# APPENDIX

**to the**

# YASS AREA CATCHMENT ACTION PLAN

**Yass Area Network of Landcare Groups**

**October 2002**

# CONTENTS

# Figures, Tables and Maps

# 1. Yass Area Network of Landcare Groups

The Yass Area Network of Landcare Groups was formed in 1996, in response to the need for a coordinated approach to address land management and natural resource issues across the Yass area. The network provides a forum for landcare groups, government agencies, local government, catchment and community organisations to meet and work together on natural resource issues within and beyond the Yass area.

The Yass Area Network of Landcare Groups incorporates 15 landcare groups and employs a Landcare Coordinator and (until October 2001) a Natural Resource Planning Advisor based in Yass. Landcare groups span approximately 62% of the Yass catchment with a membership base of an estimated 450 landholders. Many of the landcare groups formed from existing Bushfire Brigade and community organisations with some groups extending over a number of sub-catchments, covering a range of land uses and land management issues. The Yass area catchment covers an area of 283,255ha incorporating both the Yass Valley and Burrinjuck sub-catchments and encompassing nine of the 15 landcare groups. Some of these groups are planning to amalgamate in 2002.

Since 1996/97, 69 new and continuing projects have been funded by the Natural Heritage Trust providing the Yass Area Network of Landcare with an estimated $1,840,479 (and an estimated community contribution of $2,179,109) for natural resource management projects.

Projects have included:

- *Tree planting, direct tree and shrub seeding*
- *Targeted revegetation to control recharge*
- *Fencing off areas for salinity recharge revegetation and watertable control, streambank erosion control, remnant native vegetation enhancement and protection, tree corridors, biodiversity planting and farm windbreaks.*
- *Erosion control works including gully control structures, contour banks and tree planting*
- *River works such as revegetation, weed removal and invasive willow control*
- Devolved grant revegetation projects with neighbouring catchments and Landcare groups

**Figure 1: The Yass Area Network of Landcare Groups**

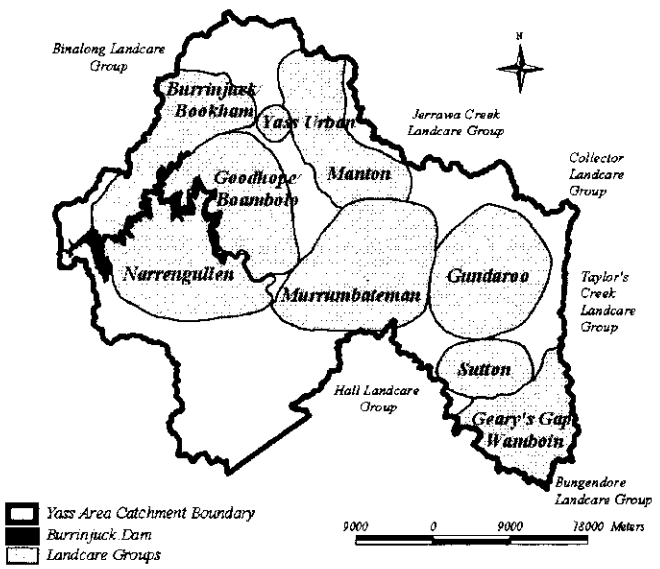


**Table 1: NHT projects undertaken by the Yass Area Network of Landcare Groups**

| Year | Projects<br>**Continuing Projects* |
|---|---|
| **2000/01** | |
| | • Yass Landcare Coordinator |
| | • Implementing the Yass Valley Sub-Catchment Plan - Salinity On-ground Works* |
| | • Stop our salt & soil entering Yass River |
| | • Burrinjuck Gully Stabilisation Project* |
| | • Burrinjuck Revegetation for Biodiversity Project |
| | • Burrinjuck Webs of Green* |
| | • Picaree Hill Conservation Project |
| | • Dieback Revegetation Project* |
| | • Manton (Yass) gully stabilisation, salt mitigation and bio-diversity project |
| | • Targeted revegetation for salinity recharge in upper-mid Lachlan & upper Murrumbidgee catchments |
| | • Taylors & Allianoyomyiga Creeks Remnant Vegetation Protection & Enhancement Project |
| | • Bungendore/Hoskinstown/Rossi Revegetation Project |
| | • Catchment planner: Yass Area Network of Landcare Groups |
| **1999/2000** | |
| | • Burrinjuck Gully Stabilisation Project |
| | • Yass Catchment Planner* |
| | • Burrinjuck Webs of Green Vegetation Enhancement and Protection Project |
| | • Burrinjuck Revegetation for Biodiversity Project |
| | • Yass Area Dieback Revegetation Project |
| | • Jerrawa Creek Catchment Green Corridors |
| | • Implementing the Yass Valley Sub-Catchment Plan - Salinity On-ground Works |
| | • Catchment Planner: Yass - Burrinjuck - Murrumbidgee Action Plan |
| | • Landcare Coordinator: Yass |
| | • Taylors & Allianoyomyiga Creeks Remnant Vegetation Protection & Enhancement Project |
| | • Bungendore/Hoskinstown/Rossi Revegetation Project |
| | • Riparian Zone Revegetation - Moura Creek Stage 2 |
| | • Streambank Restoration Demonstration sites |
| | • Merung / The Brook Gully Restoration |
| | • Narrangullen Creek Streambank Revegetation & Erosion Control Project |
| | • Sawpit Creek Gully Works |
| | • Yass Shire Vegetation Management Plan |
| | • Tyrone Tree Corridor |
| | • Jerrawa Creek Wildlife Corridor |
| **1998/99** | |
| | • Jerrawa Creek Salinity |
| | • Jerrawa Creek Wildlife Corridor |
| | • Jerrawa Creek Catchment Green Corridors |
| | • Jerrawa Creek Erosion control |

| | |
|---|---|
| | • Tyrone Tree Corridor |
| | • Jerrawa Creek Rivercare |
| | • Landcare Coordinator |
| | • Yass Catchment Planner* |
| | • Burrinjuck Remnant Bush Preservation and Revegetation* |
| | • Yass Shire Vegetation Management Plan |
| | • Burrinjuck Webs of Green |
| | • Sutton Yass River Management Plan & Works |
| | • Cooma Cottage Riverbank Rehabilitation |
| | • Yass River Fencing & Revegetation |
| | • Murrumbateman Missing Links |
| | • Jeir Creek Fencing, Revegetation & River Management |
| | • Yass Area Dieback Revegetation |
| | • Riparian Zone Revegetation Moura Creek |
| | • Dicks Creek Streambank Revegetation |
| **1997/98** | |
| | • Yass Catchment Planner* |
| | • Yass Landcare Coordinator |
| | • Jerrawa Creek Rivercare |
| | • Jerrawa Creek Rivercare |
| | • Jerrawa Creek Rivercare |
| | • Jerrawa Creek Catchment Green Corridors |
| | • Burrinjuck Remnant Bush Preservation and Revegetation |
| | • Yass Urban Willow Removal & Revegetation |
| | • Yass Shire Vegetation Management Plan |
| | • Gundaroo Common Native vegetation survey |
| | • Re-greening the Greenways |
| | • Jerrawa Creek Dryland salinity reparation |
| | • Wee Jasper Nature Conservation Group |
| **1996/97** | |
| | • Burrinjuck remnant bush preservation and revegetation |
| | • Hall-Murrumbidgee Erosion Reclamation & Prevention |
| | • Upper Jerrawa Creek catchment rehabilitation* |
| | • Yass Landcare Coordinator |
| | • Landcare Guide for the Hobby farm and Bush Block |
| | • Yass Shire Vegetation Management Plan |
| | • Gundaroo - Yass River management plan and works |
| | • Jerrawa Creek - Lachlan River Tributaries & Jerrawa Creek riverine corridor stabilisation and enhancement |
| | • Goodhope/Boambolo catchment management plan |
| | • Murrumbateman - gully fencing, revegetation & erosion control |
| **1995/96** | |
| | • Jerrawa Creek Rivercare |
| | • Jerrawa Creek Salt Action |
| **1994/95** | |
| | • Jerrawa Creek Rivercare |
| **1993/94** | |
| | • Jerrawa Creek Salt Action |

## 2. Role of the Natural Resource Planning Advisor

In March 1998 the YANLG Management Committee employed a Natural Resource Planning Advisor (NRPA) funded through a three year Natural Heritage Trust (NHT) grant.

The role of the NRPA was to liaise with landcare groups, government agencies, and the broader community to develop a catchment plan. This involved collecting data and producing maps for the key land degradation issues in order to develop the subsequent sub-catchment action plans and best management practice guidelines. The NRPA project was overseen by a Steering Committee, established as a sub-committee of the YANLG Management Committee. The role of the steering committee was to direct the progress, outcomes and budget expenditure of the project.

## 3. Community Consultation

Community consultation was conducted through:

- *Catchment Action Plan workshops/Landcare meetings*
- *Property visits – Catchment surveys/Assessment Kits*
- *Presentations/meetings with local groups, government agencies and various catchment committees*
- *Field days*
- *Catchment planning updates through Landcare newsletters, local and regional media*
- *Liaison with NRPA Steering Committee and YANLG Management Committee.*

## 4. Data Collection

Data was collected from a variety of sources including government departments, agencies, regional catchment committees, catchment assessments and local knowledge. The Catchment Assessments provided a standard method of assessing and mapping the broad land degradation issues and can be used for future assessments, monitoring of sites and to update existing data.

Data for the Yass Area was obtained from:

| | |
|---|---|
| **DLWC**<br>**Resource Information Unit Wagga Wagga** | Salt Affected Areas, Erosion, Land Use, Land Capability, Hydrology, Stressed Rivers Assessment Report – Murrumbidgee Catchment |
| **NPWS, Queanbeyan** | Regional Vegetation Mapping<br>Endangered/Threatened Species Lists |
| **Yass Shire Council** | Yass Shire Vegetation Plan |
| **Salinity Catchment Assessments (NRPA)** | Assessed as Minor/Moderate/Severe based on recognised signs and symptoms for saline sites.<br>*(Developed with assistance from Andrew Wooldridge, Salt Action DLWC, Cowra)* |
| **Gully Erosion Catchment Assessments (NRPA)** | Ranking system (High/Moderate/Low priority) to assess the degree of erosion activity and gully depth.<br>*(Developed by John Franklin, DLWC Yass)* |
| **Streambank Condition & Riparian Vegetation Catchment Assessments (NRPA)** | Ranking system (Good/Moderate/Poor) based on streambank condition, vegetation diversity and density |
| **Native Vegetation Decline Catchment Assessments (NRPA)** | Broad assessment of native vegetation composition, health and structure. |

## 5. Map Production

Maps were produced using ArcView® GIS 3.2 computer software and Spot-Lite® satellite imagery both purchased with funding assistance from the Murrumbidgee Catchment Management Committee (MCMC).

The Spot-Lite® data provides a photo-like image of the catchment, which can be used as a base layer onto which the land degradation data is mapped. ArcView® enables the data to be entered, displayed, manipulated and stored as a series of overlays to produce maps and generate statistics for the catchment. The satellite imagery used was a Spot-Lite® Spot-Pan chromatic image captured on 5th and 26th March 1996, 8th June 1997 and 5th March 1998 with $10m^2$ pixel resolution.

## 6. The Yass Area Catchment

### 6.1 Climate

The Australian Climate classification for the Yass region is " Temperate". Temperate regions are described as having no dry season, a warm summer and cold winter. Weather conditions can be variable with cool, cloudy days alternating with warmth and sunshine. Temperate regions also have relatively uniform rainfall throughout the year.

| | |
|---|---|
| *Average maximum daily temperature:* | *12.5 ℃ in winter and 28.7 ℃ in summer* |
| *Relative Humidity:* | *Ranges from 74% in winter to 53% in summer* |
| *Average annual rainfall:* | *650 mm (ranging from 148mm in summer to 174mm in winter)* |
| *Average number of raindays:* | *92 days/year* |
| *Average number clear days:* | *83 days/year* |
| *Average number of cloudy days:* | *104 days/year* |

In the Yass area rainfall generally increases with altitude, with higher rainfalls (800-1400mm) recorded in the far south-west of the catchment at Burrinjuck and the Brindabella Range (Soil Cons. Service, 1974 & ANZECC, 2000). Local topography also influences the occurrence of frosts with heavy frosts likely to occur from late May until early September.

## Table 2: CLIMATE AVERAGES *(Long term mean values of weather data)*

*Location:* YASS COMPOSITE *State:* NSW
*Commenced:* 1898 *Last record:* 1996
*Latitude:* 34.83 S *Longitude:* 148.91 E *Elevation:* 520.0 m

**Mean Daily Max Temp (°C)**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 29.4 | 29.0 | 25.6 | 21.0 | 16.2 | 12.5 | 11.5 | 13.4 | 16.5 | 20.5 | 24.3 | 27.7 |

*Range: 11.5 – 29.4°C*
*Annual Mean: 20.7°C*

**Highest Max Temp (°C)**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40.9 | 41.1 | 38.0 | 29.7 | 24.6 | 20.0 | 22.0 | 25.8 | 28.9 | 32.7 | 38.9 | 39.3 |

*Range: 20.0 – 41.1°C*
*Annual Mean: 31.8°C*

**Lowest Min Temp (°C)**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.0 | 3.1 | 0.0 | -2.6 | -7.0 | -6.2 | -8.8 | -7.5 | -3.9 | -1.8 | -0.4 | 1.5 |

*Range: -8.8 – 4.0°C*
*Annual Mean: -2.5°C*

**Relative Humidity (%)**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | 51 | 53 | 61 | 71.5 | 76 | 75 | 70.5 | 58 | 53 | 45.5 | 61 |

*Range: 45.5 – 76%*
*Annual Mean: 60.2%*

**Mean Rainfall (mm)**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 52.2 | 43.2 | 47.6 | 51.0 | 52.6 | 56.0 | 59.7 | 58.5 | 55.4 | 66.6 | 54.2 | 52.2 |

*Annual: 649.2mm* *Range: 43.2 – 66.6mm*
*Annual Mean: 54.1mm*

**Mean no. of Raindays**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.9 | 4.8 | 5.4 | 6.3 | 7.3 | 9.9 | 11.0 | 10.6 | 9.1 | 8.7 | 7.0 | 6.2 |

*Annual: 92.2 days* *Range: 4.8 – 11.0 days*
*Annual Mean: 7.7 days*

**Mean no. of Clear Days**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.4 | 7.5 | 8.0 | 8.5 | 5.5 | 4.0 | 4.9 | 6.5 | 6.5 | 6.9 | 6.4 | 9.0 |

*Annual: 83.1 days* *Range: 4.0 – 9.4 days*
*Annual Mean: 6.9 days*

**Mean no. of Cloudy Days**

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7.2 | 6.3 | 5.9 | 7.1 | 11.1 | 12.1 | 12.4 | 10.7 | 9.2 | 8.2 | 7.5 | 6.6 |

*Annual: 104.3 days* *Range: 5.9 – 12.4 days*
*Annual Mean: 8.7 days*

*SOURCE: Bureau of Meterology,2000*

## 6.2 Geology and Soils

The Yass Valley sub-catchment is situated in the centre of the Lachlan Fold Belt underlain by three dominant bedrock types – Ordovician and Silurian sediments, Silurian acid volcanics and some outcrops of granitic bedrock (Nicoll & Scown, 1993).

Such sediments are generally low in fertility and present a high erosion hazard if not carefully managed. In some areas these sediments are interbedded with volcanic rocks such as tuff and occasional limestone outcrops (SoE, 1997). The oldest strata in the Yass catchment are Upper Ordovician sediments, which were deposited in a former shallow marine environment (Soil Cons, 1981). The general lithology of the catchment is sedimentary (50%) and volcanic (45%), with smaller areas of metamorphic and plutonic. There are numerous geological boundaries and fault lines occurring throughout the catchment, in particular south of Murrumbateman-Gundaroo Rd and also to the east of Burrinjuck Dam through to the Brindabella Range.

## 6.3 Soil Landscapes

Soils derived from sedimentary rocks are poor quality and shallow. Granitic soils are generally deeper, more fertile and have better moisture retention but can also be highly erodable. Volcanic soils are generally fertile but stony such as in the Yass Valley sub-catchment. Soils in the Yass catchment are generally red podzolics (on better drained side slopes) grading to yellow podzolic soils (on the lower slopes and more waterlogged country) through to yellow solodic soils (on the lower footslopes and in the drainage lines). These yellow solodic soils often present a high salinity hazard. In addition, listhosols are found on the upper slopes and rocky ridge tops. Red podzolic soils are moderately acid, of low fertility and are often hard-setting. Yellow podzolic soils, Listhosols are often characterised by shallow soils and rock fragments. In addition, some areas in the catchment are developed on acid igneous rock such as porphyry and dacite, which represent the better quality land. These soils are generally more fertile, less susceptible to erosion and are the areas best suited for intensive agricultural land use. (SoE Report, 1997)

## 6.4 Vegetation

The Yass Area is described by early explorers as a *"park-like landscape with open grassy plains surrounded by thin eucalypt forests . . . a landscape attractive for pastoralists"* (Gallagher, W., 1989).

Early surveying maps of the Yass Valley also provide descriptions of the vegetation types. For example, the area of Warroo, Forest, Sapling Point and Spring Creeks were described as *"principally good open undulating forest land . . . well suited for agricultural purposes" and "the timber is Box, Blue Gum, Stringy Bark, Gum and Apple".* The surveyed areas surrounding Gundaroo are described as *"alluvial flats", "undulating grassy hills", "steep scrubby ranges", "steep scrubby slaty ranges" and "open forest" (Webb, 2000).*
The vegetation types for the Yass area are classified as open forest (dry-sclerophyll) and woodland (savanna) (Jenkins, 2000). Dry sclerophyll forests are found on the drier slopes, and have a relatively short growth form, often with prickly shrubs and sparse ground cover. The dominant species are:

Brittle Gum *(E. mannifera)* Scribbly Gum *(E. rossii)*
Red Stringybark *(E. macrorhyncha)* Broad-leaved peppermint *(E. dives)*

Also found in the Yass Area is *E. polyanthemos* (Red Box), and occasionally *Callitris endlicheri* (Black Cypress Pine), *E. pauciflora* (Snow Gum) and *E. rubida* (Candlebark)

(Jenkins, 2000 & Gunn *et.al.*, 1969). As a timber resource most of the tree species are poor, with only a few suitable for fencing.

Woodland (Savanna) vegetation types are found on low-lying areas. Gunn *et.al.,* (1969) suggest that much of the country described as savannah woodland was once dry sclerophyll forest, having been thinned and cleared since settlement to give a more open, sparse woodland appearance.

The dominant species are:

| | |
|---|---|
| Yellow Box *(E.melliodora)* | Blakely's Red Gum *(E. blakelyi)* |
| Apple Box (*E. bridgesiana*) | Argyle Apple *(E. cinerea)* |

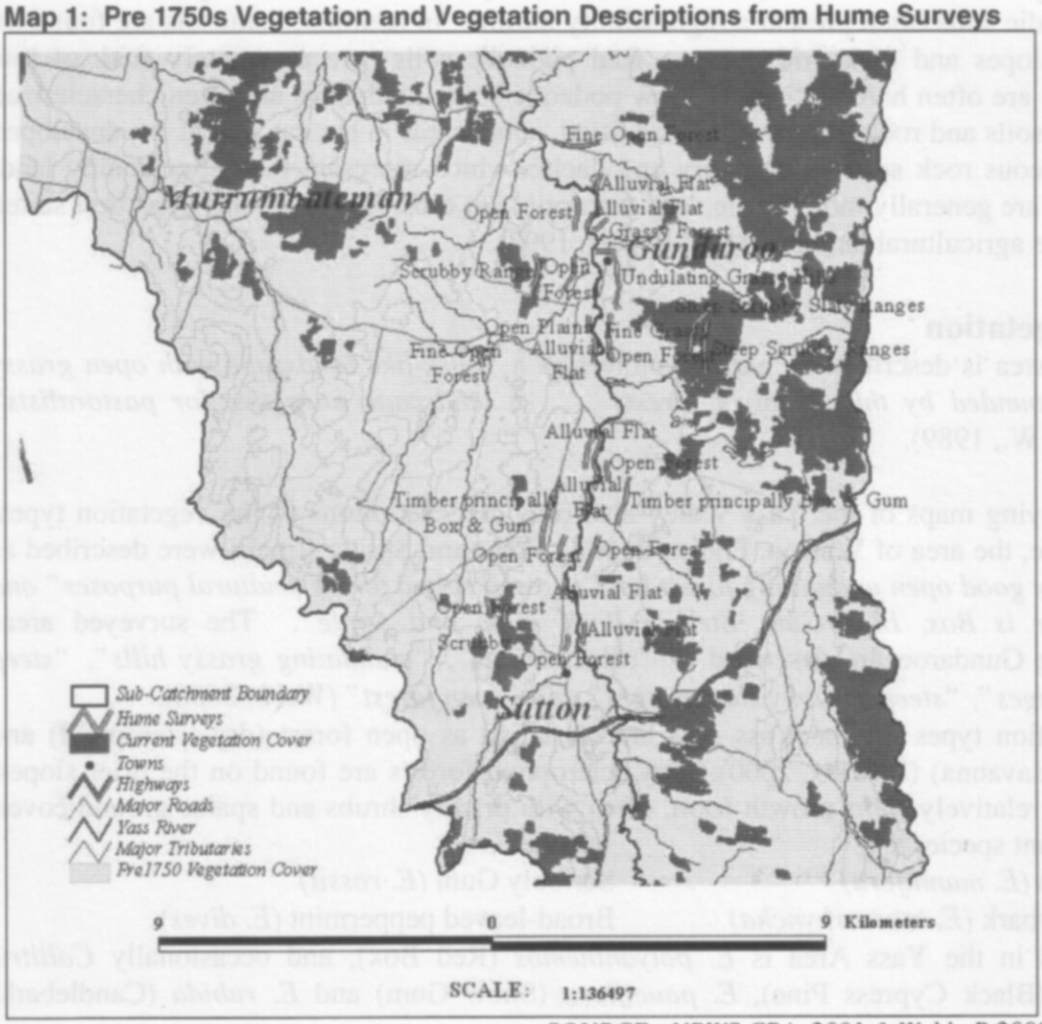
The dominant understorey species consist of:

| | |
|---|---|
| Grevillea | Wattles (*Acacia* spp.) |
| Callistemon | Bursaria |
| Tea-Tree | |

Native grasslands are dominated by (Jenkins, 2000):

| | |
|---|---|
| Speargrass (*Stipa* spp.) | Wallaby Grass (*Danthonia* spp.) |
| Kangaroo Grass *(Themeda australis)* | |
| Red Grass *(Bothriochloa macra)* | |

**Map 1: Pre 1750s Vegetation and Vegetation Descriptions from Hume Surveys**




*SOURCE: NPWS CRA, 2001 & Webb, R 2000*

**Table 3: Threatened Flora in the Yass Area**
**V – Vulnerable, E – Endangered, X – Extinct**

| Species | Common Name | Legal Status | Status in Yass Area |
|---|---|---|---|
| *Ammobium craspedioides* | Yass Daisy | V | Locally common in remnant woodland |
| *Senecio garlandii* | | V | Not seen in this area since early 20th Century |
| *Grevillea iaspicula* | Wee Jasper Grevillea | E | Restricted to limestone outcrops in the Burrinjuck area |
| *Diuris aequalis* | Buttercup Doubletail | V | Restricted to the woodlands in the vicinity of the Great Dividing Range and extremely rare |
| *Pomaderris pallida* | Pale Pomaderris | V | Rocky hillsides above the Murrumbidgee and its tributaries (uncommon) |
| *Pomaderris betulina subsp. actensis* | | | Mostly in the ACT but just extending into Yass Shire |
| *Euphrasia scabra* | Rough Eyebright | E | Probably extinct in the Lake George area |
| *Senecio georgensis* | | X | Probably extinct in the Lake George area |
| *Natural Temperate Grasslands of the Southern Tablelands of NSW & ACT* | | E | Endangered Ecological Community |

*SOURCE: National Parks and Wildlife – Threatened Species Unit Queanbeyan 2000*

## 6.5 Weeds

The Southern Slopes Noxious Plants Authority has identified 46 noxious plants within the Southern Slopes County Council control area which includes Yass, Boorowa, Harden and Young Shires. Of the 46 noxious plants 33% are classified as W1, 46% as W2, 13% as W3, 4% as W4f and 4% as W4g.

A list of noxious weeds in the Yass area is below in table 4.

| Category | Action for Control (Under the Noxious Weeds Act 1993) |
|---|---|
| **W1** | *Weeds must be notified to Local Council then fully and continuously suppressed and destroyed.* |
| **W2** | *Weed must be fully and continuously suppressed and destroyed.* |
| **W3** | *Weed must be prevented from spreading and its numbers and distribution reduced.* |
| **W4g** | *Shall not be sold, propagated or knowingly distributed* |
| **W4f** | *Shall not be sold, propagated or knowingly distributed. Any biological control or other control program directed by a local control authority must be implemented.* |

*SOURCE: Southern Slopes Noxious Plants Authority, 2001*

**Table 4 Noxious Weeds in the Yass Area Catchment**

| Common Name | Botanical Name | Category |
|---|---|---|
| African Boxthorn | *Lycium ferocissimum* | W2 |
| African Love Grass | *Eragrostis curvula* | W2 |
| Alligator Weed | *Alternanthera philoxeroides* | W1 |
| Bathurst, Noogoora, Californian & Cockle Burrs | *Xanthium spp.* | W3 |
| Black Knapweed | *Centaurea nigra* | W1 |
| Blackberry | *Rubus fruticosus (agg. spp.)* | W2 |
| Buffalo Burr | *Solanum rostratum* | W2 |
| Cabomba spp. | *Cabomba* | W4g |
| Columbus Grass | *Sorghum x almum* | W2 |
| Devil's Claw (Purple flower) | *Proboscidea louisianica* | W2 |
| Devil's Claw (Yellow flower) | *Ibicella lutea* | W2 |
| Dodder | *Cuscuta campestris* | W2 |
| Fireweed | *Senecio madagascariensis* | W2 |
| Galvanised Burr | *Sclerolaena birchii* | W2 |
| Green Cestrum | *Cestrum parqui* | W2 |
| Harrisia cactus | *Harrisia spp.* | W4f |
| Hawkweed | *Hieracium spp.* | W1 |
| Horehound | *Marrubium vulgare* | W2 |
| Horstetail | *Equisetum spp.* | W1 |
| Johnson Grass | *Sorghum halepense* | W2 |
| Karoo Thorn | *Acacia karoo* | W1 |
| Kochia | *Kochia scoparia* | W1 |
| Lagarosiphon | *Lagarosiphon major* | W1 |
| Longstyle Feather Grass | *Pennisetum villosum* | W2 |
| Miconia | *Miconia spp.* | W1 |
| Nodding Thistle | *Carduus nutans* | W2 |
| Pampas Grass | *Cortaderia spp.* | W2 |
| Parthenium weed | *Parthenium hysterophorus* | W1 |
| Patterson's Curse, Vipers Bugloss | *Echium spp.* | W3 |
| Prickly Pears | *Opuntia spp.* | W4f |
| Rhus Tree | *Toxicodendron succedanium* | W2 |
| Salvinia | *Salvinia molesta* | W1 |
| Scotch/English Broom | *Cytisus scoparius* | W2 |
| Scotch/Illyrian/Stemless Thistle | *Onopordum spp.* | W3 |
| Senegal Tea Plant | *Gymnocoronis spilanthoides* | W1 |
| Serrated Tussock | *Nassella trichotoma* | W3 |
| Siam Weed | *Chromolaena odorata* | W1 |
| Sifton Bush | *Cassinia arcuata* | W3 |
| Silverleaf Nightshade | *Solanum elaeagnifolium* | W2 |
| Spiny Burrgrass | *Cenchrus incertus C. longispinus* | W2 |
| Spotted Knapweed | *Centaurea maculosa* | W1 |
| St John's Wort | *Hypericum perforatum* | W3 |
| Sweet Briar | *Rosa rubiginosa* | W2 |
| Water Hyacinth | *Eichhornia crassipes* | W1 |
| Water Lettuce | *Pistia stratiotes* | W1 |
| Wild Raddish | *Raphanus raphanistrum* | W2 |
| Willows | *Salix spp.* | W4g |

*SOURCE: Southern Slopes Noxious Plants Authority*

## 6.6 Fauna

The following is a list of threatened fauna for the Yass catchment. Loss of habitat by removal of native vegetation has been the primary cause for the decline in native fauna populations, also predation by humans, cats and foxes.

**Table 5: Threatened Fauna in the Yass Area**

V – Vulnerable, E – Endangered, RS – Regionally Significant, X – Extinct

| Species | Common Name | Status | Status in Yass Area |
|---|---|---|---|
| ***Birds*** | | | |
| *Oxyura australis* | Blue-billed Duck | V | Uncommon occasional visitor |
| *Stictonetta naevosa* | Freckled Duck | V | Uncommon occasional visitor |
| *Ardeotis australis* | Australian Bustard | E | Possibly extinct |
| *Botaurus poiciloptilus* | Australasian Bittern | V | Rare; few records from isolated sites |
| *Lophoictinia isura* | Square-tailed Kite | V | Very uncommon; mainly in large areas of well timbered habitat |
| *Ninox strenua* | Powerful Owl | V | Uncommon; associated with taller forests in east of area |
| *Cacatua leadbeateri* | Pink Cockatoo | V | Vagrant |
| *Calyptorhynchus lathami* | Glossy Black Cockatoo | V | Uncommon; occasional records in woodlands with *Allocasuarina* species |
| *Polytelis swainsonii* | Superb Parrot | V | Locally common breeding resident |
| *Grantiella picta* | Painted Honeyeater | V | Rare; no records in ACT region since 1987 |
| *Xanthomyza phrygia* | Regent Honeyeater | E | Uncommon; occasional visitor, usually in spring/summer |
| *Melanodryas cucullata* | Hooded Robin | RS | Uncommon; mainly occurs in larger woodland remnants |
| *Pachycephala olivacea* | Olive Whistler | V | Uncommon; associated with wet forest gullies in spring/summer; other forest and woodland areas in winter |
| *Climacteris picumnus* | Brown Treecreeper | RS | Uncommon; mainly occurs in larger woodland remnants |
| ***Mammals*** | | | |
| *Mastacomys fuscus* | Broad-toothed Rat | V | Rare; restricted to montane grasslands and heathlands |
| *Miniopterus schreibersii* | Large Bent-wing Bat | V | Cave dweller |
| *Myotis adversus* | Large-footed Mouse-eared Bat | V | Cave dweller; forages over pools in creeks and rivers |
| *Dasyurus maculatus* | Spotted-tailed Quoll | V | Rare; restricted to extensive areas of suitable habitat (eg. Brindabella NP) |
| *Dasyurus viverrinus* | Eastern Quoll | E | Extinct |
| *Petaurus australis* | Yellow-bellied Glider | V | Uncommon; associated with taller forests |
| *Petroica rodinogaster* | Pink Robin | V | Uncommon winter visitor in woodland and forest areas |
| *Phascolarctos cinereus* | Koala | V | Rare to very rare |
| ***Amphibians*** | | | |
| *Pseudophryne corroboree* | Corroboree Frog | E | Rare; found in restricted habitats in alpine areas |
| *Litoria aurea* | Green and Golden Bellfrog | E | Possible only |
| ***Reptiles*** | | | |
| *Delma impar* | Striped Legless Lizard | V | Very rare, few sites known |
| *Suta flagellum* | Little Whip Snake | V | Very rare, few sites known |
| *Varanus rosenbergi* | Heath Monitor | V | |

*SOURCE: National Parks and Wildlife – Threatened Species Unit Queanbeyan 2000*

## 6.7 Land Use

The Yass Area is predominantly an agricultural and pastoral district famous for its merino wool, cattle and sheep studs. Cropping occurs on the more productive land of Silurian/volcanic origin, however these areas are reducing due to the problems of soil acidification and degradation. Native vegetation is found in areas where land is unsuitable for agricultural production due to slope limitations, or soil fertility and depth.

**Table 6: Current land use in the Yass area**

| Land Use | Area | *% of catchment* |
|---|---|---|
| Native, Naturalised, Improved Pasture | 223,572ha | *78.9* |
| Native Timber | 44,345ha | *15.7* |
| Grain, Fibre, Fodder Crops | 7,964ha | *2.8* |
| Water Body – River, Lake | 5,726ha | *2.0* |
| ACT | 1,009ha | *0.4* |
| Urban | 404ha | *0.1* |
| Mining & Quarrying | 131ha | *>1* |
| Electricity/Pipeline Easement | 105ha | *>1* |

*Source: DLWC RIU, 1999*

The Yass area also supports sites of significant conservation value which include:

- *Brindabella National Park*
- *Hattons Corner Nature Reserve*
- *Wee Jasper Nature Reserve*
- *Burrinjuck Nature Reserve*
- *Mundoonen Nature Reserve*
- *Narrangullen stone arrangement near Wee Jasper*
- *Burrinjuck State Recreation Area*
- *Geoheritage Sites – Environment Australia (1998) has identified 108 sites of geoheritage significance in the Yass catchment, predominantly sites of invertebrate fossils.*

## 6.8 Land Capability

Land capability refers to the rating land is given according to its potential to achieve a sustained level of production (Soil Con., 1981).

**Table 7: Distribution of Land Capability Classes in the Yass Area Catchment**

| Land Capability Class | Area (ha) | % of Catchment |
|---|---|---|
| Class I | 95 | 0.03 |
| Class II | 5,668 | 2.00 |
| Class III | 33,044 | 11.66 |
| Class IV | 75,421 | 26.63 |
| Class V | 43,037 | 15.19 |
| Class VI | 81,451 | 28.76 |
| Class VII | 27,209 | 9.61 |
| Class VIII | 9,745 | 3.44 |
| Water | 5,153 | 1.82 |
| Nature Reserve | 1,601 | 0.57 |
| Urban | 632 | 0.22 |
| ACT | 138 | 0.05 |
| Mining | 61 | 0.02 |

## 6.9 Community Profile

The Yass catchment incorporates three local government areas – Yass, Yarrowlumla and Gunning Shires. The Yass Shire covers the largest proportion of the Yass area.

**Table 8: Estimated Population in the Yass Shire (1998)**

| Year | Total Persons |
|---|---|
| 1996 | 9370 |
| 1997 | 9398 |
| 1998 | 9380 |
| 1999 | 9421 |

*Source: ABS, 2000*

**Table 9: Age Distribution in the Yass Shire (1998)**

| Total Population | % Population 0-19 Years | % Population 20-64 Years | % Population 65+ Years |
|---|---|---|---|
| 9380 | 29.3 | 58.3 | 12.4 |

*Source: ABS, 2000*

- *Average annual rate of change 1991-1996 0.98%*
- *Births (1997-98) 117*
- *Deaths (1997-98) 67*

**Table 10: Community Statistics for the Yass Shire**

| POPULATION | Statistics 1996 (Change between 1991-1996) |
|---|---|
| • Number of Persons Per Square Kilometre | 1-10 |
| • Population Change 1991-1996 | 0-5% increase |
| • Population Age (1996): 0 – 14 years | 0-10% above non-metro average (0-10% increase) |
| 15-24 years | 10-20% below non-metro average (10-20% decrease) |
| 25-64 years | 0-10% above non-metro average (0-10% increase) |
| 65 years or older | 10-20% below non-metro average (20%$^{+}$ increase) |
| • Median Age of the Total Population (1996) | 34 - 37 years |
| • Population Sex Ratio | 100 males to 125 females |
| **LABOUR FORCE** | |
| • Labour Force Participation (1996) | 10-20% above non-metro average |
| • Male Labour Force Participation | 10-20% above non-metro average |
| • Female Labour Force Participation | 10-20% above non-metro average |
| • Unemployment Rate | 20-40% below non-metro average |
| • Employment in Agriculture | 50-100% above non-metro average (0-10% decrease) |
| • Employment in Service Industries | 0-30% above non-metro average (20% or greater increase) |
| • Employment in Manufacturing | 60% or greater below non-metro average |
| • Median Age of Farmers & Farm Managers | 48-53 years (increased by 0-2 years) |
| • Median Age of Agricultural Workers | 33-36 years (increased by 2-4 years) |
| **INCOME** | |
| • Mean Annual Taxable Income | 0-10% above non-metro average |
| *For the Murrumbidgee Region:* | |
| • Annual Broadacre Farm Family Cash Income | $50,000 - $70,000 (increase by 75-100%) |
| • Annual Broadacre Farm Family Cash Income Derived from Farm Cash Income | Between 70-80% (increase by 10-15%) |

*SOURCE: Bureau of Rural Sciences, 1999*

**Table 11: Value of production in the Upper Murrumbidgee for 1994-95**

**SHEEP:**
- 1,846,390 Sheep
- 488,995 Sheep and lambs sold
- Total value of sheep and lambs slaughtered was $7,193,356
- The total value of wool sold was $50, 564, 605

**CATTLE:**
- 117, 225 Beef cattle
- 49,285 cattle sold
- Total value of beef cattle slaughtered was $18,734,061
- *(Dairy cattle $887,524)*
- *(Pigs $22,283)*

**CROPS:**
- Total value of crop production $7,396,135
- *(Pasture hay $1,773,506)*
- *(Oats $563,468)*

**FRUIT (other than Grapes):**
- Value $235,963
- Grapes: 102 tonnes on 25ha, valued at $64,241

*SOURCE: MCAP, 1998*

## 6.10 Geoheritage Sites in the Yass Area

**Table 12 Geoheritage sites in the Yass area**

| Place Name | TYPE | SIZE (Ha) | Criteria* | Fragility ** |
|---|---|---|---|---|
| *Boambolo, Hall's Creek (Por. 61)* | Secondary Limestone | >1 | A1,B1 | 3 |
| *Cavan (Por. 94)* | Volcanic Ash | - | A1 | X |
| *Cavan Hill (Sth Of Taemas Bridge)* | Bloomfield Limestone | 1-100 | A1, C1, | 4 |
| *Taemas Bridge (1 Mile Sth)* | Majurgong Sandstones | >1 | A1, C1, | 3 |
| *Taemas Bridge (Nth Approach At Sharp Turn)* | Majurgong Sandstones | >1 | A1, C1, | 3 |
| *Taemas Bridge Road (Nth Bank Of Murrumbidgee)* | Fossil Site, Invertebrate | >1 | A1, C1, | 3 |
| *Goodradigbee Cave* | Fossil Site, Vertebrate | - | A1,C1,D | 2 |
| Goodradigbee Cave | Karst | - | A1,C1,D | 1 |
| *Oakey Creek (Cutting Nth Of Mouth)* | Shales & Limestones | >1 | A1,C1,D | 3 |
| *Oakey Creek Valley* | Limestones | 1-10km$^2$ | A1,C1,D | 3 |
| *Cavan (Por. 136)* | Limestone Breccia | - | A1,C1,D | X |
| *Cavan (Por. 136)* | Bluff Limestone/Fossils | - | A1,C1,D | 2 |
| *Cavan (Por. 136)* | Currajong Limestone/ | - | A1,C1,D | 2 |
| *Cavan (Por. 136)* | Yellow Limestone/Fossils | - | A1,C1,D | 2 |
| *Clear Hill* | Fossil Site, Invertebrate | 1-100 | A1,C1,D | 4 |
| *Clear Hill (Near Taemas Bridge)* | Fossil Site, Invertebrate | 1-100 | A1,C1,D | 4 |
| *Clear Hill, Cavan (Pors. 5,136)* | Cavan Limestone | 1-100 | A1,C1,D | 4 |
| *Narrengullen Mountain* | Rhyolites | <10 km$^2$ | A1,C1,D | 4 |
| *Mountain Creek Tuffs* | Tuff | - | A1,C1,D | 4 |
| *Mountain Creek (Road-Cuttings West Of Bridge)* | Cavan Limestone | >1 | A1,C1,D | 3 |
| *Mountain Creek (Road-Cuttings West Of Bridge)* | Evidence Of Shallow | >1 | A1,C1,D | 3 |
| *Cavan (Por. 5)* | Volcanic Breccia | - | A1,C1,D | X |
| *Cavan (Por. 5)* | Yass Porphyry | - | A1,C1,D | X |
| *Westmead Park Formation* | Fossil Site, Invertebrate | - | A1,C1,D | 2 |
| *Westmead Park Formation* | Stratigraphic Format | - | A1,C1,D | X |
| *Glenesk Formation* | Stratigraphic Format | - | A1,C1,D | X |
| *Devil's Elbow* | Fossil Site, Invertebrate | >1 | D1, C1 | 3 |
| *Devil's Elbow* | Fossil Site, Invertebrate | >1 | D1, C1 | 3 |
| *Devil's Elbow (Taemas Anticline)* | Yassensis Limestone | >1 | D1, C1 | 3 |
| *Murrumbidgee River (Western Bank Below Taemus Bridge)* | Anticline | >1 | D1, C1 | 3 |
| *Cave Island* | Fossil Site, Invertebrate | >1 | A1,C1,D | 2 |
| *Cave Island* | Karst | >1 | A1,C1,D | 1 |
| *Cave Island* | Fossil Site, Vertebrate | >1 | A1,C1,D | 2 |
| *Cave Island* | Karst | >1 | A1,C1,D | 1 |
| *Duffy's Point (Nth End, Across Murrumbidgee River)* | Fossil Site, Invertebrate | - | A1,C1,D | 2 |
| *Duffy's Point (Nth Of Majurgong Trig Station)* | Bloomfield Limestone | - | A1,C1,D | X |
| *Good Hope Public School (Nth Of)* | Yass Porphyry | - | A1,C1,D | X |
| *Goodhope (In Vicinity)* | Cavan Limestone | - | A1,C1,D | X |
| *Goodhope, Yass* | Fossil Site, Invertebrate | - | A1,C1,D | 2 |
| *Murrumbidgee River Opposite Dawes (Duffy* | Fossil Site, Invertebrate | - | A1,C1,D | 2 |
| *Hatton's Corner* | Fossil Site, Invertebrate | 1-100 | D1, H1, | 2 |
| *Silverdale Formation (Barrandella Shale)* | Fossil Site, Invertebrate | >1 | D1, H1, | 2 |
| *Silverdale Formation (Barrandella Shale* | Type Section | >1 | D1, H1, | 3 |
| *Silverdale Formation (Bowspring Limeston* | Fossil Site, Invertebrate | >1 | D1, H1, | 2 |

| Place Name | TYPE | SIZE (Ha) | Criteria* | Fragility ** |
|---|---|---|---|---|
| *Silverdale Formation (Bowspring Limeston* | Type Section | >1 | D1, H1, | 3 |
| *Silverdale Formation (Hume Limestone)* | Fossil Site, Invertebrate | >1 | D1, H1, | 2 |
| *Silverdale Formation (Hume Limestone)* | Type Section | >1 | D1, H1, | 3 |
| *Yass (Hattons Creek, 2 Km Nw Of)* | Fossil Site, Invertebrate | - | D1, H1, | 2 |
| *Narrengullen Caves* | Limestone Cave | - | A1,C1,D | 1 |
| *Narrengullen Caves* | Cavan Limestone | - | A1,C1,D | 3 |
| *Narrengullen Caves* | Vertebrate Fossil | - | A1,C1,D | 2 |
| *Taemas* | Karst | - | A1,C1,D | 1 |
| *Shearsby's Wallpaper* | Fossil Site, Invertebrate | >1 | C1, D1, | 2 |
| *Alum Creek* | Breccia Bands Within | - | A1,C1,D | X |
| *Alum Creek (In Vicinity)* | Cavan Limestone | - | A1,C1,D | X |
| *Bushranger's Creek Valley* | Cavan Limestone | - | A1,C1,D | X |
| *Derringullen Creek* | Fossil Site, Invertebrate | 1-100 | A1,C1,D | 3 |
| *Derringullen Creek* | Fossiliferous Limestone | 1-100 | A1,C1,D | 3 |
| *Taemas-Cavan (Burrinjuck Dam)* | Limestone Series | <10 $km^2$ | A1,C1,D | 1 |
| *Devil's Pass* | Gorge | 1-100 | D1 | 3 |
| *Devil's Pass (Black Range Road; 5 Miles)* | Lava Flow | - | A1 | X |
| *Boambolo (Por. 107)* | Limestone/Fossil Site | - | C1 | 2 |
| *Boambolo (Por. 61)* | Limestone/Fossil Site | - | C1 | 2 |
| *Boambolo (Por. 79)* | Limestone/Fossil Site | - | C1 | 2 |
| *Boambolo (Pors. 80,151)* | Limestone/Fossil Site | - | C1 | 2 |
| *Boambolo Formation* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Boambolo Formation* | Type Section | >1 | C1 | 3 |
| *Glen Bower Formation* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Glen Bower Formation* | Type Section | Linear place of minimal width | C1 | 3 |
| *Taemas Bridge Road (Nth Bank Of Murrumbidgee)* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Uriarra Volcanics (Swamp Creek Member)* | Type Locality | >1 | C1 | 3 |
| *Wee Jasper Road (1 Mile From Taemas Bridge)* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Murrumbateman Creek Formation (East & West)* | Type Area | >1 | C1 | 3 |
| *Boorowa (Elmside Formation)* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Black Bog Shale* | Type Section | Linear place of minimal width | C1 | 3 |
| *Black Bog Shale (Yarwood Siltstone Member)* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Bowning* | Fossil Site | >1 | C1 | 2 |
| *Bowning (Near)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Bowning Railway Station* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Bowning Railway Station* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Burrinjuck Dam* | Fossil Site, Fish | >1 | C1 | 2 |
| *Cliftonwood (Near; Yass River)* | Fossil Site Invertebrate | - | C1 | 2 |
| *Cliftonwood Limestone* | Type Section | >1 | C1 | 3 |
| *Willow Bridge Tuff* | Type Section | Linear place of minimal width | C1 | 3 |
| *Cowridge Siltstone* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Cowridge Siltstone* | Type Section | >1 | C1 | 3 |
| *Elmside Formation (Mudstone Member)* | Fossil Site, Invertebrate | - | C1 | 2 |

| Place Name | TYPE | SIZE (Ha) | Criteria* | Fragility ** |
|---|---|---|---|---|
| *Elmside Formation (Mudstone Member)* | Type Section | Linear place of minimal width | C1 | 3 |
| *Elmside Formation (Sandstone Member)* | Type Section | >1 | C1 | 3 |
| *Laidlaw Formation (Euralie Limestone Member)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Laidlaw Formation (Euralie Limestone Member)* | Type Section | >1 | C1 | 3 |
| *Laidlaw Formation (Excursion Creek Sands)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Laidlaw Formation (Excursion Creek Sands)* | Type Section | >1 | C1 | 3 |
| *Silverdale Formation (Gums Road Limestone)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Silverdale Formation (Gums Road Limestone)* | Type Section | >1 | C1 | 3 |
| *Silverdale Formation (Tullerah Sandstone)* | Type Section | >1 | C1 | 3 |
| *O'briens Creek Sandstone* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *O'briens Creek Sandstone* | Type Section | >1 | C1 | 3 |
| *Rosebank Sle (Marl Member)-(Rainbow Hill)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Rosebank Sle (Marl Member)-(Rainbow Hill)* | Type Section | >1 | C1 | 3 |
| *Rosebank Sle (Sle Member)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Rosebank Sle (Sle Member)* | Type Section | >1 | C1 | 3 |
| *Spring Mount (300m NW Of; Road Cutting)* | Fossil Site, Invertebrate | >1 | C1 | 2 |
| *Warroo Creek* | Fossil Site, Fish | - | C1 | 2 |
| *Taemas House (0.5 Mile Nth)* | Fossil Site, Fish | - | C1 | 2 |
| *Yass (Booroo Ponds Creek, 2 Km NW Of)* | Fossil Site, Invertebrate | - | C1 | 2 |
| *Taemas (Por.65)* | Fossil Site, Invertebrate | - | C1 | 2 |

*Source: CRA, 2000*

* **CRITERIA** – Criteria for Register of the National Estate relevant to place type

** **FRAGILITY**:

1 – Places sensitive to unintentional human impact
2 – Places sensitive to intentional human impact including use of hand tools. This includes those places sensitive to sampling, collecting or vandalism.
3 – Places sensitive to mechanical interference at any scale
4 – Places generally immune to human interference
X – Insufficient sensitivity data available

# 7. Priority Issues - Further Information

## 7.1 Dryland Salinity

Dryland salinity can occur when the water tables rise to between 2-3 metres of the surface. Capillary action brings the salts to the soil surface in concentrated amounts affecting the surrounding environment (Nicholson, A & Wooldridge, A. 2000).

**Objectives for Managing Dryland Salinity**

The processes that have contributed to salinity and rising groundwater levels such as vegetation clearing and agricultural practices over the past 150 years cannot be reversed. Instead, land use practices need to be modified to accept saline conditions and find productive uses for working with saline land as the impacts of salinity are slowly controlled.

- *Reduce recharge - Native vegetation has a greater potential to intercept rainfall before reaching the groundwater with deep roots and organic material.*
- *Protect and manage native vegetation.*
- *Use water more effectively and efficiently*
- *Implement engineering solutions*
- *Productive use of salt affected land focus on-ground actions on priority areas*
- *Reduce spread of salinity*
- *Reduce visual impact of salinity such as scalds, improving aesthetics*
- *Reduce the risk of erosion by providing soil cover and stabilisation*
- *Reduce topsoil salinity by reducing groundwater levels that could otherwise bring salts to the surface*
- *Re-establish landscape to deep-rooted perennial vegetation*

## 7.2 Native Vegetation

Dieback refers to the decline in health and vigour of trees over time and is caused by an ecosystem imbalance which impacts on the natural systems that support native vegetation. Dieback is caused by the interaction of a number of factors, which include:

- *Clearing*
- *Rising watertables and salinity*
- *Insect attack*
- *Tree ageing and natural regeneration decline*
- *Habitat decline (understorey) for insectivorous predators*
- *Soil nutrient imbalance – from fertilisers, stock camps, cropping systems and changes in pasture species*
- *Pasture improvement*
- *Weed competition*
- *Mistletoe*
- *Drought*
- *Ringbarking – from stock and clearing*
- *Changes to water balance – runoff, erosion, dams*
- *Grazing pressure – stock, native fauna & rabbits*

**Table 13: Dominant native riparian vegetation for the Yass area**

| RIVER/CREEK | SUB-CATCHMENTS | DOMINANT NATIVE VEGETATION |
|---|---|---|
| Yass River | Yass River, Brooks Creek, Murrumbateman Creek | *Bottlebrush and Burgan dominated shrubland, Poa dominated grasslands, River Red Gum dominated woodlands.* |
| Murrumbidgee River (Downstream & including the ACT) | Murrumbidgee River, Ginninderra Creek, Tuggeranong Creek | Bottlebrush and Burgan dominated shrubland, Poa dominated grasslands, River she-oak dominated woodland. |
| Mountain Creek | Mountain Creek | Burgan dominated shrubland and River she-oak dominated woodland. |
| Goodradigbee River | Goodradigbee River, Micalong Creek | Tea-tree dominated shrubland, River she-oak dominated woodland, Ribbon Gum dominated woodland. |

## 7.3 Stream Bank Zone

**Stressed Rivers Assessment Report**
The Yass Area Catchment falls within the Yass Upper, Yass Lower and Murrumbidgee II sub-catchments of the Stressed Rivers Assessment Report (DLWC 1999). 'Yass Upper' and 'Yass Lower' constitute the Yass Valley Sub-Catchment, while the Burrinjuck Sub-Catchment covers both "Burrinjuck Dam' (a regulated catchment) and the upper section of 'Murrumbidgee II'. The Murrumbidgee II data only represents the south-eastern area of the Burrinjuck sub-catchment.

***Yass Upper:***
Yass Upper includes the Yass River and tributaries above Yass weir which were assessed as having high environmental stress and high water extraction. The primary stress factors for the Yass Upper catchment include salinity, dams and rural residential development. NSW Fisheries identified a high conservation value with threatened species present such as Macquarie Perch and Silver Perch expected to occur.

Stream bank vegetation was rated as *poor* in relation to; width of rip zone, indigenous cover, connectivity and structural integrity.

***Yass Lower:***
Yass Lower includes the Yass River and tributaries below Yass weir, which were assessed as having high environmental stress and low water extraction. The primary stress factors for the Yass Lower catchment include sewerage, weir and salinity. Similar to Yass Upper, NSW Fisheries identified a high conservation value due to the expected presence of threatened species. Full development of the Yass Lower catchment creates a potential increase in hydrologic stress which could see Yass Lower ranked in the highest overall stress category (S1) similar to Yass Upper and Murrumbidgee II.

Stream bank vegetation was rated as *fair* in relation to indigenous cover, connectivity and structural integrity, and *good* in relation to cover of bank and width of rip zone.

***Murrumbidgee II:***
Murrumbdigee II includes the Murrumbidgee River and minor tributaries between Numeralla and Burrinjuck which were assessed as having high environmental stress and high water extraction. The primary stress factors on stream condition being Canberra and surrounds. NSW Fisheries ranked Murrumbidgee II as having an Identified Conservation Value with high fish species diversity and containing threatened species such as Trout Cod, Macquarie Perch and Silver Perch.

**Table 14: Current Stress Classifications**

| **Sub-Catchment** | **Yass Upper** | ***Yass Lower*** | ***Murrumbidgee II*** |
|---|---|---|---|
| *Present Management Classification* | S1 | S5 | S1 |
| *Hydrologic Stress* | High | Low | High |
| *Environmental Stress** | High | High | High |
| *High Conservation Value* | No | No | No |
| *Identified Conservation Value* | | | |
| *NPWS* | Yes | No | Yes |
| *Fisheries* | Yes | Yes | Yes |

*Source: DLWC, 1999*

***Present Management Classification:***
**S1** – High environmental stress and high water extraction (of high priority for the preparation of river management plan).
**S5** – High environmental stress and low water extraction (of medium priority for preparation of river management plan).

***Hydrologic Stress:***
Hydrologic stress is based on an estimation of water extraction in proportion to the estimated stream flow.
**High** – 70-100% extraction **Low** – 0-30% extraction

***Environmental Stress:***
Environmental stress refers to a measure of stream health indicators, each ranked to reflect average stream condition.
**High** – Stream health indicators reflect high environmental stress on stream health

***High Conservation Value & Identified Conservation Value:***
This assessment was conducted by NPWS and NSW Fisheries using environmental value indicators. Indicators included: physical disturbance, presence of wetlands, national park, riparian vegetation, water birds, threatened species, fish species diversity. Using this data streams were assigned a high conservation or identified conservation value.

**Table 15: Stream Condition Assessment**

| **Stream Health Indicators:** | | **Yass Upper** | **Yass Lower** | **M'bidgee II** |
|---|---|---|---|---|
| *Riparian Vegetation* | *Cover* | Fair | Good | Fair |
| | *Width* | Poor | Good | Good |
| | *Indigenous* | Poor | Fair | Fair |
| | *Connectivity* | Poor | Fair | Poor |
| | *Integrity* | Poor | Fair | Poor |
| *Geomorphology* | *Bank Stability* | Fair | Poor | Very Poor |
| | *Active Bank Density* | Poor | Poor | Very Poor |
| | *Bed Stability* | Good - stable with some siltation | Good - stable with some siltation | Good - stable with some siltation |
| *Anthropogenic Catchment Effects* | *Fish Barriers* | Poor - many passable | Poor - many passable | Fair - some passable |
| | *Dams & Development* | Very Poor (extensive development) | Poor (agriculture/urban) | Poor (agriculture/urban) |
| | *Conservation* | Very Poor | Very Poor | Fair |
| | *Tree – Shortfall* | Good | Poor | Poor |
| | *Over-grazing* | Very Good | Good | Fair |
| | *% Cropping* | Fair 2.70% | Fair 2.69% | Fair 2.29% |
| | *Over-cropping* | Very Good | Very Poor | Very Good |
| | *Areal Erosion Index* | Very Poor | Poor | Very Poor |
| *Water Qualtiy* | *Total Phosphorus* | Poor 65 $\mu gL^{-1}$ | Poor 65 $\mu gL^{-1}$ | Poor 65 $\mu gL^{-1}$ |
| | *Turbidity* | Fair 23 NTU | Good 10 NTU | Good 10 NTU |
| | *Salinity* | Poor 1400EC | Fair 550EC | Good 200EC |
| | *pH* | Good 6 | Good 6 | Good 6 |
| *Stress Assessment* | | **HIGH** | **HIGH** | **HIGH** |

# RIPARIAN VEGETATION & STREAM BANK CONDITION

Data collated from Catchment Assessments conducted by the Natural Resource Planning Advisor, DLWC Catchment Condition and Erosion mapping.

## *Table 16 Burrinjuck sub-catchment: Riparian vegetation & stream bank condition*

Refer to Map: "Burrinjuck Riparian Condition".

| | GOOD | MODERATE | POOR |
|---|---|---|---|
| ***Riparian Condition**** | • Cobblestone Ck (lower-mid)<br>• Carrol Ck (mid) | • Waroo Ck (mid), Brikeys Ck (mid), Brassil Gully (mid-upper), Sapling Point Ck (mid), Cobblestone Ck (mid-upper), Jeir Ck (lower-mid), Mountain Ck (lower) | |
| ***Streambank Condition**** | • Woolgarlo Ck (mid), Carrolls Ck (mid), Warroo Ck (mid), Gooda Ck (mid & mid-upper), Jeir Ck (mid & mid-upper), Chainoponds Ck (lower), Swamp Ck (mid-upper), Tea Drinking Ck (mid), Mullion Ck (lower-mid, mid-upper & upper), Ledgers Ck (mid), Johnsons Ck (mid), Oaky Ck (lower), Razorback Ck (mid), Sawyers Ck (lower to mid), Mountain Ck (lower to mid), Flinty Mountain Ck (lower to mid), Spring Ck (lower), Salt Blx Ck (lower & upper), Narrangullen Ck (mid-upper), Nibs Ck (lower-mid), Sugarloaf Ck (lower-mid & mid-upper), Cave Ck (mid), Oaky Ck catchment (lower), Goodradigbee River catchment (lower) | • Cobblestone Ck (lower)<br>• Gooda Ck (mid-upper)<br>• Little Swamp Ck (mid-upper)<br>• Mullion Ck (mid-upper)<br>• Johnsons Ck (mid)<br>• Native Dog Ck (lower to mid)<br>• Spring Ck (mid)<br>• Oaky Ck (upper)<br>• Ledgers Ck catchment (upper)<br>• Tea Drinking Ck catchment (lower) | • Woolgarlo Ck (upper)<br>• Oaky Ck (upper)<br>• Little Swamp Ck (mid)<br>• Tea Drinking Ck (mid-upper)<br>• Spring Ck (mid)<br>• MacPhersons Ck (upper) |

***Assessment based on dominance of native or exotic vegetation and streambank erosion (limited information available)***

***Assessment based on erosion depth and extent.***

**Good** *Good vegetative cover (predominantly native), of highly erosion resistant soil. No undermining of banks, may be some isolated erosion. Streambank erosion <1.5m and no continuous damage to bank structure of vegetation.*

**Moderate** *Banks held by discontinuous vegetation (native & exotic) or erosion resistant soils. Some obvious damage to bank structure and vegetation, streambank erosion 1.5-3m, generally stable toe.*

**Poor** *Little effective vegetation (predominantly exotic), on unstable or dispersive soils. Mostly undercut toe, may be recent bank movement/erosion, streambank erosion 3-6m and >6m.*

# RIPARIAN VEGETATION & STREAM BANK CONDITION

Riparian Condition data collated from Catchment Assessments conducted by the Natural Resource Planning Advisor, DLWC Catchment Condition and Erosion mapping.

***Table 17: Yass Valley sub-catchment: Riparian vegetation & stream bank condition***
*Refer to Map "Yass Valley Riparian Vegetation & Streambank Condition"*

| | GOOD | MODERATE | POOR |
|---|---|---|---|
| ***Riparian Vegetation**** | • Yass River – lower (west of Yass township) | • Yass River mid-upper (Gundaroo to Sutton)<br>• Yass River upper (Sutton to headwaters) | • Yass River lower-mid (Yass to Gundaroo) |
| ***Streambank Condition***** | Two Mile Ck (mid-upper), Bowning Creek (mid-upper), Limestone Ck (mid-upper), Derringullen Ck (mid), Bango Ck (lower & mid), Mantons Ck (mid-upper), Nowlands Ck (lower), Five Mile Ck (lower-mid), Five Mile Ck (lower-mid), Nelanglo Ck (lower & upper), Gundaroo Ck (mid), Deep Creek (lower & mid), Dairy Ck (mid & upper), Brooks Ck (mid and mid-upper), Gum Flat Ck (lower), Bungendore Ck (mid-upper), Black Joes Ck (lower), Birchams Ck (lower & mid), Amungula Ck (lower, mid, upper), McLaughlins Ck (lower-mid), Back Ck (mid), Bendy Ck (mid), Spring Flat Ck (mid-upper), Williams Ck (lower-mid), Dicks Ck (lower & mid), Scabing Ck (lower), Murrumbateman Ck (mid), Graveyard Gully (mid), Broken Dam Ck (lower and mid) Reedy Ck (mid) | • Two Mile Ck (mid)<br>• Gallop Ck (mid)<br>• Derringullen (mid-upper)<br>• Cooks Ck (lower)<br>• Bango Ck (mid)<br>• Nelanglo Ck (mid)<br>• Gundaroo Ck (mid & upper)<br>• McLeods Ck (lower)<br>• Brooks Ck (lower & mid)<br>• Bungendore Ck (mid)<br>• McLaughlins Ck (lower & mid)<br>• Dicks Ck (mid-upper)<br>• Murrumbateman Ck (lower-mid & mid-upper)<br>• Reedy Ck (mid) | • Derringullen (mid)<br>• Cooks Ck (mid)<br>• Mantons Ck (lower-mid)<br>• Gundaroo Ck (lower)<br>• Bungendore Ck (upper) |

***Assessment of vegetation based on dominance of native or exotic species.***
****Assessment of stream bank condition based on erosion depth and extent.***

**Good** *Good vegetative cover (predominantly native), of highly erosion resistant soil. No undermining of banks, may be some isolated erosion. Streambank erosion <1.5m and no continuous damage to bank structure of vegetation.*

**Moderate** *Banks held by discontinuous vegetation (native & exotic) or erosion resistant soils. Some obvious damage to bank structure and vegetation, streambank erosion 1.5-3m, generally stable toe.*

**Poor** *Little effective vegetation (predominantly exotic), on unstable or dispersive soils. Mostly undercut toe, may be recent bank movement/erosion, streambank erosion 3-6m*

## 7.4 GULLY AND SOIL EROSION

Gully erosion is a complex form of erosion whereby large quantities of soil are removed by runoff. The volume and velocity of water movement generated is great enough to cut large channels in the landscape which provide for rapid movement of soil material, sediment and water into catchment drainage systems. Gully erosion is accelerated by the dispersion of unstable subsoils due to seepage, causing the collapse of the surface soils, evident in the slumping and slipping of gully heads and walls.

**Forms of Gully Erosion include:**

***Head Erosion*:** Enlargement of the gully channel in an upstream direction caused by concentrated runoff forming a 'waterfall' effect and subsequent pooling of water at the gully head. This leads to undercutting and slumping, and can be further affected by sub-surface seepage, sheet and splash erosion.

***Lateral Erosion*:** Enlargement of a gully in a sideways direction caused by concentrated runoff at the gully walls leading to undercutting, slumping, sheet, rill and splash erosion.

***Attrition*:** Erosion of poorly structured (highly dispersive) material such as gravel and sand which is easily dislodged from the banks.

***Slumping*:** Collapse of the bank, leaving blocks of soil on the gully floor.

***Toe*:** Area where the gully walls meet the gully floor, and is most prone to erosion.

***Undercutting*:** Removal of soil from the toe steepening the slope and producing an overhang, which can lead to slumping.

The erosion of soil sediments can contribute to numerous other forms of land degradation within a catchment, particularly within the drainage systems. For example:

- *Increased nutrient loads (eg. phosphates and nitrates)*
- *Siltation and sedimentation*
- *Streambank erosion*
- *Increased salt loads - salt crystals on the soil surface become mobilised*
- *Pollution*
- *Algal blooms*
- *Water quality decline*

**Causes of Erosion**

Erosion is caused by water flowing across the surface, occurring in areas where there is insufficient groundcover to provide soil protection. Erosion is a natural process which has been accelerated by human activities as suggested by Gallagher (1989) with evidence of gully erosion in the Burrinjuck reservoir catchment dating back to the early settlers of the 1800s (ANZECC, 2000).

Erosion is the result of several interacting processes relating to soil type, landform, land use and climate. Erosion begins when there is a change in drainage discharge (runoff) and/or decreased soil resistance to detachment and transport. This is commonly caused by a reduction in ground cover (vegetation) exposing topsoil to the processes of erosion and

damaging the soil structure. Vegetation cover strongly influences the rate of erosion with other factors such as soil type and slope also impacting on the potential and extent of erosion. The primary causes of erosion in the Yass Area relate to:

| | |
|---|---|
| *Vegetation Decline* | *Increases runoff and peak flows during storm events, and reduces soil strength along drainage lines* |
| *Land management* | *Overstocking, poor pest animal and weed control, repeated cultivation, inappropriate clearing, lack of deep rooted perennial pastures* |
| *Landuse practices* | *Cultivation and compaction caused by machinery and stock* |
| *Rabbits* | *Destabilising soils and contributing to gully formation* |
| *Infrastructure* | *Development and road drainage, railways, etc.* |
| *Vegetation Decline* | *Decline of native vegetation and deep rooted perennial pastures* |
| *Dryland salinity* | *Loss of vegetation cover and soil structure* |
| *Soil Type* | *Naturally unstable soils, with most soils in the Upper Murrumbidgee have a moderate to high erosion hazard (MCAP, 1988)* |
| *Economics* | *Financial pressures leading to over clearing and non-sustainable agricultural practices to maximise land use* |
| *Drought and flood* | *Climatic conditions* |

## Table 18: Soil erosion in the Yass area catchment

| Erosion Classification | Area (Ha) | % of Catchment (% of total) |
|---|---|---|
| | | |
| **Erosion: (total)** | **201 622** | |
| | | |
| **Rill Erosion: (total)** | **1703** | **1** |
| *- moderate* | *(75)* | *(4)* |
| *- severe* | *(166)* | *(10)* |
| *- very severe* | *(127)* | *(8)* |
| *- salting* | *(1335)* | *(78)* |
| | | |
| **Sheet Erosion: (total)** | **199721** | **70** |
| *- minor* | *(133,345)* | *(67)* |
| *- moderate* | *(61,915)* | *(31)* |
| *- severe* | *(3094)* | *(1)* |
| *- very severe* | *(1119)* | *(>1)* |
| *- salting* | *(249)* | *(>1)* |
| | | |
| **Mass Movement: (total)** | **198** | **>1** |
| *- avalanche/soil debris* | *(90)* | *(45)* |
| *- slump* | *(108)* | *(55)* |
| | | |
| **No Appreciable Erosion** | **81,421** | **28** |
| | | |
| **ACT** | **212** | **>1** |

**Statistics:**

| | |
|---|---|
| *Minor Erosion* | *133,345ha* |
| *Moderate Erosion* | *61,990ha* |
| *Severe Erosion* | *3260ha* |
| *Very Severe Erosion* | *1246ha* |
| *Salting* | *1584ha* |

# Table 19: Gully erosion in the Yass area catchment

| EROSION CLASSIFICATION | LENGTH KMS | % OF EROSION |
|---|---|---|
| **Total Erosion** | **1578 kms** | |
| | | |
| • **Streambank Erosion: (total)** | **311 kms** | **20%** |
| *Depth: - <1.5 metres* | *205* | |
| *- 1.5-3 metres* | *90* | |
| *- 3-6 metres* | *14* | |
| *- >6 metres* | *2* | |
| | | |
| • **Gully Erosion: (total)** | **1267 kms** | **80%** |
| | | |
| ***Minor: total*** | ***384 kms*** | ***30%*** |
| *Depth: - <1.5 metres* | *338* | |
| *- 1.5-3 metres* | *27* | |
| *- 3-6 metres* | *1* | |
| *- Salting* | *18* | |
| | | |
| ***Moderate: total*** | ***407 kms*** | ***32%*** |
| *Depth: - <1.5 metres* | *273* | |
| *- 1.5-3 metres* | *89* | |
| *- 3-6 metres* | *3* | |
| *- Salting* | *42* | |
| | | |
| ***Severe: total*** | ***294 kms*** | ***23%*** |
| *Depth: - <1.5 metres* | *130* | |
| *- 1.5-3 metres* | *136* | |
| *- 3-6 metres* | *12* | |
| *- Salting* | *16* | |
| | | |
| ***Very Severe: total*** | ***182 kms*** | ***15%*** |
| *Depth: - <1.5 metres* | *31* | |
| *- 1.5-3 metres* | *69* | |
| *- 3-6 metres* | *55* | |
| *- >6 metres* | *25* | |
| *- Salting* | *2* | |
| | | |

**Statistics:**

| | |
|---|---|
| *Minor Gully Erosion* | *384kms* |
| *Moderate Gully Erosion* | *407kms* |
| *Severe Gully Erosion* | *294kms* |
| *Very Severe Gully Erosion* | *182kms* |
| *Streambank Erosion* | *311kms* |
| *Salting* | *79kms* |

## 8. Related Policies, Programs and Funding Sources

Given the wide range of government programs and policies relating to natural resource management, it is difficult to summarise all available funding programs. Below is a list of relevant government and community web sites that are useful in seeking out further information on current programs.

**Agriculture, Fisheries and Forestry Australia (AFFA)**
www.affa.gov.au

**Bureau of Rural Sciences (BRS)**
www.affa.gov.au/brs

**Commonwealth Scientific and Industrial Research Organisation (CSIRO)**
www.csiro.gov.au

**Department of Land & Water Conservation NSW (DLWC)**
www.dlwc.nsw.gov.au

**Environment Australia**
www.ea.gov.au

**Environment Protection Authority NSW (EPA)**
www.epa.nsw.gov.au

**Greening Australia**
www.greeningaustralia.org.au

**Gunning Shire Council**
www.micropal.com.au/gunningweb/welcome.htm

**Landcare Australia**
www.landcareaustralia.com.au

**Murrumbidgee Catchment Management Board**
www.murrumbidgee-catchment.org.au

**National Parks and Wildlife Service (NPWS)**
www.npws.nsw.gov.au

**Natural Heritage Trust**
www.nht.gov.au

**NSW Department of Agriculture**
www.agric.nsw.gov.au

**Yarrowlumla Shire Council**
www.yarrowlumla.nsw.gov.au

**Yass Shire Council**
www.nsw.gov.au

# 9. LOCAL CONTACTS

**Bushcare Program**
ACT Parks & Conservation Service
PO Box 1065
TUGGERANONG ACT
Phone (02) 6207 7802

**Greening Australia ACT & SE NSW**
PO Box 538
JAMISON CENTRE ACT 2614
Phone: (02) 6253 3035

**Landcare Coordinator**
C/- DLWC
PO Box 23
YASS NSW 2582
Phone: (02) 6226 1433

**NSW Department of Agriculture**
Rossi Street
YASS NSW 2582
Phone: (02) 6226 2199

**Rivercare Program**
DLWC
QUEANBEYAN NSW 2620
Phone: (02) 6299 7688

**Water Watch Program**
PO Box 446
HOLT ACT 2615
Phone (02) 6951 2603

**Yass Area Network of Landcare Groups**
Sylvia Gleeson (Chair)
RMB 1856
Back Creek Road
GUNDAROO NSW 2620
Ph: 6236 8309

Or contact;

Landcare Coordinator
C/- Department of Land and Water Conservation (DLWC)
PO Box 23
YASS NSW 2582
Phone: (02) 6226 1433

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