*, Jacky Winter *Microeca leucophaea* and Australian Raven *Corvus coronoides*.

Key habitat values include riparian corridors and sand rises with mature hollow bearing trees, open grassy woodlands with mature hollow bearing trees and frequent log debris, natural grasslands with cracking clay soils, and ephemeral flood out areas, such as lagoons. Habitats have been affected by the pressures of over 100 years of livestock grazing, clearing, cultivation, and alterations to natural water flow regimes. Grasslands and grassy woodlands are key habitats for two endangered species recorded in the reserve – the Bush Stone-curlew *Burhinus grallarius* and Australian Bustard *Ardeotis australis*.

The Macintyre River, Boomi River and their tributaries, including Budelah and Boomangera Creeks, contain potential habitat for several threatened aquatic species, populations and communities listed under the Fisheries Management Act. These include, in addition to the species listed in Table 2, the endangered "aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River", the endangered western population of the Olive Perchlet *Ambassis agassizii,* and the endangered Murray-Darling population of the Eel-tailed Catfish *Tandanus tandanus.*

The reserve's habitat values increase in importance when considering the fragmentation of habitat surrounding the reserve, including the broad acre cropping on three sides. The reserve provides an important wildlife corridor, 10-15 kilometres wide between the Boomi and Macintyre Rivers, and there is connectivity of habitat with neighbouring properties to the north.

Although an abundance of suitable habitat is provided for small ground dwelling mammals, such as dunnarts and planigales, no species have yet been captured despite intensive surveying. Predation by foxes and cats is certainly a factor. The Striped-faced Dunnart *Sminthopsis macroura* was identified in a fox scat collected in the reserve in 2007. The recording of some animals is often opportunistic in response to favourable weather events, such as flooding.

Table 2 below lists threatened animal species recorded in the reserve, or that are likely to occur in the reserve, based on available habitat and known records in the surrounding Castlereagh-Barwon sub-region of the Darling Riverine Plains bioregion. Threatened species recovery plans in NSW have been prepared for the Bush Stone-curlew and Barking Owl and the NSW Threatened Species Priorities Action Statement lists actions that can be taken to assist the recovery of other threatened species.

Table 2 Threatened animal species under the Threatened Species Conservation (TSC) Act or Fisheries Management (FM) Act recorded or likely to occur in the reserve.

Common name	Scientific name	TSC or FM Act Legal Status
Magpie Goose	*Anseranas semipalmata*	Vulnerable
Australian Bustard	*Ardeotis australis*	Endangered *
Australasian Bittern	*Botaurus poiciloptilus*	Vulnerable
Bush Stone-curlew	*Burhinus grallarius*	Endangered *
Red-tailed Black-cockatoo	*Calyptorhynchus banksii*	Vulnerable * ^
Glossy Black-cockatoo	*Calyptorhynchus lathami*	Vulnerable *
Pink Cockatoo	*Cacatua leadbeateri*	Vulnerable *
Speckled Warbler	*Chthonicola sagittata*	Vulnerable
Brown Treecreeper	*Climactus picumus victoriae*	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable *
Black-necked Stork	*Ephippiorhynchus asiaticus*	Endangered
Grey Falcon	*Falco hypoleucos*	Vulnerable
Painted Honeyeater	*Grantiella picta*	Vulnerable
Brolga	*Grus rubicundus*	Vulnerable *
Square-tailed Kite	*Lophoictinia isura*	Vulnerable
Little Eagle	*Hieraaetus morphnoides*	Vulnerable
Barking Owl	*Ninox connivens*	Vulnerable *
Hooded Robin	*Melanodryas cucullata cucullata*	Vulnerable *

Black-chinned Honeyeater	*Melithreptus gularis*	Vulnerable
Turquoise Parrot	*Neophema pulchella*	Vulnerable
Grey-crowned Babbler	*Pomastostomus temporalis temporalis*	Vulnerable *
Grass Owl	*Tyto capensis*	Vulnerable
Masked Owl	*Tyto novaehollandiae*	Vulnerable
Painted Snipe	*Rostratula benghalensis*	Endangered
Diamond Firetail	*Stagonopleura guttata*	Vulnerable
Little Pied bat	*Chalinolobus picatus*	Vulnerable
Beccari's Freetail-bat	*Mormopterus beccarii*	Vulnerable
Greater Long-eared Bat (SE form)	*Nyctophilus timoriensis*	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable
Stripe-faced Dunnart	*Sminthopsis macroura*	Vulnerable *
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*	Vulnerable
Five-clawed Worm-skink	*Anomalopus mackayi*	Endangered ^
Pale-headed Snake	*Hoplocephalus bitorquatus*	Vulnerable
River Snail	*Notopala sublineata*	Endangered
Silver Perch	*Bidyanus bidyanus*	Vulnerable
Purple Spotted Gudgeon	*Mogurnda adspersa*	Endangered

* Recorded in Budelah Nature Reserve.
^ Denotes species also listed as nationally threatened under the EPBC Act.

3.4 ABORIGINAL HERITAGE

Aboriginal communities have an association and connection to the land. The land and water within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge, kinship systems and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable from each other and need to be managed in an integrated manner across the landscape.

Budelah Nature Reserve is situated in an area that is part of the traditional home of the Kamilaroi. Today many Kamilaroi live in towns of the NSW northwest plains, including Mungindi. The Aboriginal people in the area of the reserve are represented by the Mungindi Local Aboriginal Land Council (LALC).

Information on the traditional way of life, customs and language of the Kamilaroi is available through texts and various oral sources. However, information on the way of life and customs in the specific reserve area is limited to a couple of local histories and the interpretation of material evidence. For example, an account from a neighbouring landholder in 1921 recalls that during a period of flood when box trees on the "Athlone" sand rise were being lopped for fodder a human skeleton was discovered in the hollow of a tree. This was probably an Aboriginal burial. The skeleton was removed and lost (Brosnan, 2004).

Over 50 Aboriginal sites have been recorded in the reserve. A site survey was carried out in 2006 with the assistance of the Mungindi LALC and people from the Mungindi community employed by NPWS. The survey recorded 47 sites across the reserve. Three site types were recorded – artefact scatters, modified or scarred trees (including a canoe tree) and a shell midden. Artefact scatters are the most common site type, followed by scarred trees. Stone artefacts are generally very small, probably due to the

fact that there is no local source of stone and stone would therefore have to be brought from outside the local area. Stone used includes silcrete, quartz, argite, river pebbles and sandstone. Sites are commonly found on the margins of sand rises and on stream banks. None were found on open floodplains of black clay soils. Large sites of artefact scatters (50+) and scarred trees in the reserve were found, including at the confluence of a flood channel and prominent creek, where a shell midden has also been recorded (Henderson, 2007).

All sites in the reserve are in a relatively stable condition. Natural process, such as flood, wildfire, erosion and decay may over time disturb or even destroy Aboriginal sites. This in many cases is unavoidable. Some sites are in areas that have the potential to be affected by human and mechanical activities, such as road works.

3.5 HISTORIC HERITAGE

The Mungindi area was first officially explored by Sir Thomas Mitchell in 1846 on his expedition from Sydney to the Gulf of Carpentaria. However, settlers were already active along the Barwon/Macintyre River from Walgett to Goondiwindi at this time. The earliest properties near Budelah Nature Reserve include “Werrina Station” and “Colunah”, established in the late 1830s or early 1840s.

Budelah Nature Reserve is made up of the former property “Athlone” and part of the property “Thorndale”. Athlone is a town in central Ireland, and its use in the name of the property demonstrates the origins of the first settlers. Edward Murphy purchased “Athlone” from Patrick Ryan in 1908. Edward and Janet Murphy had 13 children between 1906 and 1922. Edward had two children from a previous marriage. All 15 children were brought up at “Athlone” with the live-in assistance of Edward’s mother Johannah, until her death in 1922, and a number of governesses. Edward Murphy junior (the first born) took over “Athlone” after his father’s death in 1952. Members of the Murphy family lived on “Athlone” right up until its sale to the NSW Government in 2002. The “Thorndale” block of the reserve has always been a ‘scrub block’ with no improvements apart from fencing. It was a part of the “Thorndale” property, purchased by Frank Murphy in 1897, a brother of Edward Murphy of “Athlone” (MDHBC, 1988, Murphy, 2003 & Brosnan, 2004).

“Athlone” was principally a sheep property, although cattle grazing and cultivation also took place. Evidence of activities associated with pastoral production is still visible on the reserve, including stags with ringbark marks, old camps with discarded bottles, internal fencing, dams, sheep yards and an old stock bridge over Boomangera Creek. Other items of historical interest in the reserve include boundary survey markers as scars on trees, old telegraph line poles and the scattered remnants of domestic rubbish tips.

The original “Athlone” homestead was built on Boomangera Creek in 1908. It was moved to its current location in 1911. In addition to the homestead, there was originally an orange orchard and two tennis courts, which are now gone. Extensive renovations have been carried out on the “Athlone” homestead since 2002 by NPWS. The homestead is currently in very good condition. It still maintains its original timber structure, floor plan and character. It is now a residence for a NPWS staff member, whose role is the management of Budelah Nature Reserve and other reserves in the Moree district. The “Athlone” homestead precinct contains infrastructure associated

with its past, including a five-stand shearing shed and yards, shearers' quarters and meat house, various sheds, an outside toilet, and internal fencing. Most of the buildings on the site date from the period 1911 to early 1920s (Murphy, 2003 & High Ground Consulting, 2008).

The "Athlone" homestead precinct has been assessed to be of local significance, except the shearing shed and shearers' quarters which have been assessed to be of State significance. "Athlone" is held in good regard by the local population for its association with a prominent local family. A conservation management strategy has been prepared (High Ground Consulting, 2008). Despite the name of Budelah Nature Reserve, the "Athlone" name is retained for the homestead precinct in recognition of its historic and cultural associations.

3.6 EDUCATION, RECREATION AND RESEARCH VALUES

The primary purposes of nature reserves are the conservation of natural and cultural heritage and to provide opportunities for education and scientific research. As the land remained in private ownership up to its purchase by the NSW Government, there has been no public recreational use of the land and no public recreation facilities exist. Picnicking and camping opportunities, and access to the Macintyre/Barwon and Boomi Rivers, are available elsewhere in the Mungindi and Boomi areas.

For the above reasons, Budelah Nature Reserve will not be promoted for recreational use. Public use and visitation of the reserve is supported where it meets the objectives of the reserve and is consistent with this plan of management.

Use of the reserve for research is encouraged. The reserve provides opportunities for a variety of research and monitoring projects, particularly with the facilities and resources available at "Athlone". A key theme of study is the monitoring of the recovery of biodiversity since land management objectives have changed from livestock and crop production to nature conservation. For example, Landscape Function Analysis plots have been established for long-term annual monitoring. This is a CSIRO methodology designed to measure improvements in landscape function over time, including soil stability, infiltration and nutrients and vegetation cover (Tongway & Hindley, 1996).

4. THREATS TO RESERVE VALUES

4.1 PEST SPECIES

Pest species within Budelah Nature Reserve and on adjoining lands are of concern because they have detrimental effects on natural values and can spread to and from neighbouring lands.

The NPWS aims to manage populations of pest species to minimise adverse impacts by employing best practice methods. There is a clear recognition that total eradication of pest species is generally not feasible. Pest control is more effective when undertaken in conjunction with local landholders, rather than in isolation.

Pest management will be undertaken in accordance with the strategies and recommendations outlined in the current NPWS Northern Plains Region Pest Management Strategy, relevant threat abatement plans, recovery plans and the priorities action statement.

Pest animals

All pest animals in the reserve pose a serious threat to threatened species, including those threatened species particularly vulnerable to predation - the Bush Stone-curlew *Burhinus grallarius*, Australian Bustard *Ardeotis australis*, and Striped-faced Dunnart *Sminthopsis macroura*. Predation by the fox and cat are listed as key threatening processes in NSW under the TSC Act and the EPBC Act.

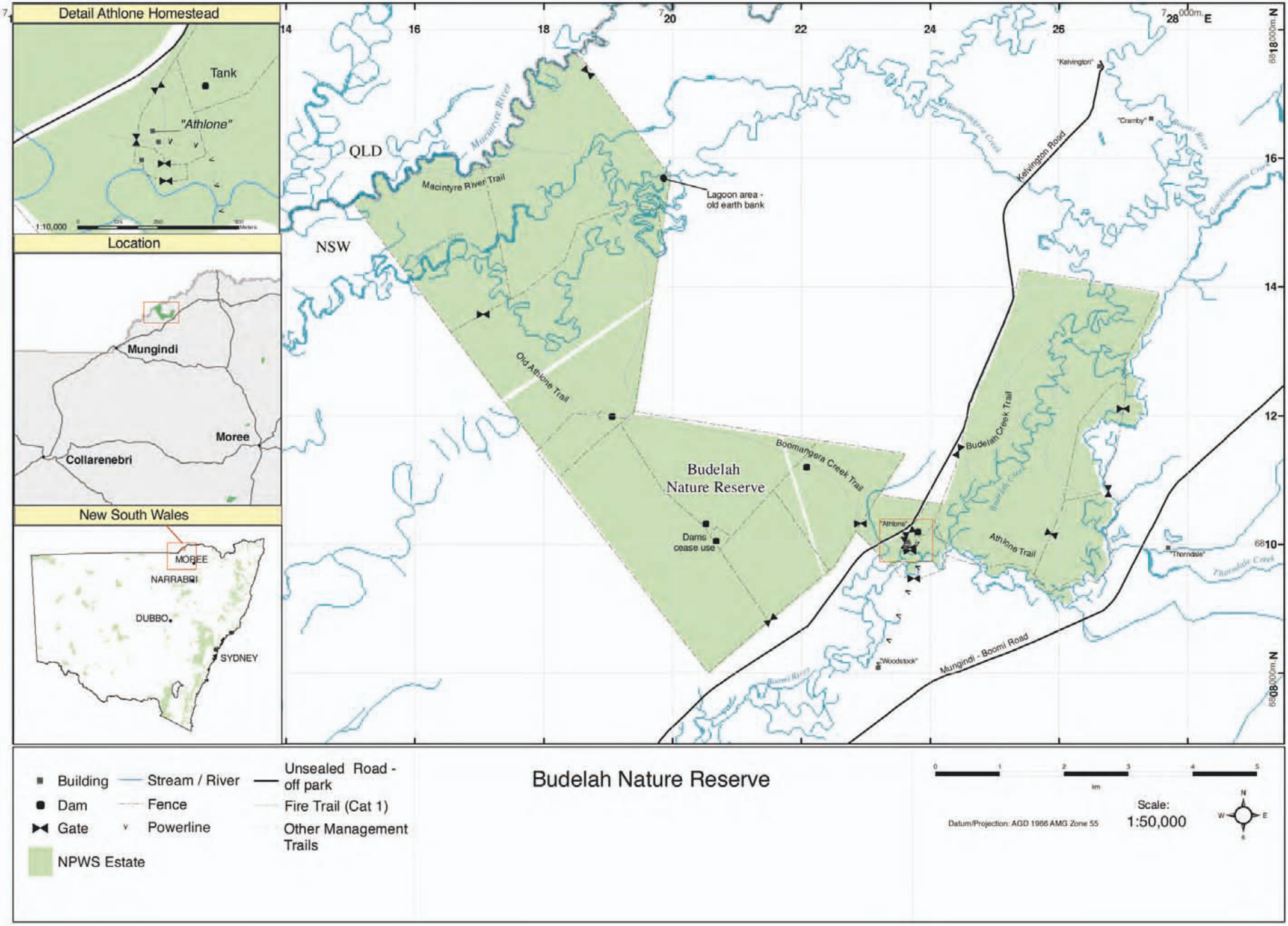
Dams in the reserve can provide an artificial water source for pest animals, particularly pigs.

Table 3 below lists the key pest animals that occur in the reserve that require strategic control.

Table 3 Key pest animals in the reserve.

Common name	Scientific name	Summary
Feral Pig	*Sus scrofa*	Widespread, numbers fluctuate from low to high
Fox	*Vulpes vulpes*	Widespread, numbers generally low to medium
Feral Cat	*Felis cattus*	Widespread, numbers generally low
Rabbit	*Oryctolagus cuniculus*	Localised - sand rises, numbers low

The Brown Hare *Lepus capensis* and House Mouse *Mus musculus* are pest species of a less serious nature occurring in the reserve. Dog scats have also been identified throughout the reserve from time to time. Straying livestock is an on-going issue that is managed in conjunction with reserve neighbours.


Detail Athlone Homestead
Tank
"Athlone"
1:10,000
Location
Mungindi
Moree
Collarenebri
New South Wales
MOREE
NARRABRI
DUBBO
SYDNEY
QLD
NSW
Macintyre River
Macintyre River Trail
Lagoon area - old earth bank
Old Athlone Trail
Budelah Nature Reserve
Boomangera Creek Trail
Dams cease use
Budelan Creek Trail
"Athlone"
Athlone Trail
Kelvington Road
"Kelvington"
"Cranby"
Boomi River
"Thorndale"
Thorndale Creek
"Woodstock"
Mungindi - Boomi Road
Building
Dam
Gate
Stream / River
Fence
Powerline
Unsealed Road - off park
Fire Trail (Cat 1)
Other Management Trails
NPWS Estate
Budelah Nature Reserve
km
Scale:
1:50,000
Datum/Projection: AGD 1966 AMG Zone 55

Weeds

Introduced plants make up about 12% of the plant taxa in the reserve, most of which are found in areas associated with high disturbance, around margins of the reserve and where roads dissect. Most of these introduced plants, however, are not declared noxious or considered a serious environmental threat (Hunter, 2006).

Table 4 below lists the key noxious and environmental weeds found in the reserve that require strategic control.

Table 4 Key noxious and environmental weeds in the reserve.

Common name	Scientific name	Status & Summary
Spiny Burrgrass	*Cenchrus incertus*	*localised on sandy areas
Prickly Pear	*Opuntia stricta*	*widespread in light infestations
Lippia	*Phyla canescens*	*localised near waterbodies
Bathurst Burr	*Xanthium spinosum*	*localised, esp. old cultivation paddock
Noogoora Burr	*Xanthium occidentale*	*localised in light infestations
Mimosa Bush	*Acacia farnesiana*	Localised scattered infestations along trails; localised widespread infestations
Buffel Grass	*Cenchrus ciliaris*	Isolated infestations on sand rises

* Listed under the *Noxious Weeds Act 1993* and declared in Moree Plains Shire Council.

It is recognised that some environmental weed species may occur in the reserve that have not yet been identified because they are in small numbers. Additional environmental weed species may also invade the reserve from surrounding lands, brought in via watercourses and by vehicles and pest animals.

4.2 FIRE MANAGEMENT

Fire is a natural feature of many environments and is essential for the survival of some plant communities. However, inappropriate fire regimes can lead to loss of particular plant and animal species and communities, and high frequency fires have been listed as a key threatening process under the TSC Act.

The primary fire management objectives of the NPWS are to protect life and property and community assets from the adverse impacts of fire, whilst managing fire regimes to maintain and protect biodiversity and cultural heritage (NPWS, 2005). The NPWS uses a zoning system for bushfire management which is compatible with the zoning used by the Moree Plains Bush Fire Management Committee (BFMC) in its bushfire risk management plan. Budelah Nature Reserve is largely a Land Management Zone with an Asset Protection Zone around the “Athlone” precinct. A fire management strategy was prepared in 2006. Hazard reduction programs, which include mechanical fuel reduction, prescribed burning and fire trail works, are submitted to the Moree BFMC.

There is a very low incidence of fire in the reserve and surrounding area. There has not been a fire in the reserve since its purchase by NPWS in 2002. The last bushfire in the reserve area was in 1951. This was a year of increased grass growth following the 1950 flood. Lightning strikes started a fire about 10 kilometres out of Mungindi and burnt out to Boomi, including the Macintyre River area of “Athlone” (Murphy, 2003). The district has changed greatly since 1951, with broad scale cropping areas

dominating the landscape and timbered and grassy areas remaining only as fragments. For this reason, such a large bushfire event is now unlikely.

The likely cause of a bushfire in the reserve is a lightning strike during the spring and summer period. Areas of grassland and grassy woodlands in particular may contribute to a rapidly spreading bushfire in extreme fire weather conditions, as long as grasses are well cured. However, total available fuels in these vegetation structures are generally low (estimated to be less than 10 tonnes per hectare) and fuel hazards are variable. These factors, in combination with a level terrain, mean that typical bushfire behaviour is likely to be of low to medium intensity.

In general no two fires should occur within a 20 year period to protect vegetation communities in the long term (Hunter, 2006). Beyond this threshold prescribed burns may be considered as a measure to preserve biodiversity. The Budelah Nature Reserve Fire Management Strategy proposes a prescribed burn in the northwest portion of the reserve for ecological reasons.

High intensity fires that consume large trees, tree canopies and fallen logs should be avoided to protect both natural and cultural values. A single fire event over a large area of the reserve is not desirable. Significant built assets in the reserve that are vulnerable to fire are located within the "Athlone" homestead precinct. This precinct is an Asset Protection Zone and mowing is regularly carried out as a hazard reduction activity. Strategic control lines include all fire trails, Kelvington Road, and the Macintyre River. Fire trail maintenance to increase effectiveness includes grading, spraying and slashing. Reliable water sources include the "Athlone" ground tank and Macintyre River. Other watercourses and dams in the reserve are ephemeral and are only an advantage when full.

4.3 ALTERED WATER FLOWS

The reserve is predominantly a floodplain with an ecology formed by pre-development flow regimes. Flow-related ecology of the floodplain and riparian areas in the reserve are likely to be affected in the long-term by alterations to the natural flow regimes of the Macintyre and Boomi Rivers. Alteration to the natural flow regimes of rivers, streams and floodplains is listed as a key threatening process in NSW under the TSC Act. Degradation of native riparian vegetation has been declared a threatening process under the Fisheries Management Act.

A detailed study of the environmental health of sub-catchments indicates the waterways around Budelah Nature Reserve also suffer from stress due to loss of riparian vegetation, gully/streambank erosion, barriers to fish passage, chemicals and water turbidity (DLWC, 1999).

The NPWS has limited influence and control over water flow issues outside of reserve boundaries. The NPWS seeks to participate in broader water issues and influence outcomes through formal Government processes.

The Water Sharing Plan NSW Border Rivers Regulated River Water Source (DWE, 2007) aims to share the water of the Macintyre River and other streams in the area between agricultural, domestic and environmental interests.

5. MANAGEMENT OPERATIONS AND OTHER USES

The “Athlone” precinct in Budelah Nature Reserve includes the following built assets that are essential to the day to day operations of the reserve management:

- Homestead, including septic system and rain water tanks;
- All weather access road;
- Ground tank with pipe from Boomi River;
- Workshop and office, including water tanks;
- Staff quarters, toilet/shower and septic system;
- Herbicide and fuel storage shed; and
- Shearing shed and yards and two old sheds, including water tank (for storage).

Fire trails in the reserve are mapped and classified in the Budelah Nature Reserve Fire Management Strategy and are used for both strategic and management purposes. There are about 30 kilometres of management trails in the reserve. All trails are 4WD dry weather access only.

A power line traverses the reserve for about 700 metres, servicing the “Athlone” precinct and other properties to the south and east. It is currently maintained by Country Energy in agreement with NPWS. Kelvington Road, which traverses the reserve for about one kilometre, is the responsibility of the Moree Plains Shire Council.

Boundary fences are generally in a good condition with approximately 20 kilometres having been replaced in co-operation with reserve neighbours since purchase of the property by NPWS in 2002. Boundary breaks or trails currently exist along about 30% of boundary fences. Internal fences and sheep yards have proved useful when mustering stray livestock and most key internal fences are in a reasonable condition.

The timber vehicle bridge over Boomangera Creek is currently safely rated to 3.7 tonnes gross. Upgrade works were carried out in 2006. This bridge requires an assessment in 2011, and further upgrade works may be required in accordance with recommendations in a strength assessment report (Ryan, 2006).

There are four dams in the reserve. Only the two adjacent to Boomangera Creek Trail are required for fire management purposes. Old earthworks on a natural outflow of Boomangera Creek to a lagoon area, originally designed to slow water entering the lagoon or as a stock bridge, are in an advanced state of deterioration. The ground tank in the “Athlone” homestead precinct is used for domestic water supply and can be used for fire fighting.

6. MANAGEMENT STRATEGIES AND ACTIONS

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
6.1 Soil and water conservation			
Soil erosion is a natural process. Erosion is a minor issue and only evident at stream channel margins. Past disturbances, such as grazing and cultivation, have affected soil stability. In some areas soils are fragile and easily prone to damage. Natural flow regimes in the reserve have been altered by the regulation of the Macintyre and Boomi Rivers. Alteration to natural flow regimes of rivers, streams and floodplains is listed as a key threatening process in NSW under the TSC Act. An old earth bank constructed on Boomangera Creek has inhibited natural flow into a large lagoon area. The bank is already in an advanced state of deterioration.	Soil erosion and damage is minimised. Water quality and health of reserve streams is improved.	6.1.1 Undertake all works in a manner that minimises erosion and water pollution. 6.1.2 With the exception of boundary fence breaks, no new trails will be constructed. All existing trails (refer map) will be maintained to dry weather access standard. 6.1.3 Continue to work with Government departments and water authorities to maintain and improve water quality and flows in the reserve's catchments for environmental purposes. Where possible, participate in formal water sharing decision making processes. 6.1.4 Soil erosion will be monitored at stream channel margins and simple stabilisation works implemented if necessary. 6.1.5 Remove the old earth bank on Boomangera Creek to improve natural flows to the lagoon area and water quality.	High Medium Medium Low Low
6.2 Native plants			
A raspwort *Haloragis stricta* has been recorded in the reserve. This plant is listed as presumed extinct under the TSC Act. This record requires full verification. The dominant vegetation class is Northwest Floodplain Woodlands. Vegetation	Native plant species and communities are conserved. Structural diversity and habitat values are restored in areas	6.2.1 Verify the record of *Haloragis stricta*. If verified, ensure its distribution is clearly mapped and develop and implement a protection plan. 6.2.2 Establish a program to monitor long-term health of key floodplain and riparian species, such as the Coolibah and River Red Gum.	High Medium

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
communities within this class, such as Coolibah-Black Box Woodland, depend on occasional flooding for their long-term survival. Endangered ecological communities include Coolibah-Black Box Woodland, Carbeen Open Forest, Brigalow Community and Myall Woodland. Much of the reserve has been affected by over 100 years of grazing and a small area of cultivation. Ground layer vegetation can be damaged by vehicle traffic. The reserve is surrounded by an area where the dominant land use is rapidly changing from grazing to broad acre cropping and where native vegetation communities have become fragmented.	subject to past disturbance.	6.2.3 Implement relevant strategies in priorities action statements and recovery plans for threatened species and endangered ecological communities. 6.2.4 Monitor the ecological recovery of the reserve over time with the Landscape Function Analysis method and other suitable methods, using established sites. Report periodically. Monitoring to continue until at least 2017. 6.2.5 As far as possible, keep vehicle traffic to existing trails, internal fence lines and boundary fence breaks (refer to map) with the exception of quad bikes. 6.2.6 Continue to work with Government departments and water authorities regarding water quality and flows (see 6.1.3). 6.2.7 Support initiatives by relevant authorities and private landholders in the retention and appropriate management of key vegetation corridors in the vicinity of the reserve.	Medium Medium Medium Medium Low
6.3 Native Animals A fauna survey was carried out in 2007. Further surveys are required to target areas of low return in the survey and to monitor potential recovery of fauna diversity over time. Threatened species have been recorded, including two endangered species – the Bush Stone-curlew and Australian Bustard. Other threatened species may also be present.	Native animal species are conserved. There is greater understanding of species diversity, distribution and ecological	6.3.1 Complete two further fauna surveys by 2013, using fauna survey sites established in 2007. Target ground dwelling fauna, bats and nocturnal birds, and known and predicted threatened species. 6.3.2 Map suitable habitat for the Bush Stone-curlew and Australian Bustard.	High High

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
A recovery plan for the Bush Stone-curlew is approved and a plan for the Barking Owl is currently in draft. Threats to all native animal habitats include fragmented regional habitat, gross changes in vegetation structure as a result of frequent or high intensity fire, straying livestock, alterations to natural water flow regimes, and predation by pest animals. Key habitat values include riparian corridors and sand rises, open grassy woodlands, natural grasslands, and ephemeral flood out areas, such as lagoons. The protection of native animals in the area is ultimately reliant on the adequate protection of habitat over a much larger scale. The reserve protects a valuable wildlife corridor between the Boomi and Macintyre Rivers.	requirements.	6.3.3 Carry out opportunistic surveys in response to favourable weather events, such as floods. 6.3.4 Implement relevant strategies in priorities action statements and recovery plans for threatened species. Including maintaining on-going pest control programs. 6.3.5 Support initiatives by relevant authorities and private landholders in the retention and appropriate management of key habitat and corridors in the vicinity of the reserve (see also 6.2.7).	Medium Medium Low
6.4 Aboriginal Heritage A comprehensive Aboriginal site survey was carried out in 2006. Over 50 sites have been recorded. Site types include artefact scatters, scarred trees (including a canoe tree) and a shell midden. All sites are in a relatively stable condition. Threats to Aboriginal sites include natural processes, such as flood, fire, erosion and decay, which are largely unavoidable.	Aboriginal features and values are identified and protected. Aboriginal people are involved in management of the Aboriginal cultural values in the park.	6.4.1 Precede all new works/activities by NPWS or external authorities likely to lead to ground or tree disturbance by an assessment of Aboriginal sites. 6.4.2 Consult and involve the Mungindi Local Aboriginal Land Council (LALC) in the management of Aboriginal sites, places and values, including interpretation of places or values.	High High

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
Other threats include those that are the result of human activity, such as prescribed burns, bushfire fighting and trail maintenance. The reserve is a useful resource for use by the Aboriginal community to educate its members about cultural heritage. Aboriginal studies and Aboriginal traditional use of the area is limited.	Understanding of the cultural values of the park is improved.	6.4.3 Support initiatives by the Mungindi Aboriginal community to use the reserve as an educational resource. 6.4.4 Encourage further research into the Aboriginal heritage values of the park in consultation with the Mungindi LALC.	Medium Low
6.5 Historic Heritage The "Athlone" homestead precinct has been assessed as being of local and State historic significance. It contains buildings dating from around 1911. A conservation management strategy has been prepared. Threats to the "Athlone" homestead precinct include fire, natural decay and deterioration. The name "Athlone" is associated with the Murphy family and is important for its historical associations to the Mungindi and Boomi region. Other items of historic interest associated with the reserve's pastoral past are scattered throughout the reserve, including internal fences, sheep yards, a stock bridge, survey trees and old telegraph poles.	Historic features and values are identified and protected. Understanding of the cultural values of the park is improved.	6.5.1 Implement actions, in accordance with priority, listed in the conservation management strategy for the conservation of the "Athlone" homestead precinct. 6.5.2 Officially retain the name "Athlone" when referring to the homestead precinct. For example, on NPWS field signage and maps (refer to map). 6.5.3 Record and map historic features throughout the reserve. Leave features *in situ* unless causing a hazard to visitors or wildlife. 6.5.4 Encourage further research into the history of the reserve.	High High Medium Low

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
6.6 Introduced Plants and Animals Pest animals and weeds have a negative impact on native vegetation, fauna habitat and native animals. For example, foxes and cats have a direct impact on threatened species such as the Bush Stone-curlew, Australian Bustard and Stripe-faced Dunnart through predation. Buffel Grass invades and dominates native ground layer vegetation. Pest animals and weeds may also have a negative impact on surrounding agricultural enterprises. For example, pigs feeding on crops. Noxious weeds in the reserve include Spiny Burrgrass, Prickly Pear, Lippia, Bathurst Burr and Noogoora Burr. Other environmental weeds include Buffel Grass and Mimosa Bush. Pest animals include the feral pig, fox, feral cat and rabbit. The current Northern Plains Regional Pest Management Strategy guides the strategic control of pests in the reserve in the context of the Region. Current control programs include pig trapping and aerial shooting, fox baiting, and spot spraying of noxious weeds. Other noxious and environmental weeds might spread into the reserve or may not yet be identified in the reserve. Livestock from surrounding properties occasionally stray onto the reserve.	Introduced plants and animals are controlled and where possible eliminated. Pest control programs are undertaken in consultation with neighbours.	6.6.1 Implement pest control programs in accordance with the Northern Plains Regional Pest Management Strategy. 6.6.2 Support the Northern Plains Pest Management Strategy by applying programs in a strategic manner specific to the reserve. For example, establish a fox baiting run to adequately cover the reserve area, and prepare a reserve weed map to assist with strategic control. 6.6.3 Wherever possible undertake integrated pest control programs with the North West Livestock Health and Pest Authority and neighbours. 6.6.4 Regularly monitor for noxious and significant environmental weeds. Treat any new outbreaks as soon as possible. 6.6.5 Encourage research into pests, such as trialling of new methods to control the feral cat. 6.6.6 In conjunction with neighbours, maintain boundary fences and determine strategies to exclude stock. 6.6.7 Retain the two dams on Boomangera Creek Trail. Retain the other two to the south with a long-term view to closing (de-commissioning) them, pending a review of the fire management strategy. Retain the ground tank in the “Athlone” homestead precinct (refer to map).	High Medium Medium Medium Medium Low

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
Dams in the reserve can provide an artificial water source for pest animals, such as pigs, particularly when they are in close proximity to cropping lands.			
6.7 Fire Management The Budelah Nature Reserve Fire Management Strategy was prepared in 2006. The last major bushfire in the reserve area was in 1951. There has been a low incidence of bushfire in the area since. None has occurred in the reserve since the property was acquired by NPWS in 2002. Built assets at risks are confined to the "Athlone" homestead precinct. Aboriginal scarred trees are also susceptible to fire. In general no two fires should occur within a 20 year period to protect vegetation communities. Beyond this maximum threshold prescribed burning may be considered as a measure to preserve biodiversity. High intensity fires should be avoided. Management trails and water storage used for fire management exist on the reserve (see 6.10).	Life, property and natural and cultural values are protected from fire. Fire frequencies are appropriate for conservation of native plant and animal communities.	6.7.1 Implement the Budelah Nature Reserve Fire Management Strategy, including fire trail maintenance, asset and cultural heritage protection and the prescribed burn proposal. 6.7.2 Participate in the Moree Plains Bush Fire Management Committee. Maintain cooperative arrangements with Rural Fire Service brigades and fire control officers and surrounding landowners in regard to fuel management and fire suppression. 6.7.3 Suppress all bushfires in the reserve as soon as possible to minimise damage to natural and cultural values and surrounding properties. 6.7.4 Manage the reserve to protect biodiversity in accordance with the identified fire interval guidelines for vegetation communities.	High Medium Medium Medium

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
6.8 Visitor Use The primary purpose of nature reserves are the conservation of natural and cultural heritage and to provide opportunities for education and scientific research. The reserve can provide a resource for people to enjoy, appreciate and understand the natural and cultural environment. Use of the reserve must be carefully managed since it is a significant area of remnant vegetation. Inappropriate visitor use would include orienteering, camping, horse riding and use of management trails by unauthorised vehicles. Public use and visitation of the reserve is supported where it meets the objectives of the reserve, is consistent with this plan of management and where it is supported by the NPWS.	Visitor use is appropriate and ecologically sustainable. Visitor use encourages appreciation of the reserve's values. The local community is aware of the significance of the area and of management programs.	6.8.1 Public use is confined to nature appreciation, research and educational uses as approved by the NPWS. The reserve will not be promoted for general recreational use or visitor access. 6.8.2 Prohibit orienteering, camping, horse riding, and the use of management trails by public vehicles (unless vehicle use is authorised by the NPWS). 6.8.3 Permit organised group visits, subject to limits on numbers and other conditions if necessary to minimise impacts. 6.8.4 Build a simple shelter on the Macintyre River to assist people involved with educational and research activities in the field. 6.8.5 Maintain access gates and trailhead signage to control unauthorised access. 6.8.6 Carry out community open days and events and encourage participation from surrounding communities.	High High Medium Medium Low Low
6.9 Research and Monitoring Initial flora and fauna research has been undertaken in the reserve. Further research will improve understanding of the reserve's natural and cultural heritage, the processes that affect them and the requirements for management of species.	Research enhances the knowledge and management of the reserve. Research has minimal environmental	6.9.1 Encourage or undertake research into the reserve generally. 6.9.2 Selected research and monitoring topics include (but are not confined to): • ecological recovery with the land use recently changed from grazing to nature conservation, and the effects on vegetation with changes in natural	Medium Medium

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
	impact.	flow regimes (see also 6.2.2 & 6.2.4); • surveys on gaps in knowledge on native fauna presence, distribution and abundance (see also 6.3.1, 6.3.2 & 6.3.3); • surveys on predicted and known threatened species (see also 6.3.1); • cultural heritage values; and • pest control methods (see also 6.6.5).	
6.10 Management Operations and Other Use The "Athlone" homestead precinct includes significant built assets that are essential for the day to day management operations; including NPWS staff accommodation, workshop and office. Boundary fences are managed in co-operation with reserve neighbours. Boundary fence breaks on the reserve are developed for about 30% of the boundary, but are an important feature of effective boundary fencing. A timber vehicle bridge over Boomangera Creek is rated to 3.7 tonnes gross. Upgrade works were completed in 2006. Re-assessment of the bridge is required in 2011. There are approximately 30 kilometres of management trails in the reserve. All trails are 4WD dry weather access only. Some internal fences and sheep yards have proved useful in mustering stray livestock. Strategic removal is required of most internal	Management facilities and operations adequately serve management needs and have minimal impact.	6.10.1 Continue to base a NPWS Ranger at "Athlone" precinct to manage Budelah Nature Reserve and other reserves in the Moree district, subject to staffing and budgetary constraints. 6.10.2 Maintain all "Athlone" homestead precinct built assets, essential for day to day operations, in a good working order. 6.10.3 Replace and maintain boundary fencing in co-operation with reserve neighbours and in accordance with the NPWS Boundary Fence Policy. 6.10.4 Assess the Boomangera Creek bridge in 2011 in accordance with a strength assessment report (Ryan, 2006); implement any further upgrade works as required, such as replacing decking (refer to map). 6.10.5 Maintain all existing trails (refer to map) to a standard in accordance with their fire trail and management trail classifications, including activities such as grading, slashing and spraying. No new trails will be constructed.	High High High High Medium

Current Situation	Desired Outcomes	Management Strategies / Actions	Priority
fences, leaving some key fences in place. A power line traverses the reserve for about 700 metres, currently managed by Country Energy. Kelvington Road traverses the reserve for about one kilometre and is managed by the Moree Plains Shire Council. Four dams are located on the reserve; only two on Boomangera Creek Trail are required long-term as watering points to aid in bushfire suppression. The ground tank at the "Athlone" homestead is required for domestic water.		6.10.6 Maintain existing boundary fence trails to a minimum standard permitting basic vehicle access. Construct boundary fence breaks or trails where possible when boundary fences are re-placed. 6.10.7 Prepare and implement an internal fence removal strategy, ensuring key internal fences and sheep yards are retained and maintained to an effective standard. 6.10.8 Permit external authorities to maintain the power line and Kelvington Road according to relevant agreements where applicable. 6.10.9 Retain the two dams on Boomangera Creek Trail. Retain the other two to the south with a long-term view to closing (de-commissioning) them, pending a review of the fire management strategy. Retain the ground tank in the "Athlone" homestead precinct (refer to map and see 6.6.7).	Low Low Low Low

High priority activities are those imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources.

Medium priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent.

Low priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

REFERENCES

Bradstock, R., Kenny, B. & Tasker, E. (2003). *Guidelines for Ecological Sustainable Management. Final Report for NSW Biodiversity Strategy.* Department of Environment and Conservation, Hurstville.

Brosnan, Maureen (2004). *Murphy Family History*. Informal publication.

DLWC (1999). *Stressed Rivers Assessment Report: Barwon Region, Border Rivers Catchment.* Dept of Land and Water Conservation, Sydney.

DWE (2007). *Draft Water Sharing Plan NSW Border Rivers Regulated Rivers Water Sources.* Department of Water and Energy (NSW).

Henderson, Adam (Feb 2007). *Budelah Nature Reserve Aboriginal Site Survey*. Internal NPWS report.

Henderson, Adam (June 2007). *Budelah Nature Reserve Fauna Survey*. Internal NPWS report.

High Ground Consulting (2008). *Conservation Management Strategy "Athlone" Precinct Budelah Nature Reserve.* A Report to the Department of Environment and Climate Change.

Hunter, John T. (2006). *Vegetation and Floristics of Budelah Nature Reserve*. A Report to the NPWS.

Keith, David (2004). *Ocean Shores to Desert Dunes; The Native Vegetation of NSW and the ACT*. Dept of Environment and Conservation (NSW).

Mitchell, Geoff (2006). *Birds of Budelah Nature Reserve August 2006*. A list compiled from the records of NPWS, NPWS Northern Plains Regional Advisory Committee and Tamworth Birdwatchers.

MDHSBC (1998). *A History of Mungindi to 1988*. Mungindi and District Historical Society Book Committee. Southern Cross Printery, Toowoomba.

Murphy, Norman (2003). *The Following May Interest Someone Some Day*. Informal publication.

NPWS (2001). *Athlone/Thorndale (now Budelah NR) internal acquisition paper*.

NPWS (2005). *Fire Management Manual.* NSW National Parks and Wildlife Service, Hurstville.

NPWS (2006). *Budelah Nature Reserve Fire Management Strategy*. Dept of Environment and Conservation (NSW).

Ryan, Nick (2006) *Strength Assessment for Boomangera Creek Bridge*. Landvison Solutions P/L. Report commissioned by NPWS.

Tongway, D & Hindley, N (1996). *Understanding More About Your Landscape: A Method for Monitoring Landscape Productivity.* CSIRO Sustainable Ecosystem, Canberra.

APPENDIX 1 - BIRDS RECORDED IN BUDELAH NATURE RESERVE

Common Name	Scientific Name	Common Name	Scientific Name	Common Name	Scientific Name
Flightless Birds		***Quail***		***Cuckoos***	
Emu	*Dromaius novaehollandiae*	Stubble Quail	*Coturnix novaezealandiae*	Horsfield's Bronze Cuckoo	*Chrysococcyx basalis*
Waterbirds		Brown Quail	*Coturnix australis*	Channel-billed Cuckoo	*Scythrops novaehollandiae*
Australasian Grebe	*Tachybaptus novaehollandiae*	Painted Button-quail	*Turnix varia*	***Nightbirds***	
Australian Pelican	*Pelecanus conspicillatus*	***Grassland Birds***		Southern Boobook	*Ninox novaeseelandiae*
Darter	*Anhinga melanogaster*	Australian Bustard	*Ardeotis australis*	Barking Owl	*Ninox connivens*
Great Cormorant	*Phalacrocorax carbo*	Bush Stone-curlew	*Burhinus magnirostris*	Barn Owl	*Tyto alba*
Pied Cormorant	*Phalacrocorax varius*	***Swamp Birds & Waders***		Tawny Frogmouth	*Podargus strigoides*
Little Pied Cormorant	*Phalacrocorax melanoleucos*	Dusky Moorhen	*Gallinula tenebrosa*	Australian Owlet-nightjar	*Aegotheles cristatus*
White-necked Heron	*Ardea pacifica*	Brolga	*Grus rubicundus*	***Kingfishers***	
White-faced Heron	*Ardea novaehollandiae*	Masked Lapwing	*Vanellus miles*	Laughing Kookaburra	*Dacelo novaeguineae*
Great Egret	*Egretta alba*	Banded Lapwing	*Vanellus tricolor*	Red-backed Kingfisher	*Todiranohus pyrrhopygia*
Little Egret	*Egretta garzetta*	Red-kneed Dotterel	*Erythogonys cinctus*	Sacred Kingfisher	*Halcyon sancta*
Intermediate Egret	*Egretta intermedia*	Black-fronted Dotterel	*Elseyornis melanops*	Rainbow Bee-eater	*Merops ornatus*
Rufous Night Heron	*Nycticorax caledonicus*	Black-winged Stilt	*Himantopus himantopus*	Dollarbird	*Eurystomus orientalis*
Glossy Ibis	*Plegadis falcinellus*	***Pigeons & Doves***		***Songbirds***	
Australian White Ibis	*Threskiornis aethiopica*	Peaceful Dove	*Geopelia placida*	Singing Bushlark	*Mirafra javanica*
Straw-necked Ibis	*Threskiornis spinicollis*	Diamond Dove	*Geopelia cuneata*	Welcome Swallow	*Hirundo neoxena*
Yellow-billed Spoonbill	*Platalea flavipes*	Bar-shouldered Dove	*Geopelia humeralis*	Tree Martin	*Cecropis nigricans*
Plumed Whistling Duck	*Dendrocygna eytoni*	Crested Pigeon	*Ocyphaps lophotes*	Fairy Martin	*Ceocropis ariel*
Black Swan	*Cygnus atratus*	***Parrots***		Richard's Pipit	*Anthus novaeseelandiae*
Pacific Black Duck	*Anas superciliosa*	Red-tailed Black-cockatoo	*Calyptorhynchus magnificus*	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Grey Teal	*Anas gibberifrons*	Glossy Black-cockatoo	*Calyptorhynchus lathami*	White-bellied Cuckoo-shrike	*Coracina papuensis*
Maned (Wood) Duck	*Chenonetta jubata*	Galah	*Cacatua roseicapilla*	White-winged Triller	*Lalage sueurii*
Birds of Prey		Little Corella	*Cacatua sanguinea*	Hooded Robin	*Melanodryas cucullata*
Pacific Baza	*Aviceda subcristata*	Pink Cockatoo	*Cacatua leadbeateri*	Jacky Winter	*Microeca leucophaea*
Whistling Kite	*Haliastur sphenurus*	Sulphur-crested Cockatoo	*Cacatua galerita*	Crested Shrike-tit	*Falcunculus frontatus*
Grey Goshawk (grey morph)	*Accipiter novaehollandiae*	Red-winged Parrot	*Aprosmictus erythropterus*	Golden Whistler	*Pachycephala pectoralis*
Wedge-tailed Eagle	*Aquila audax*	Cockatiel	*Nymphicus hollandicus*	Rufous Whistler	*Pachycephala rufiventris*
Little Eagle	*Hieraaetus morphnoides*	Budgerigar	*Melopsittacus undulatus*	Grey Shrike-thrush	*Colluricincla harmonica*
Spotted Harrier	*Circus assimilis*	Pale-headed Rosella	*Platycercus adscitus*	Crested Bellbird	*Oreoica gutturalis*
Australian Hobby	*Falco longipennis*	Eastern Ringneck	*Barnardius barnardi*	Restless Flycatcher	*Myiagra inquieta*
Brown Falcon	*Falco berigora*	Red-rumped Parrot	*Psephotus haematonotus*	Willie Wagtail	*Rhipidura leucophrys*
Nankeen Kestrel	*Falco cenchroides*	Blue Bonnet	*Northiella haematogaster*	Grey-crowned Babbler	*Pomatostamus temporalis*
White-browed babbler	*Pomatostamus superciliosus*	Noisy Miner	*Manorina melanocephala*	Little Woodswallow	*Artamus minor*
Rufous Songlark	*Cinclorhamphus mathewsi*	Yellow-throated Miner	*Manorina flavigula*	Grey Butcherbird	*Cracticus torquatus*
Brown Songlark	*Cinclorhamphus cruralis*	White-plumed Honeyeater	*Lichenostomus penicillatus*	Pied Butcherbird	*Cracticus nigrogularis*
Superb Fairy-wren	*Malurus cyaneus*	Black-chinned Honeyeater	*Melithreptus gularis*	Australian Magpie	*Gymnorhina tibicen*
Variegated Wren	*Malurus lamberti*	Brown Honeyeater	*Lichmera indistincta*	Australian Raven	*Corvus coronoides*
White-winged Wren	*Malurus leucopterus*	Crimson Chat	*Epthianura tricolor*	***Introduced Birds***	
Weebill	*Smicrornis brevirostris*	Mistletoebird	*Dicaeum hirundinaceum*	Feral Pigeon	*Columba livia*
Western Gerygone	*Gerygone fusca*	Spotted Pardalote	*Pardalotus punctatus*	Common Starling	*Sturnus vulgaris*
White-throated Gerygone	*Gerygone olivacea*	Striated Pardalote	*Pardalotus striatus*		
Inland Thornbill	*Acanthiza apica*	Zebra Finch	*Poephila guttata*		
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Double-barred Finch	*Poephila bichenovii*		
Yellow Thornbill	*Acanthiza nana*	Plum-headed Finch	*Aidemosyne modesta*		
Southern Whiteface	*Aphelocephala leucopsis*	Spotted Bowerbird	*Chlamydera maculata*		
Varied Sitella	*Daphoenositta chrysoptera*	White-winged Chough	*Corcorax melanorhamphos*		
Brown Treecreeper	*Climactus picumnus*	Apostlebird	*Struthidea cinerea*		
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	Australian Magpie-lark	*Grallina cyanoleuca*		
Striped Honeyeater	*Plectorhyncha lanceolata*	White-breasted Woodswallow	*Artamus personatus*		
Noisy Friarbird	*Philemon corniculatus*	White-browed Woodswallow	*Artamus superciliosis*		
Little Friarbird	*Philemon citreogularis*	Black-faced Woodswallow	*Artamus cinereus*		
Blue-faced Honeyeater	*Entomyzona cyanotis*	Dusky Woodswallow	*Artamus cyanopterus*		

APPENDIX 2 - FAUNA RECORDED IN BUDELAH NATURE RESERVE

Common Name	Scientific Name	Common Name	Scientific Name
Frogs		***Snakes***	
Striped Burrowing Frog	*Cyclorana alboguttata*	Green Tree Snake	*Dendrelaphis punctulata*
Knife-footed Frog	*Cyclorana cultripes*	Yellow-faced Whipsnake	*Demansia psammophis*
New Holland Frog	*Cyclorana novaehollandiae*	Mulga Snake	*Pseudechis australis*
Waterholding Frog	*Cyclorana platycephala*	Spotted Black Snake	*Pseudechis guttatus*
Warty Waterholding Frog	*Cyclorana verrucosa*	Eastern Brown Snake	*Pseudonaja textilis*
Green Tree Frog	*Litoria caerulea*	Coral Snake	*Simoselaps australis*
Peron's Tree Frog	*Litoria peronii*	***Mammals - Egg Laying***	
Desert Tree Frog	*Litoria rubella*	Short-beaked Echidna	*Tachyglossus aculeatus*
Desert Froglet	*Crinia deserticola*	***Mammals - Marsupials***	
Eastern Sign-bearing Froglet	*Crinia parinsignifera*	Striped-faced Dunnart	*Sminthopsis macroura*
Barking Marsh Frog	*Limnodynastes fletcheri*	Sugar Glider	*Petaurus breviceps*
Salmon-striped Frog	*Limnodynastes salmini*	Common Brushtail Possum	*Trichosurus vulpecula*
Spotted Grass Frog	*Limnodynastes tasmaniensis*	Eastern Grey Kangaroo	*Macropus giganteus*
Crucifix Frog	*Notaden bennetti*	Red Kangaroo	*Macropus rufus*
Reptiles - Turtles		Black Wallaby	*Wallabia bicolor*
Broad-shelled Turtle	*Chelodonia expansa*	***Mammals - Placentals***	
Eastern Long-necked Turtle	*Chelodonia longicollis*	White-striped Freetail Bat	*Austronomus australis*
Reptiles - Geckos		Gould's Wattled Bat	*Chalinolobus gouldii*
Prickly Gecko	*Heteronotia binoei*	Southern Freetail Bat	*Mormopterus sp 4*
Dubious Dtella	*Gehyra dubia*	Lesser Longeared Bat	*Nyctophilus geoffroyi*
Common Dtella	*Gehyra variegata*	Little Forest Bat	*Vespadelus vulturnus*
Reptiles - Dragons		***Introduced***	
Burns's Dragon	*Amphibolurus burnsi*	Brown Hare	*Lepus capensis*
Nobbi Dragon	*Amphibolurus nobbi*	Rabbit	*Oryctolagus cuniculus*
Bearded Dragon	*Pogona barbata*	Fox	*Vulpes vulpes*
Reptiles - Goannas		Feral Cat	*Felis catus*
Sand Monitor	*Varanus gouldii*	Feral Pig	*Sus scrofa*
Lace Monitor	*Varanus varius*	House Mouse	*Mus musculus*
Reptiles - Skinks		Black Rat	*Rattus rattus*
A striped skink	*Ctenotus ingrami*		
Tree Skink	*Egernia striolata*		
Broad-banded Sand-swimmer	*Eremiascincus richardsonii*		
Spotted Burrowing Skink	*Lerista punctatovittata*		
Eastern Blue-tongued Lizard	*Tiliqua scincoides*		