Namoi CMA CATCHMENT MANAGEMENT AUTHORITY

STATE OF ENVIRONMENT REPORT 2008 - 2009

NAMOI REGION

30/11/2009

LIVERPOOL PLAINS SHIRE COUNCIL

WALGETT SHIRE COUNCIL

Shire of Gunnedah Land of opportunity

Narrabri Shire Heart of the North West

Tamworth Regional Council

Hyder

Contents

PART 1 – INTRODUCTION & OVERVIEW OF THE NAMOI REGION

1 Introduction

1.1 What is a State of the Environment report?

SoE reports were a corporate reporting responsibility under the *Local Government Act 1993* (LG Act) for NSW local government, with the requirements for SoE reporting being detailed in the *Local Government (General) Regulation 2004*. Under the *Local Government Amendment (Planning and Reporting) Act 2009*, which commenced on 9 October 2009, SoE reporting is provided for under section 428A. The provisions of this Act specify that:

1 A SoE report covering environmental issues relevant to the objectives of the community strategic plan must be prepared by council in the year in which an ordinary election of councillors is held.

2 The report must be prepared in accordance with the guidelines under section 406.

3 The state of the environment report is to:

- **a** establish relevant environmental indicators for each environmental objective; and
- **b** report on and update trends for each such environmental indicator; and
- **c** identify all major environmental impacts (being events and activities that have a major impact on environmental objectives).

4 The report may be part of a SoE for a larger area (such as a region).

This report has been designed to support participating councils with the development Community Strategic Plans by highlighting the key environmental issues facing the region.

The aim of SoE reporting is to allow trends in the condition of the environment to be analysed and provide a sound basis for determining whether or not policies and programs implemented are successfully achieving environmental goals (DLG, 1999). A SoE report is a management tool to assess the effect of management actions on environmental conditions within the management planning and reporting cycle (Figure 1).

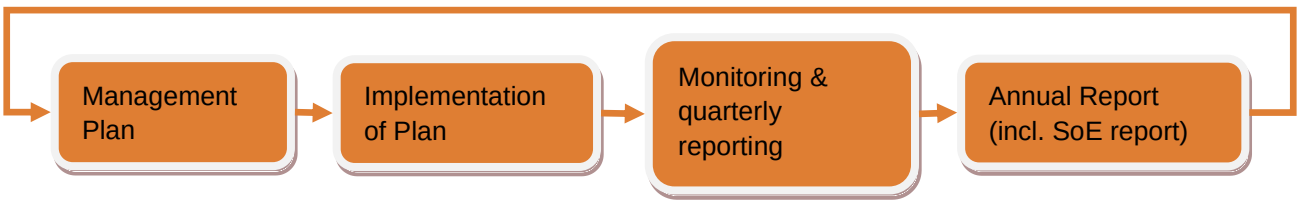


Figure 1: Local government annual reporting cycle.

1.2 Why a Namoi Regional SoE report?

This report represents the second regional SoE report for the Namoi Region. The first report, prepared in 2008, presented a detailed overview of the Region which provides the foundation for this report. A regional approach to reporting recognises that environmental issues are not restricted to council boundaries and that solutions and management often require an integrated response. A regional approach for reporting also:

- facilitates a better understanding of the state of the environment;
- encourages the sharing of ideas and resources concerning targeted responses for key environmental issues;
- provides a mechanism for more effective collaboration; and
- forges stronger regional links across participating councils.

1.3 Participating councils

Participating councils which are the subject of this Regional State of the Environment (SoE) report are the local government areas (LGAs) of:

- Gunnedah Shire;
- Liverpool Plains Shire;
- Walgett Shire;
- Narrabri Shire; and
- Tamworth Regional Council.

The area covered by this SoE report is shown in Figure 2.

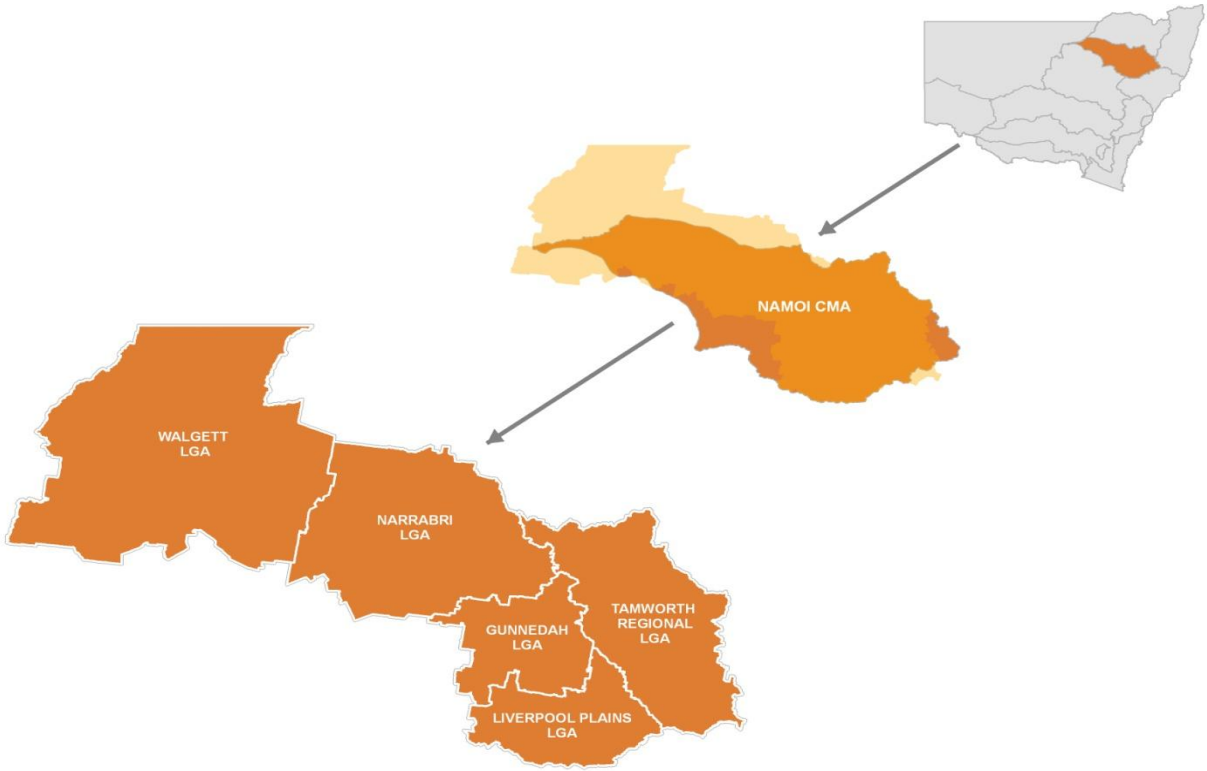


Figure 2: Namoi Regional SoE area.

1.4 Framework for this SoE report

This 2009 Namoi Regional SoE report aims to provide updated environmental data, as available, based on the information presented in the 2008 SoE report.

The report is structured as follows:

- *Part 1: Introduction & Overview of the Namoi Region*
- *Part2: Environmental Issues*
- *Part 3: Conclusions, References and Appendices*

1.5 Process for SoE preparation

The process for preparing the 2009 Namoi Regional SoE is presented in Figure 3. The initial step involved a workshop with council representatives in January 2009. The priority issues were identified, along with appropriate indicators to assess these issues. Indicator data (collated from constituent councils, the Namoi CMA, state agencies and research organisations) was analysed to determine the state of particular environmental issues and the implications on the region from a social, economic and environmental perspective, where possible.

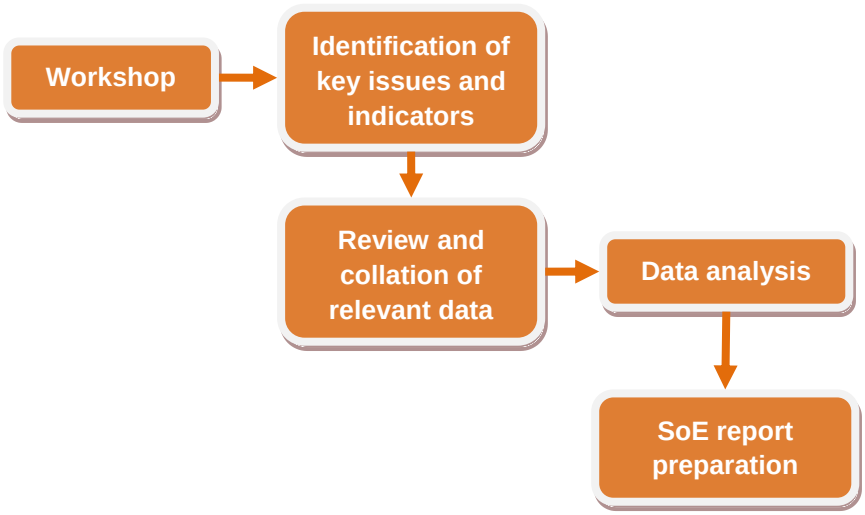


Figure 3: Process for SoE development.

The following criteria were agreed amongst workshop participants to assist in prioritising the issues:

- Extent of problem in the Namoi Region;
- Impact of issue on environmental/aesthetic values;
- Economic implications of issue on regional community;
- Social implications for community/human health; and
- Level of council/community concern.

Table 1 presents the results of the multi-criteria analysis used for prioritising the environmental issues to be covered in the 2009 SoE. The high (dark orange) and medium (light orange) priority issues were selected to include in this 2009 Regional SoE. Although heritage issues rated as low they have been included in this Regional SoE at the request of councils.

Table 1: Priority of environmental issues.

Issue	Score		Average	Rank
	Team 1	Team 2		
Declining water quantity	20	20	20.0	1
Increasing number, distribution and density of invasive species	16	16	16.0	2
Decreasing extent and condition of native vegetation	15	12	13.5	3
Declining surface water quality	13	14	13.5	3
Land degradation	10	16	13.0	5
Climate change	14	9	11.5	6
Increasing number of threatened species	10	11	10.5	7
Waste generation	12	5	8.5	8
Knowledge and management of aboriginal heritage sites	8	6	7.0	9
Knowledge and management of non-aboriginal heritage sites	7	6	6.5	10
Littering and illegal dumping	6	6	6.0	11

1.6 Limitations

This section details the main limitations associated with the development of this Regional SoE report.

1. **Data availability/quality:** data limitations, both in terms of availability and quality, have hindered the quantitative assessment and reporting on the state of the environment. The main implications of data issues include:

    - an inconsistent depth of information across the various themes and issues;
    - an inconsistent availability of data from participating councils in relation to some indicators (e.g. information relating to STP discharges);
    - inconsistent data collection approaches between councils, which gives rise to problems in comparing information; and
    - a lack of time series data; making it difficult to identify and analyse trends and changes in environmental conditions.

2. **Limitations of indicators:** indicators are only one tool for reporting on the state of the environment. While they focus on key issues and highlight significant trends, they do not give the whole story. Indicators should not be used to infer direct relationships between cause and effect as these relationships are often complex.

    Indicators are also most likely to be available for single biophysical elements that can be readily measured such as water quality. They can be much more difficult to select and use for measuring multi-faceted features of the environment such as landscape change.

3. **External pressures:** environmental conditions are a result of driving forces and pressures both internal and external to the Namoi Region. For example, condition of the atmosphere or watersheds, for example, will be affected by occurrences both within and outside the region, many of which cannot be accurately analysed for the purposes of SoE reporting.

4. **Thematic reporting:** it is further recognised that certain activities are not easily placed into a single category as required by the LG Act. For example, the issue of sewage treatment can be considered equally applicable to both the ‘water’ category and the ‘waste’ category. Again the specific categorisation

is considered less important than the measurement of indicators and the recognition of human response. Where such instances occur in this report, linkages to other SoE reporting themes have been identified.

2 Overview of the Namoi Region

2.1 Area

The Namoi Region (the Region) encompasses a total area of 55,106 km^2. The area of each LGA and the percentage of each in the Region are shown in Table 2.

Table 2: Area of constituent LGAs and percentage they comprise of the total Namoi Region (ABS, 2008b).

Local Government Area (LGA)	Area (km^2)	Percentage regional area (%)
Gunnedah Shire	4,993	9.05
Liverpool Plains Shire	5,086	9.22
Tamworth Regional Council	9,713	17.61
Walgett Shire	22,336	40.49
Narrabri Shire	13,031	23.62
Total Region	***55,159***	***100***

2.2 Socio-economic profile

The Australian Bureau of Statistics (ABS) have calculated Socio-Economic Indexes for Areas (SEIFA) which rank geographic areas across Australia in terms of relative socio-economic conditions. Indexes are based on 2006 Census data. Under each index, a score is assigned to an area based on the socio-economic characteristics of the area. Scores are then divided into 10 equal groups. The lowest scoring 10 percent of areas is given a decile ranking of one, the second lowest scoring a decile ranking of two, and so on. As shown in Table 3, SEIFA rankings for LGAs in the Namoi Region are in the two to six decile range, indicating a high level of socio-economic disadvantage in the Namoi Region relative to other regions in Australia.

Table 3: SEIFA Decile Rankings for LGAs in the Namoi Region (DEEWR, 2008).

SEIFA Index type	Local Government Area (LGA)	SEIFA Decile Ranking 1-10 (Lowest score = 1)
SEIFA Index of Relative Socio-Economic Disadvantage This index summarises a ranges of variables related to disadvantage only such as low income, low educational attainment, and unemployment.	Gunnedah Shire	3
	Liverpool Plains Shire	3
	Tamworth Regional	5
	Walgett Shire	2
	Narrabri Shire	4
SEIFA Index of Relative Socio-Economic Advantage and Disadvantage This index summarises a range of variables related to both advantage and disadvantage such as income and tertiary education.	Gunnedah Shire	3
	Liverpool Plains Shire	3
	Tamworth Regional	6
	Walgett Shire	2
	Narrabri Shire	4

2.2.1 Population

The population for the Region, as at June 2008, was 97,647 (Table 4). The largest LGA in terms of population is Tamworth Regional Council, which accounts for 59% of the population, with Walgett Shire being the least populous with 7% people. The population density (people per square kilometre) ranges from 0.32 in Walgett Shire to 5.9 in Tamworth Regional Council.

During the period 2002 -2007, the population in the Region has declined by 1.9%. However, in 2008 the population increased by 2.6%. It is predicted that the average projected population growth is slow at 1.89% and 2.65% for 2021 and 2031, respectively (DOP, 2005).

Table 4: Population statistics for the Namoi Regional SoE area.

Local Government Area (LGA)	Estimated Population at 30 June 2008*	Percentage regional population (%)	Population projection 2021#	Population projection 2031#	Density (per Km^2)
Gunnedah Shire	11,985	12	11,030	10,530	2.4
Liverpool Plains Shire	7,880	8	7,440	7,240	1.6
Tamworth Regional Council	57,182	59	61,030	62,830	5.9
Walgett Shire	7,200	7	7,790	7,660	0.3
Narrabri Shire	13,507	14	12,290	11,900	1.0
Total Region	***97,647***	***100***	***99,580***	***100,230***	

* ABS, 2008a; # DOP, 2005.

The majority of the population (approximately two thirds) in all LGAs of the Region live in urban centres having a population between 1,000 and 99,999 people, while most of the remainder live on the land (Figure 4). Table 5 presents the main settlements in each LGA.

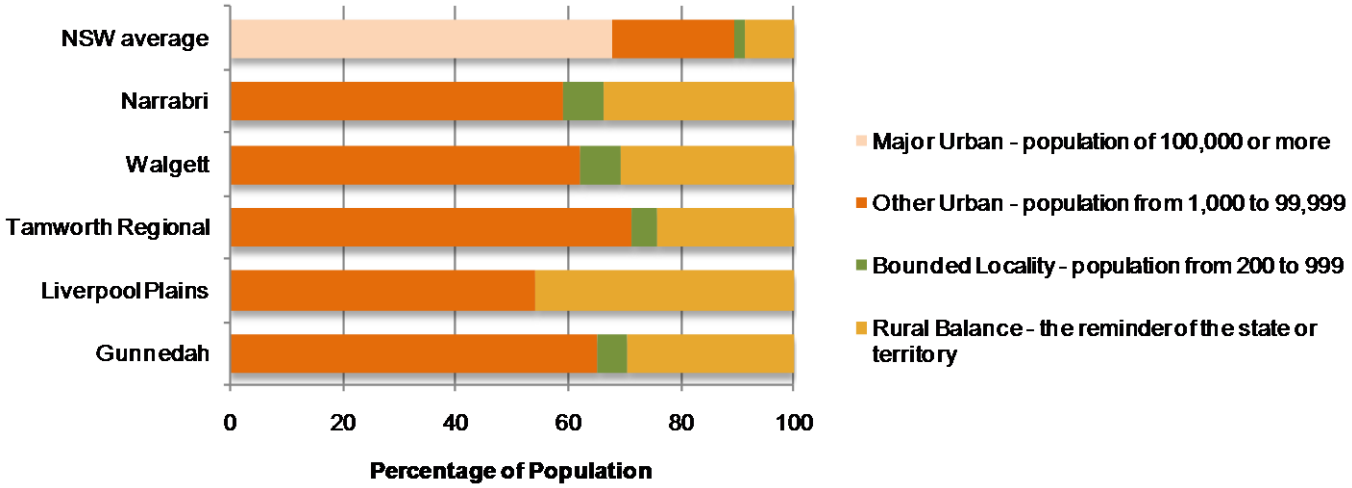


Figure 4: Proportion of population by section of state (ABS, 2008b).

Table 5: Settlements in the Namoi Region.

Local Government Area (LGA)	Major urban settlements
Gunnedah Shire	Gunnedah, Curlewis, Carroll, Mullaley, Tambar Springs
Liverpool Plains Shire	Quirindi, Werris Creek, Willowtree
Tamworth Regional Council	Tamworth, Barraba, Manilla, Kootingal, Nundle
Walgett Shire	Walgett, Lightning Ridge
Narrabri Shire	Narrabri, Wee Waa, Boggabri

2.2.2 Age

The age profile for each LGA in the Region as at June 2006 is presented in Figure 5. Analysis of data since 2002 indicates that the percentage of people in the age groups 0 to 44 have declined, while those in the age groups 45 years and over have increased. This is characteristic of an aging population.

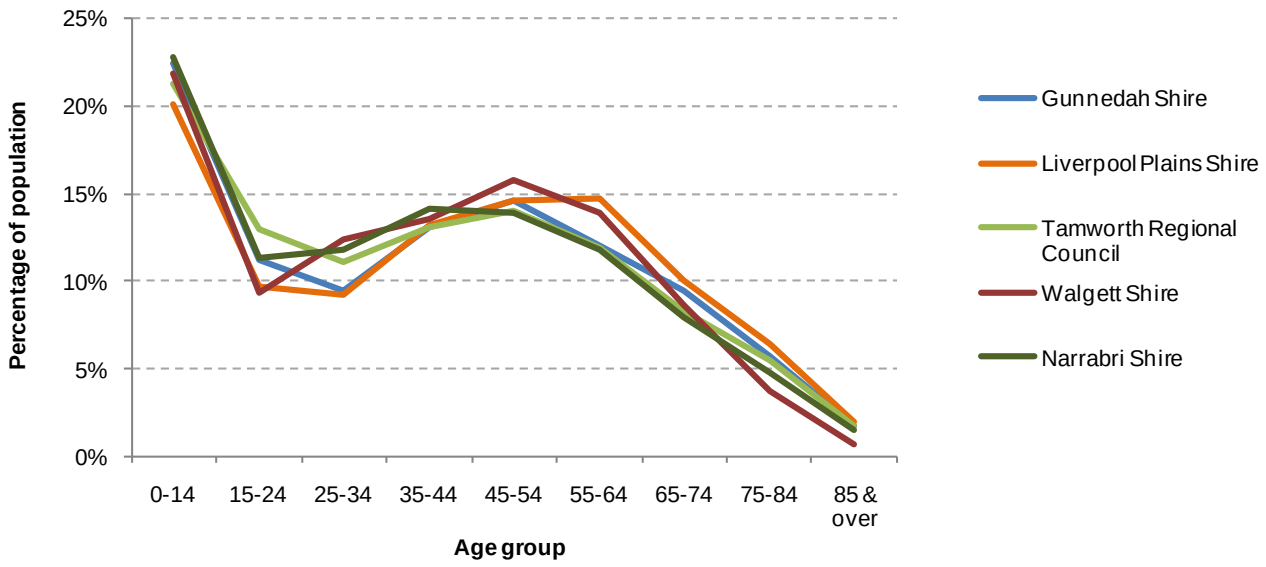


Figure 5: Percentage of population by age group as at June 2006 (ABS, 2008b).

2.2.3 Employment & occupation

The regional labour force comprises over 32,000 people, or about one-third of the population. The percentage of unemployment varies considerably across the Region, with the rate for Walgett Shire being almost double that for the Narrabri Shire (Table 6). The average total income is comparable between LGAs in the region; however, the highest (Narrabri Shire) is still over $8,000 less than the NSW average.

Table 6: Employment statistics for constituent LGAs (ABS, 2008b).

Employment & Income	Gunnedah	Liverpool Plains	Tamworth Regional	Walgett	Narrabri	NSW*
Labour force	3,768	2,337	19,913	1,735	4,606	
Unemployed persons	386	183	1,624	336	343	182,554
Unemployment rate (%)	6.3	4.4	5.8	8.3	4.2	5.3
Average total income*	35,317	35,308	36,579	34,648	37,019	45,153
Number of businesses	1,344	972	5,259	960	1,923	672,006

* Figures for 2005.

All the LGAs in the Region have a lower percentage of professionals than the NSW average (Figure 6). However, the percentage recorded as managers is considerably higher than the NSW average in most instances (e.g. Liverpool Plains has 26.1% compared to 13.6% for NSW). This may reflect a higher proportion of business ownership and people listed as sole-traders (e.g. landholders). The percentage of employees classified as labourers in the Region is also higher than the NSW average.

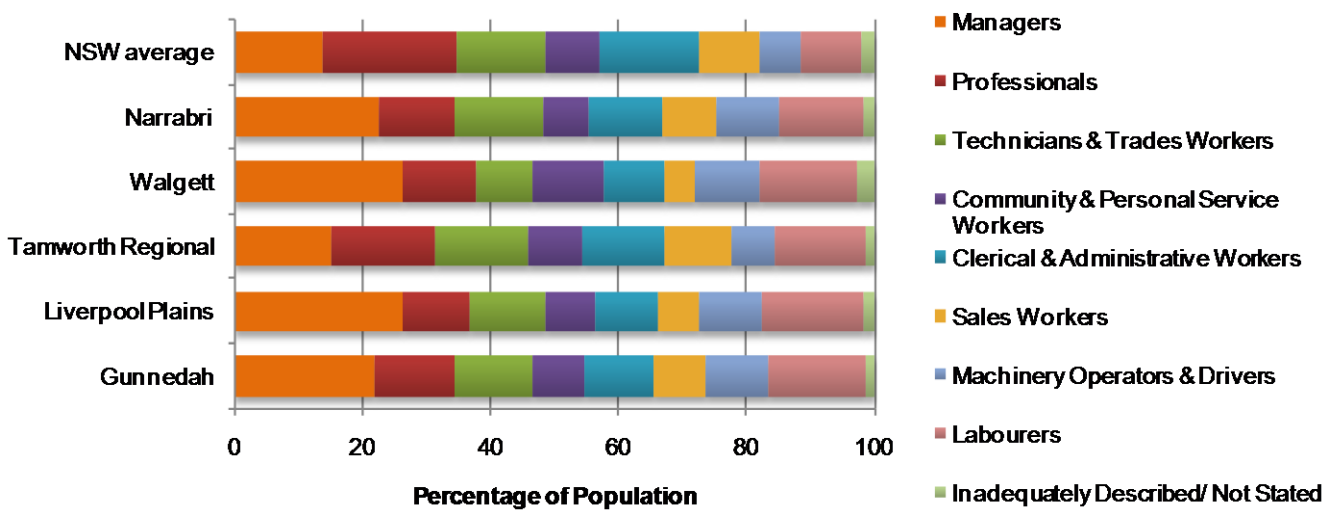


Figure 6: Occupation of employed persons (%) as at June 2006 (ABS, 2008b).

2.2.4 Economy & industry

Agriculture

Agriculture (dryland and irrigated) forms the major industry of the Namoi Region and includes sheep, cattle, broadacre cropping, cotton and intensive industries such as poultry, piggeries and feedlots. This agricultural production is primarily exported from the region, either by road or rail. The Centre for Agricultural and Regional Economics (CARE, 2006) identified that agriculture and its associated marketing and processing industries contributes over 40% to the Namoi regional economy. This contribution varies with the season and commodity price levels.

The total area of agricultural and livestock holdings[1] in the Region is 4,589,720 ha; this represents over 83% of the Regions total area (ABS, 2008b). Approximately 45% of the total area of holdings in the Region are located in Walgett Shire LGA. The total area under cropping in the Region is 912,514 ha (approximately 20% of total holdings).

Figure 7: Cattle farming in Gunnedah.

Mining & minerals

Mining currently contributes significantly to the Namoi regional economy. The Gunnedah coalfield forms part of the Sydney - Gunnedah Basin, a 500 km long and 150 km wide area stretching from south of Wollongong to north of Narrabri that contains the major coal resources of NSW. There has been a long history of coal mining in the Gunnedah Basin, particularly in the Gunnedah, Narrabri and Werris Creek areas. Coal mines in this area have typically been small scale operations to date. Existing mines include Werris Creek Coal, Boggabri Coal and Tarrawonga Coal.

A number of new small to medium sized coal mines are likely to commence operation in the Region in the next few years. There is also potential for a couple of larger coal mining operations to commence within the next decade. For example, BHP Billiton are currently undertaking coal exploration activities in the Caroona Coal Area in the Gunnedah Basin. The Caroona deposit is estimated to contain more than 500 Mt of in situ potentially mineable underground coal that may produce a high quality exportable thermal coal. Shenua Energy are also currently exploring for coal in the Watermark coal area, a region located 35 km south-east of the town of Gunnedah and just north of the Caroona exploration area. The Watermark deposit is expected to contain shallow resources of domestic and export quality thermal coal, with in situ coal resources expected to exceed 1 billion tonnes (I&I NSW, 2009a).

[1] A holding is defined as land located within one shire used for the production of agricultural and livestock produce. Each holding usually corresponds to an individual farm business, and can consist of a number of separate parcels of land, providing they are all in the one shire. The area of a holding includes all occupied and maintained land owned, leased or rented, land worked by share farmers and all road permits. Excludes land leased or rented to others.

Other mining industries in the Region include:

- Natural gas: in 2008 Santos announced potential coal-seam methane resources in the Gunnedah Basin, in the order of 40 trillion cubic feet of potential resources.
- Opals: primarily from Lightning Ridge in the Walgett Shire.
- Quarries: hard rock from Ardglen and Currabubla in LPSC, limestone from Attunga in TRC and zeolite from Quirindi and Werris Creek (LPSC, 2005).

Tourism

Examples of the variety of tourist attractions in the Namoi Region are summarised in Table 7.

Table 7: Tourist attractions in the Namoi Region.

Attraction Type	Examples of attractions in Namoi Region
Natural heritage	Camping, bushwalking and bird watching in national parks and reserves. Gunnedah is known as the Koala Capital of the World.
Heritage sites	Historical towns and settlements; Cohens Bridge; Nundle Woollen Mill.
Cultural Heritage	Australian Cotton Centre; CSIRO Australia Telescope; the Black Queen; Australian Railway Monument and Rail Journeys Museum; Quirindi Rural Heritage Village.
Special Events	Tamworth Country Music Festival; Nosh on the Namoi - Fine Food, Wine and Cultural Event, Lightning Ridge Opal Festival, local shows and rodeos and country race meets.
Other	Wineries, farm stays, fossicking and fishing.

Figure 8: Australia Telescope, Narrabri.

Figure 9: Golden Guitar, Tamworth.

Figure 10: Nundle Woollen Mill.

Statistics for travel to the New England North West Region (which includes the Namoi Region) for the year ended June 2009 are shown in Table 9. The number of visitors to the area decreased in the year ended June 2009 compared to the number of visitors in the previous year. This decline may be a consequence of the Global Financial Crisis.

Table 8: Regional Tourism Statistics – New England North West Region year ended June 2009 (Tourism NSW, 2009).

Travel Type	Number of Visitors		Market Share of Regional Tourism in NSW		Total Expenditure in Region	
	Year End June 2009	% Change from Year End June 2008	Year End June 2009	% Change from Year End June 2008	Year End June 2009	% Change from Year End June 2008
Domestic Overnight Travel	<1,200,000	-5.7%	7.2%	+0.1%	$386 million	Not available
Domestic Daytrip Travel	>1,600,000	-8.4%	5.5%	-0.4%	$178 million	Not available
International Overnight Travel	44,800	-4.6%	7.6%	0.0%	$32 million	Not available

2.3 Landuse

The key regional landuse types in the Region include grazing natural vegetation (3,629,013 ha), cropping (873,249 ha)[2], production forestry (352,392 ha), grazing modified pastures (240,212 ha), other minimal use (150,371ha), nature conservation (85,871 ha), water (27,970 ha), urban (20,202 ha) and irrigated modified pastures (17,062 ha) (Figure 11).

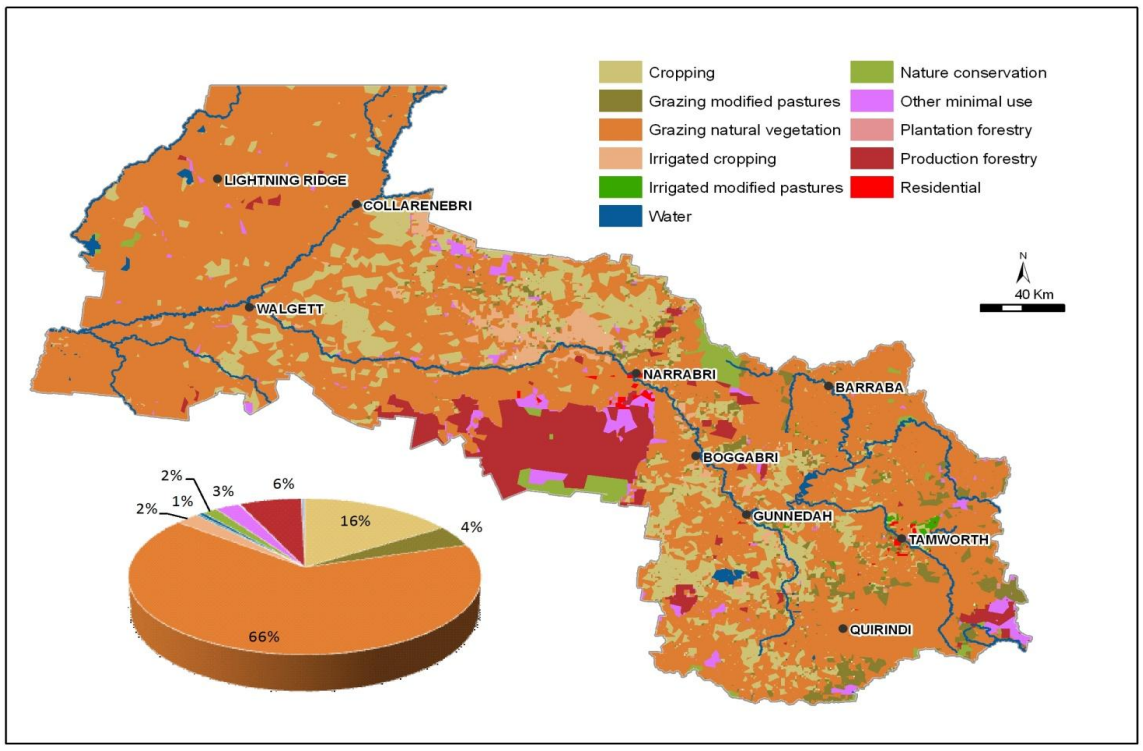


Figure 11: Landuse in the Region (Bureau of Rural Sciences, 2001/2002).

[2] This figure is lower than the figure for cropping in the Region provided by ABS (refer to Agriculture section above). The difference in figures is likely to be due to use of different landuse type classification systems.

Walgett Shire Council has a by far the greatest area of natural vegetation grazing, accounting for 50% of this landuse type. Narrabri Shire Council contains the majority of the regions production forestry (82% or 290,688 ha), as well as irrigated cropping (65% or 87,272 ha). Agricultural landuse across the Region correlates closely with physical environment characteristics, including soil condition as described in Section 2.4. Walgett Shire Council contains the majority of water related landuse (45% or 12,707 ha) followed by Gunnedah Shire Council (28% or 7,793 ha) and Tamworth Regional Council (14% or 3,898 ha) (Figure 12).

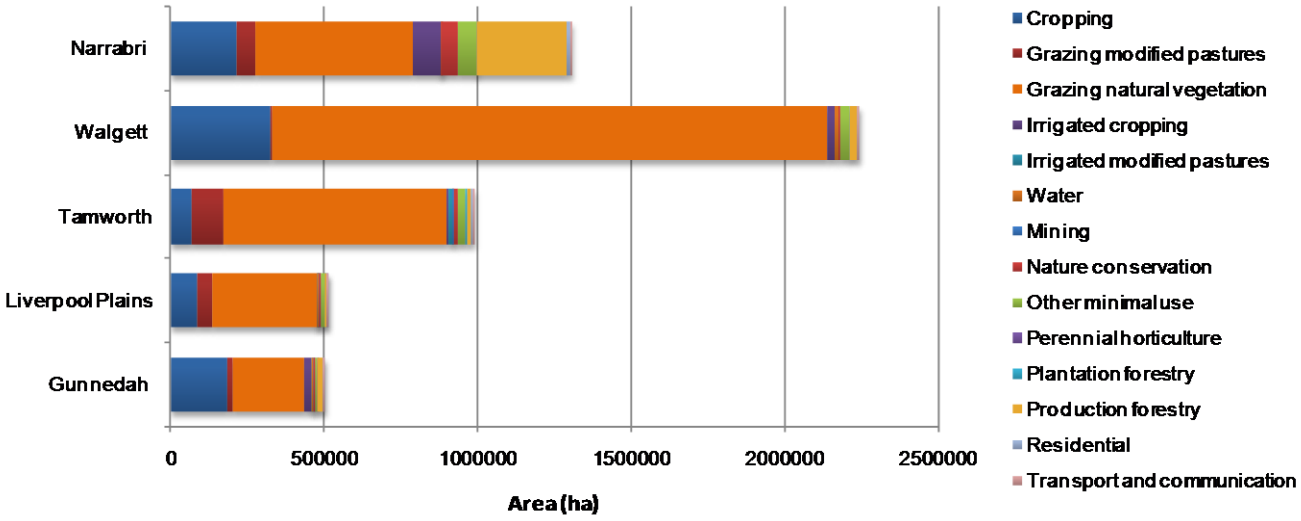


Figure 12: Landuse for the Namoi Region for the constituent LGAs (Bureau of Rural Sciences, 2001/2002).

2.4 The physical environment

2.4.1 Topography/landscape

The Namoi Region supports a diversity of landscapes ranging from the steep to rugged range country of the Liverpool, Warrambungle and Nandewar Ranges, to the rolling hills of sedimentary slopes, to the open flood plains, characterised by Liverpool Plains and Darling Riverine Plains in the western part of the Region. The Region contains three distinct landform types - tablelands, slopes and plains, each with distinctive patterns of drainage, soils, native vegetation, settlement and land use. Most of the Region (about three-quarters) is flat with slopes not exceeding three degrees, while only 15% is considered rugged (DEC, 1995) (Figure 13). Prominent landscape features are found primarily in the eastern and southern areas of the Region. An example is Mount Yulludunida in the Mount Kaputar National Park (Figure 14).

The Region support a number of significant landscape values, including:

- the volcanic landforms of the Nandewar Ranges; and
- the major lava field of the Liverpool Range with its important grassland ecosystems (NPWS, 2003).

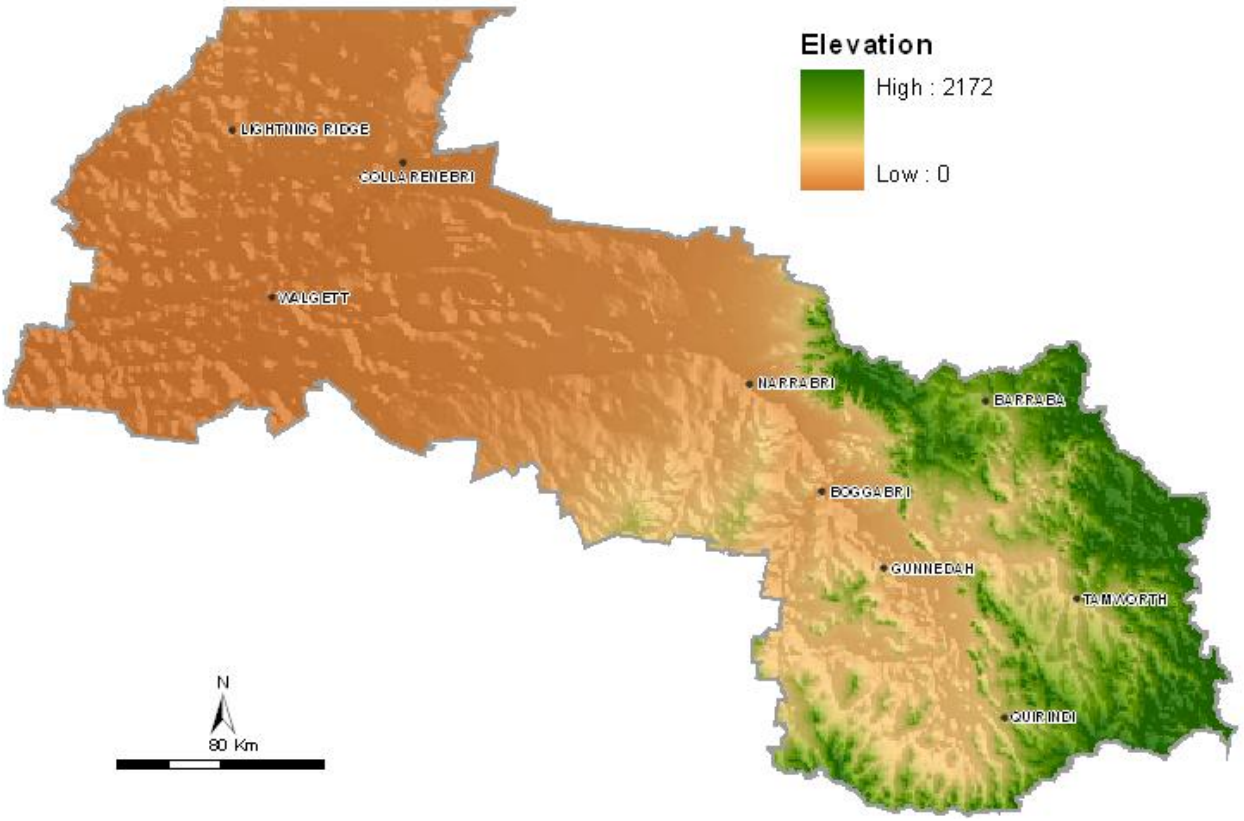


Figure 13: Topography of the Namoi Region.

Figure 14: Mount Yulludunida Mountain.

2.4.2 Geology & soils

The Namoi catchment sits within a region of geological complexity and diversity and includes:

- Cainozoic volcanics;
- a section of the Great Artesian Basin, including the Gunnedah sub-basin and Oxley-Surat sub-basin; and
- parts of the central and wester zones of the New England Fold Belt.

The distribution of soils in the Namoi Basin is a function of geology, topography and climate. The upper catchment, which is characterised by complex geology and deeply weathered parent material, has a wide range of soils including highly erodible lithosols and red and yellow sodic soils. Weathering and eroding of the Tertiary basalts of the Liverpool Ranges have formed the highly fertile black cracking clays of the Liverpool Plains. The massive red and yellow earths adjacent to the Namoi River in the Narrabri/Wee Waa districts are the result of weathering of the Pilliga Sandstone. These course textured, porous soils have low fertility and are associated with surface scalding.

The prevalent soil types in the Region include clays, sandy soils and silt, accounting for 1,720,943 ha, 1,064,893 ha and 702,217 ha, respectively. Other significant soil types, characterised by moderate to high fertility, include basalt and alluvium, accounting for 362,749 ha and 178,616 ha, respectively. The distribution of key soil types in the Namoi Region are shown in Figure 15, while the proportion of each soil type represented in each LGA is shown in Figure 16.

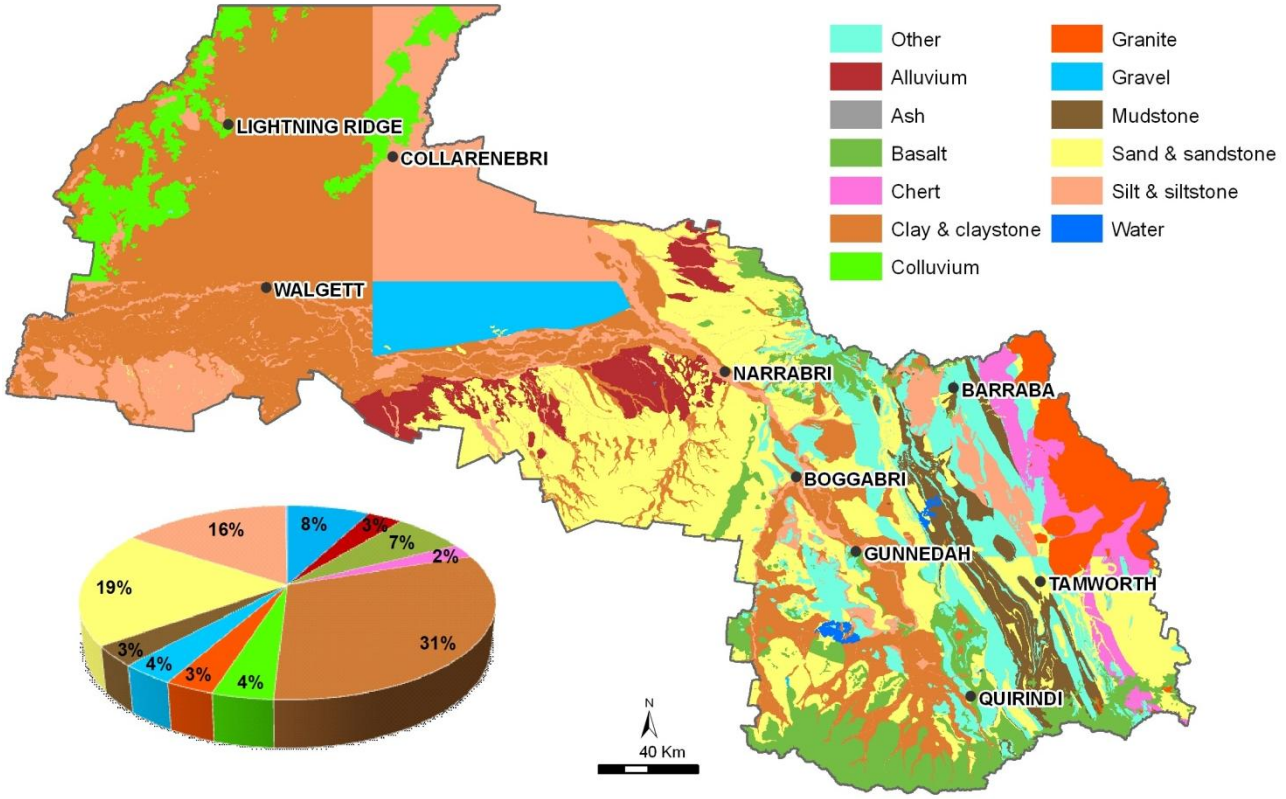


Figure 15: Distribution of soil types in the Namoi Region.

Landuse across the Region correlates closely to soil properties. Characteristics of soil types and the landuses which they support are highlighted by the following:

- Sandy soils: have low nutrient levels and drain rapidly. These are prevalent throughout the eastern half of the Region including the Narrabri, Gunnedah, Liverpool Plains and Tamworth Regional LGAs. The Narrabri LGA contains the largest area of this soil type (606,657 ha). Sandy soils in the Region support broad acre mixed agriculture such as cropping and grazing.

- Alluvial loams: these are of medium to high fertility and are found along the Namoi River valley, where Narrabri LGA has by far the greatest area of this soil type (73% or 130,133 ha). Alluvial soils in the Region support intensive agriculture (e.g. cotton and orchards).
- Extensive flood plains: located in the western area of the Region are characterised by heavy clay soils and loams. These soil types are commonly associated with the Darling River Plains which support extensive areas of broad acre cropping (e.g. wheat). The Walgett LGA contains 73% (1,244,318 ha) of clay soils in the Region.
- High fertility basalt soils: are also found in the rugged areas of the Region, along its south-eastern border in the Liverpool Plains and Tamworth Regional LGAs. These soil types support high value native vegetation (e.g. dry schlerophyll forests).

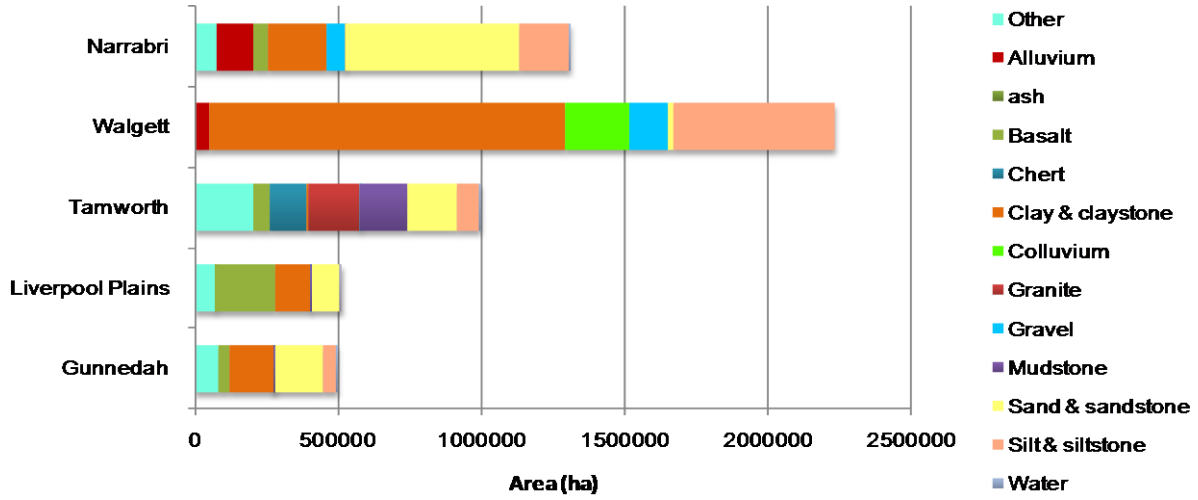


Figure 16: Proportion of soils types in each LGA.

2.4.3 Water (surface & groundwater)

The Namoi catchment is part of the Murray-Darling Basin and accounts for approximately 3.8% of the total Basin area. The Namoi River is the predominant river system in the Region flowing from its south-eastern to western margins over a total distance of 659 km (Figure 17).

The headwaters of the Namoi River include the Macdonald River, the Peel River, the Cockburn River and the Manilla River. These originate along the western slopes of the Great Dividing Range on the Northern Tablelands, in the eastern and south-eastern extremities of the Region. Smaller tributaries of the Namoi include Cobrabald River, Coxs Creek, Maules Creek, Mooki River and Bundock Creek. The river plain of the Namoi, located in the western area of the Region, merges with the Gwydir, Castlereagh, and Barwon Rivers near Walgett (NLWRA, 2002).

Although approximately one quarter of the Namoi River valley is subject to flooding natural wetlands are not widely prevalent, with the largest being Lake Goran, situated south east of Gunnedah. Other wetlands are small, comprising mainly of lagoons and billabongs on the river flood plain (NLWRA, 2002). Of the total wetland area of 52,677 ha approximately 6,902 ha (13%) is freshwater lakes, while 45,775 ha (87%) are floodplains (Kingsford *et al.*, 2003).

The Region includes three key water supply storages including:

- Split Rock Dam on the Manilla River in the north-east with a storage capacity of 397,000 ML;
- Keepit Dam on the Namoi River in the upper catchment with a storage capacity of 423,000 ML; and
- Chaffey Dam (Figure 18) regulates the flow of the Peel River and augments the water supply to the city of Tamworth. Total storage capacity is 62,000 ML.

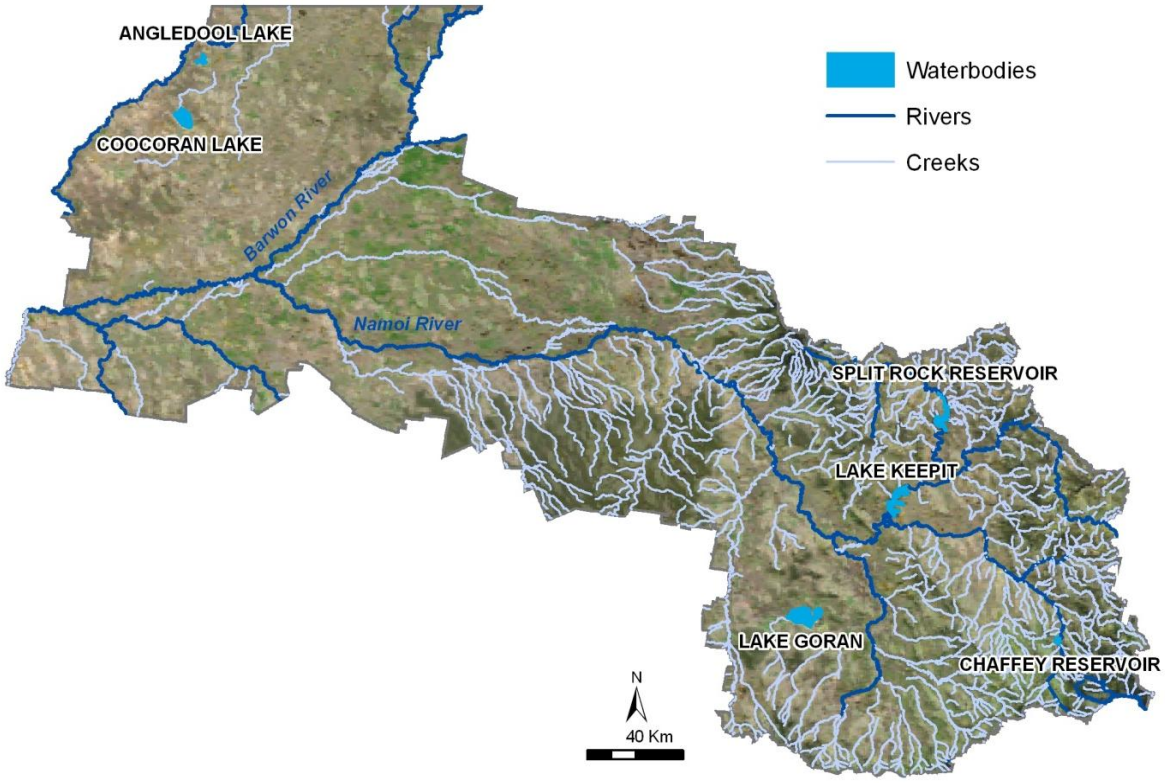


Figure 17: Major rivers in the Namoi Region.

Figure 18: Chaffey Dam spillway.

Groundwater is also a significant resource in the Namoi catchment and has been extensively developed for irrigation, stock and domestic uses, with the catchment having the highest rate of groundwater use in NSW. Within the catchment there are alluvial, fractured rock and porous rock groundwater management areas. The highest yielding and most actively used bores being located in the alluvial aquifers.

2.5 Biodiversity & conservation

The Region is made up of five bioregions under the Interim Biogeographic Regionalisation of Australia (IBRA)[3]. These include the Darling River Plains (2,095,495 ha), Brigalow Belt South (2,080,606 ha), Nandewar (994,517 ha), New England Tablelands (220,814 ha) and NSW North Coast (19,577 ha). The Darling River Plains and Brigalow Belt South bioregions collectively account for 78% of the total regional area. The distribution of the key IBRA bioregions for the Region are presented in Figure 19.

Three of the bioregions in the Region are characterised by very low levels of areas reserved for conservation, including Nandewar (<2.5%), New England (<10%) and Darling River Plains (<1%). This provides a significant opportunity for investment to improve the conservation status for high value vegetation communities and fauna found within these bioregions (Namoi CMA, 2006).

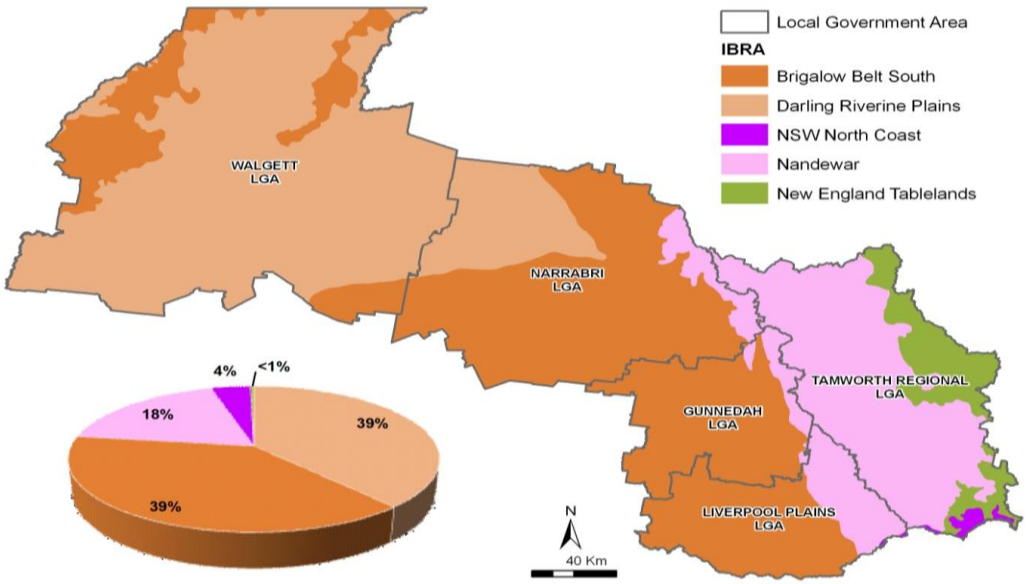


Figure 19: Distribution of IBRA Regions in Namoi Region.

Conservation areas include national parks, nature reserves and state forests and account for a total area of 86,157 ha, or 2%, of the regional area. Examples of key conservation tenures within the Region (Figure 20) include: Mount Kaputar, Ben Halls Gap and Coolah Tops National Parks. Mount Kaputar National Park (Figure 21) is considered to be the most ecologically viable tract of land for native biota in the Nandewar IBRA bioregion. A further 357,364 ha, or 6%, of the Region is managed as State Forest.

The remaining 5,085,026 ha, or 92%, consists largely of cleared, disturbed and modified landscapes with fragmented or variegated vegetation cover. In some instances unprotected areas are in adequate or good condition and provide habitat and resources for wildlife. These areas may be used as buffers for protected areas or may be in sufficiently good condition to provide migratory pathways or even support permanent populations of flora and fauna.

[3] Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems. They are used as a reporting unit for assessing the status of native ecosystems, their protection in the national reserve system.

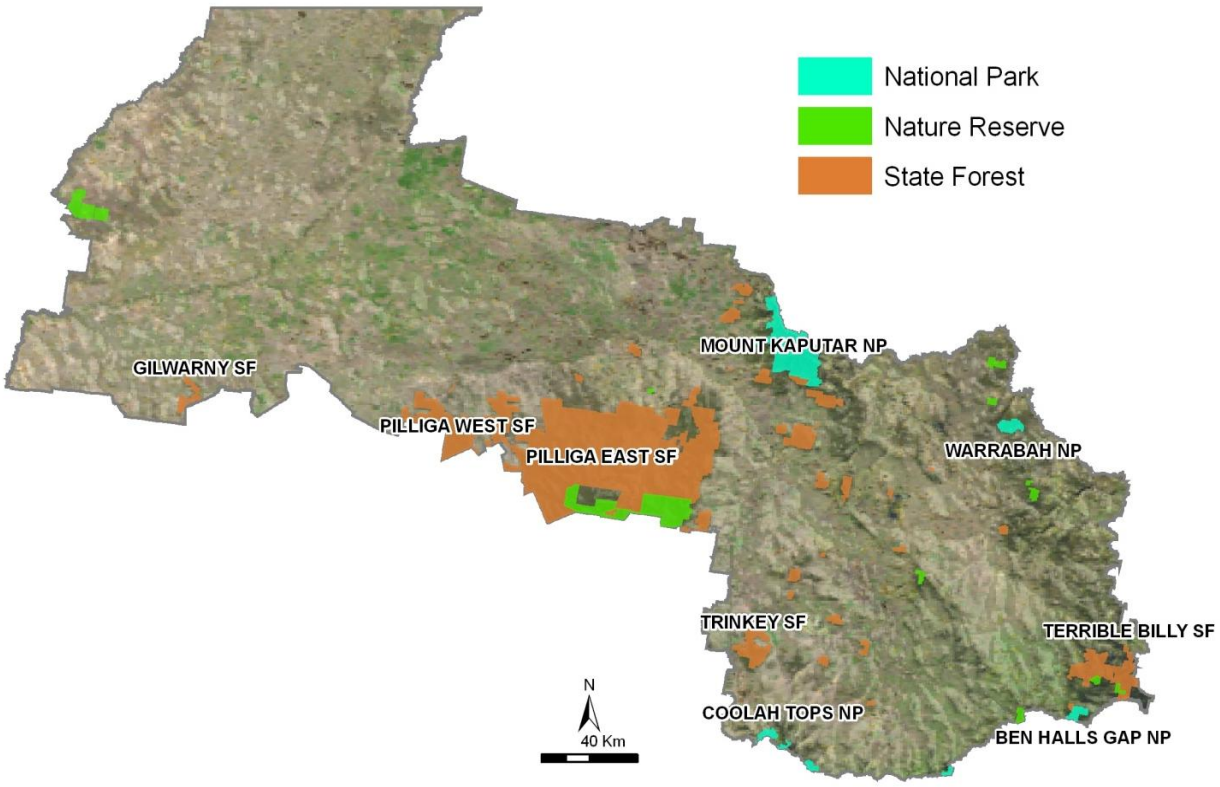


Figure 20: National parks, nature reserve and state forest in Namoi Region.

The region also has community conservation reserves; the most significant being the Pilliga Nature Reserve that encompasses an area of over 80,000 ha between Coonabarabran and Narrabri in the southern area of the Pilliga Scrub on the North West Slopes of NSW. It is a very significant area for the local Gamilaraay Aboriginal people, with modified trees, grinding grooves, rock engravings, stone tools, art sites and bush food.

Figure 21: Mount Kaputar National Park.

2.5.1 Vegetation

A significant proportion of the landscape has been cleared for cropping land on the lower slopes and grazing country on the upper slopes and tablelands (Namoi CMA, 2006). Only a small proportion of undisturbed native vegetation remains within conservation reserves; generally within rugged, inaccessible areas of the Region which have been precluded from agricultural development.

Native vegetation remaining within the Region is estimated at 75%, compared to 42% across the Eastern and Central Divisions of NSW (Namoi CMA, 2006). Large areas of remnant native vegetation in the Region are attributable to extensive tracts of public land in the Brigalow Belt South Bioregion (i.e. Pilliga forests and large areas of native pastures used for grazing). However, there is significant variation in the extent and condition of remaining native vegetation across the Region (Namoi CMA, 2008).

The distribution of native and non-native vegetation in the Region is shown in Figure 22. Most of woody native vegetation in the Region remains in Narrabri LGA. Non-woody native vegetation accounts for 50% of the vegetation in the Region.

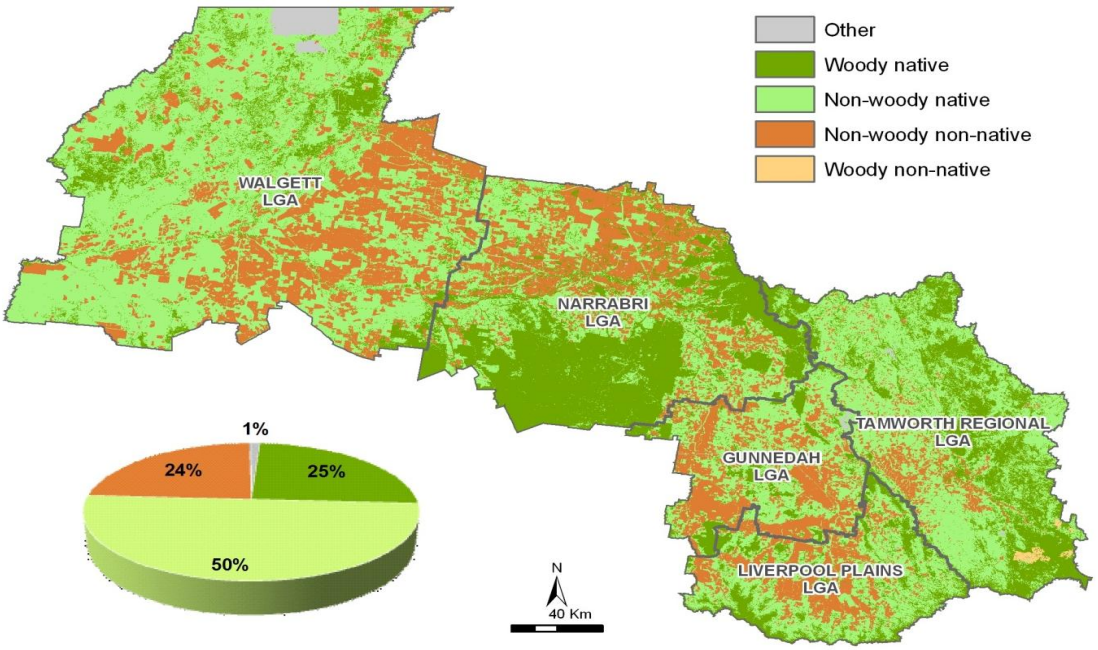


Figure 22: Distribution of vegetation in the Namoi Region (DECC vegetation, 2008).

The Region contains some nationally listed ecological communities, including brigalow, grassy white box woodlands and semi-evergreen vine thicket. The dry rainforest and sub-alpine communities of Mount Kaputar National Park represent the western and north-western geographical limits for these environments in south-eastern Australia (DEC, 2006a).

Significant plant species listed under the *Threatened Species Conservation Act 1995* (TSC Act) are also prevalent in the Region. Threatened plant species for each LGA are listed in Appendix A. Examples include:

- Narrow-leaved Black Peppermint (*Eucalyptus nicholii*) (Figure 23);
- White-flowered Wax Plant (*Cynanchum elegans*); and
- Slender Darling Pea (*Swainsona murrayana*).

2.5.2 Fauna

The Region provides refuge and important habitat for a number of significant fauna species listed under the TSC Act. Threatened animal species for each LGA are listed in Appendix A. Examples of key species include:

- Eastern Pygmy-possum (*Cercartetus nanus*) (Figure 24);
- Pale-headed Snake (*Hoplocephalus bitorquatus*); and
- Square-tailed Kite (*Lophoictinia isura*).

Figure 23: Narrow-leaved Black Peppermint.

Figure 24: Eastern Pygmy-possum.

2.6 Climate

The Bureau of Meteorology (BoM) climate statistics were identified for the main centre in each LGA of the Region; these being Gunnedah, Quirindi, Tamworth, Walgett, and Narrabri. This section presents regional information in relation to temperatures, rainfall, drought and floods and projections for climate change.

2.6.1 Temperatures

The mean minimum and maximum temperatures for LGA centres are shown in Figure 25. As expected, the lowest temperature for all centres is experienced over the winter months of June to August, with the range of average minimum temperatures dropping to below 5^{o}C. Similarly the hottest months are in summer (December to February) when the average maximum temperature exceeds 30^{o}C for all centres.

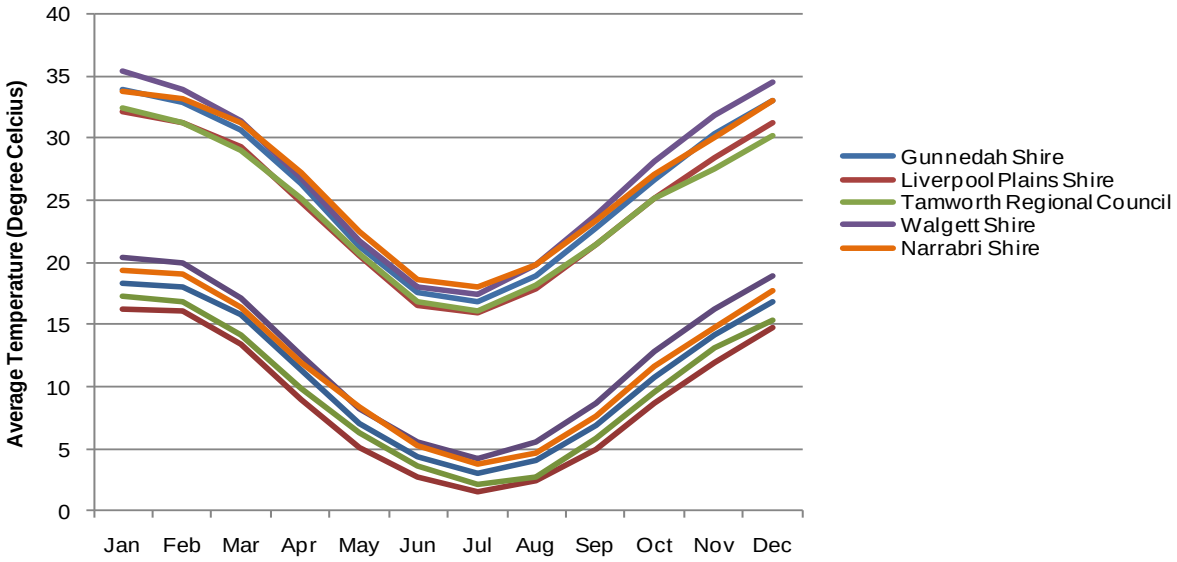


Figure 25: Mean minimum and maximum monthly temperatures for the main centre in each LGA (BoM, 2009).

2.6.2 Rainfall

The annual average rainfall (in mm) for Gunnedah, Quirindi, Tamworth, Walgett, and Narrabri are 617.5, 683.2, 594.4, 476.3 and 657.6 respectively. The mean monthly average rainfall is shown in Figure 26. For all centres, with the exception of Tamworth, the lowest average rainfall occurs in August and September. In Tamworth the lowest rainfall months are April and May. Generally most rainfall occurs over the summer months of December to February (BoM, 2009).

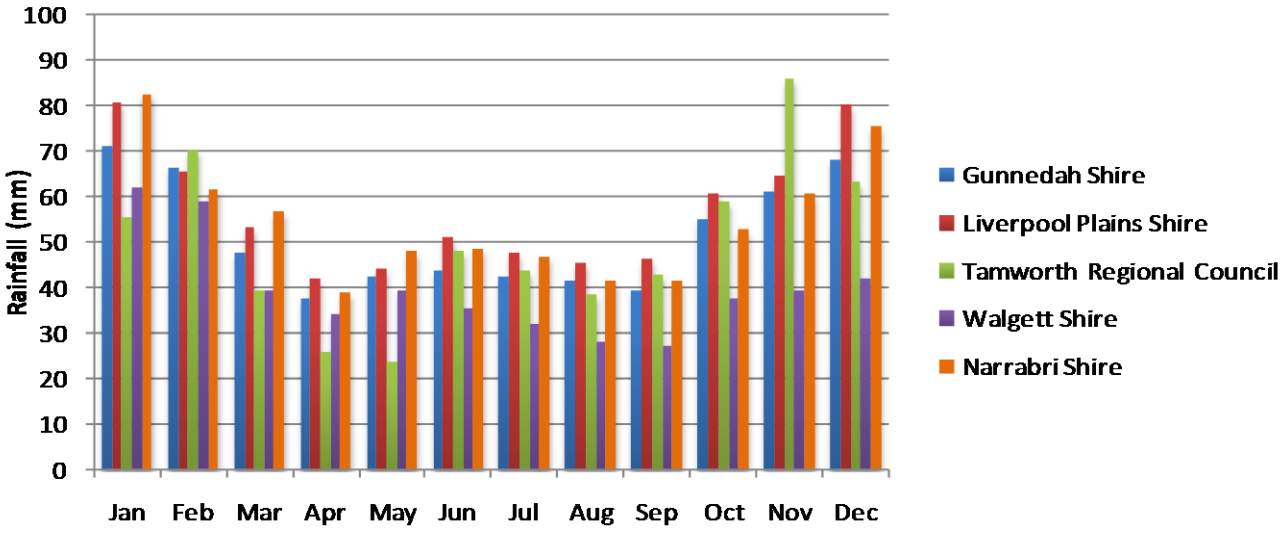


Figure 26: Mean monthly average rainfall for the main centre in each LGA (BoM, 2009).

2.6.3 Drought & floods

Drought in general refers to an acute water shortage. Industry & Investment NSW (formerly the Department of Primary Industries) prepares monthly drought maps for NSW which highlight the areas considered to be suffering from a serious or severe rainfall deficiency. The maps are prepared from information provided by district Livestock Health and Pest Authority (LHPA) agencies, rainfall details from the Bureau of Meteorology and reports from Industry & Investment NSW regional staff. Drought classification of an area takes into account the following factors:

- a review of historic rainfall records for the area;
- pasture availability;
- climatic events such as frosts; and
- seasonal factors such as pasture growing seasons.

From June 2006 to December 2007 much of the Region was classified as being in drought or marginal. This was eased somewhat as a result of rainfalls during summer and autumn 2008, however, by July over 50% of the region was back in drought. Figure 27 shows the proportion of the Region that was in drought since November 2007. The drought often occurs from May to December each year. In 2009, the drought area has been reduced significantly.

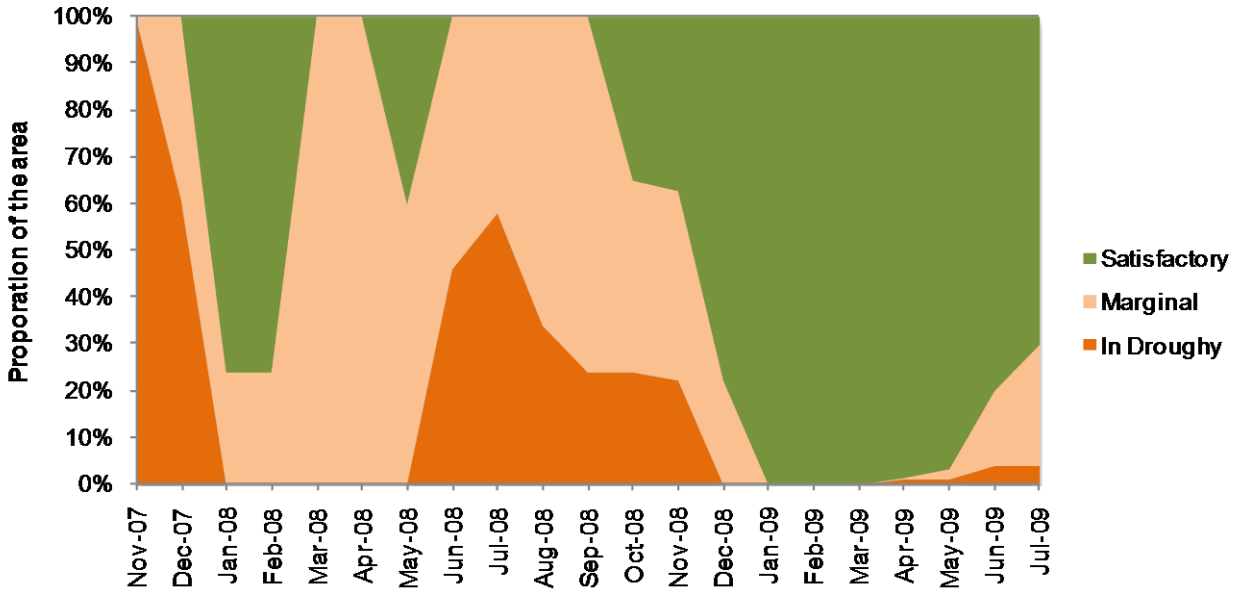


Figure 27: Proportion of the Namoi Region classified as in drought (I&I NSW, 2009b).

Many parts of the Region are subject to the effects of flooding. The Emergency Management Australia Disasters Database records major floods affecting much of the Region in 1998, 2000 and 2004. Local councils have lead responsibility for managing flood prone areas through the creation and implementation of Floodplain Management Plans which enable them to manage flood risk, particularly urban centres.

2.7 Heritage

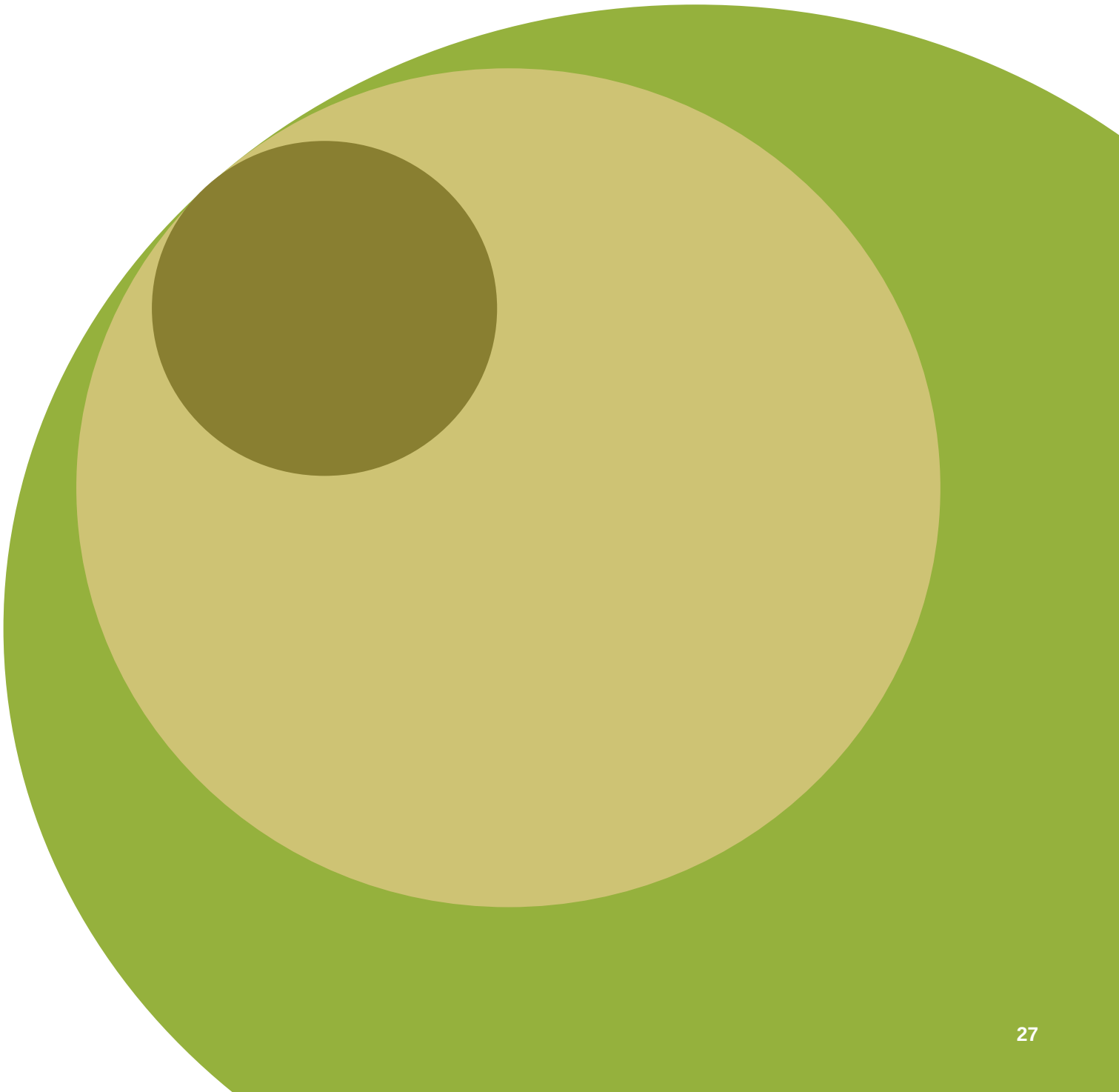
The main indigenous group in the Region is the Kamilaroi people who inhabited the area between Tamworth and Goondiwindi, and west to Narrabri, Walgett and Lightning Ridge. In the south-west, their country extends to Coonabarabran and the eastern foothills of the Warrumbungle Ranges. The Kamilaroi are a large nation consisting of many tribes that included Kwiambal, Weraerai, Jukambal, Pigambul/Bigambul and Coonbri. The Kamilaroi were nomadic people, due to necessity created by the conditions and changing seasons. Traditionally, they were 'hunters and gatherers', the men hunted native wildlife such as kangaroo, snakes and emus, while the women caught smaller animals and picked fruits, honey and seeds. One of the Kamilaroi sub-bands, the Gunnedarr people occupied the general area around the present day Gunnedah township.

When the country was occupied by settlers, there was fierce resistance from the Aboriginal people. There was retaliation on both sides but the most notable event is the Myall Creek Massacre of 1838, when seven settlers were convicted of the murder of 31 Kamilaroi people and hanged in Sydney.

The first European to explore the Region was John Oxley who named and crossed the Castlereagh River in 1818. Oxley named the fertile alluvial flats the Liverpool Plains and then ascended the New England ranges

to follow the Hastings River to the coast. Reports by Sir Thomas Mitchell regarding favourable pastoral prospects in the area prompted squatters from the south to settle the area in the 1830s. Growth in the region was based on agriculture; primarily sheep and wheat. A major soldier resettlement scheme in the region after World War II brought prosperity to the district and a resurgent population.

PART 2 – ENVIRONMENTAL ISSUES



3 Environmental Issues

As described in Section 1.5 the key environmental issues to be covered in this Regional SoE were identified through a workshop process with representatives from the constituent councils. The issues to be covered in this section, in order of priority, are:

- Declining water quantity;
- Increasing number, distribution and density of invasive species;
- Decreasing extent and condition of native vegetation;
- Declining surface water quality;
- Land degradation;
- Climate change;
- Increasing number of threatened species;
- Waste generation;
- Knowledge and management of aboriginal heritage sites; and
- Knowledge and management of non-aboriginal heritage sites.

3.1 Pressure-state-response (P-S-R)

SoE reports most commonly use a 'pressure–state–response' (P-S-R) framework, a model that has been refined and promoted by the Organisation for Economic Co-operation and Development (OECD).

The P-S-R model is based on the concept of causality: human activities exert pressures on the environment, and can change the state (quality and/or the quantity) of natural resources. The human responses to these changes include any organised behaviour that aims to reduce, prevent or mitigate undesirable changes or enhance desirable changes (e.g. restoration).

This model attempts to answer three key questions:

- What is happening to the condition of the environment and natural resources?
- Why is it happening?
- What is being done about it?

An outline of the P-S-R reporting framework is as follows:

Pressure *– human activities, such as energy, land transport, land use and industry, impacting on the condition of the environment.*

State *– description of the current condition of the environment, including environmental quality and quantity of natural resources. Includes the air, water, land, biodiversity etc.*

Response *– actions taken by councils and the community to address the pressures on the environment. These responses can include legislation, economic instruments, new technologies, changing community values, international obligations. Societal responses (decisions and actions) in turn influence the state of the environment and the pressure on the environment.*

The OECD P-S-R framework adapted for use in the Namoi Region is presented in Figure 28.

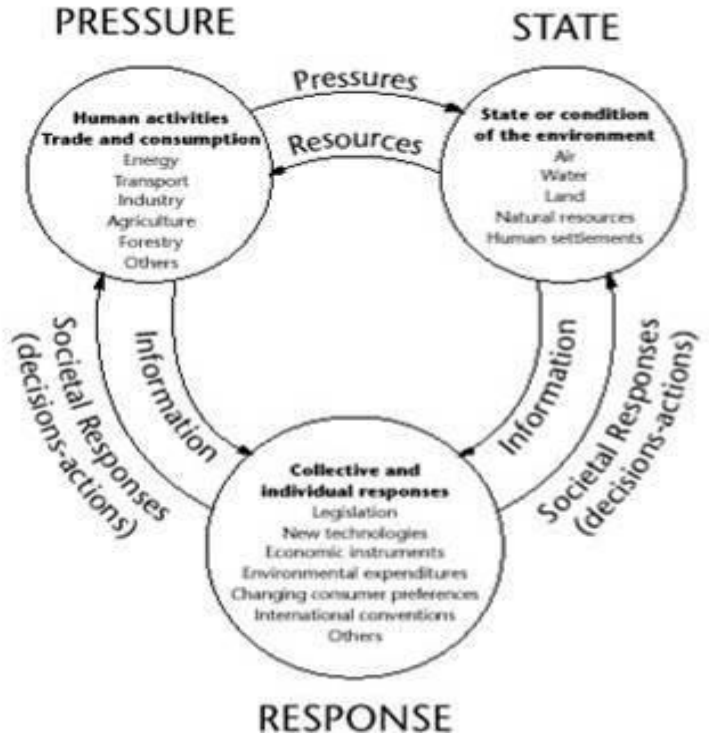


Figure 28: Pressure-State-Response framework.

3.2 Environmental indicators

Environmental indicators have been used for reporting on key environmental issues in the Namoi Region for the above mentioned P-S-R reporting framework. These indicators allow changes in the regional environment to be monitored over time as well as providing the mechanism for connecting council's social, environmental and economic planning functions to secure a more integrated management focus.

It is recognised that the indictors selected for the Namoi RSoE may not be best practice, but rather best available. To facilitate improvement key indicator 'gaps', recommended indicators and the standards and protocols for monitoring these indictors will be identified in the report.

In presenting the indicators identified for each issue a number or series of numbers will be identified. These numbers will correspond with the following sources that provide recommended indicators.

Table 9: Indicator sources used in this SoE.

Source No.	Source document for indicators
1	Namoi Catchment Sustainability Plan: Common indicators for State of the Environment reporting (Urbis, 2008).
2	Monitoring and evaluation: Resource Condition Indicators (Australian Government, 2007).
3	NSW Monitoring, evaluation and reporting (MER) Strategy indicators (NSW Government, 2006).
4	Environmental Guidelines: State of the Environment Reporting by Local Government Promoting Ecologically Sustainable Development (DLG, 1999).
5	2009 Namoi State of the Catchment (SoC) report (draft).

3.3 Legend

The following table provides the legend for the summary presentation of the status of each environmental issue. Included is an assessment of the priority of the issue, the trend in the indicator and whether it represents the pressure, state or response to the issues and an estimate of the data confidence.

Trend (indicator)		Data confidence		Aspect	
☺	Improving	H	High	P	Pressure
☹	Declining	M	Medium	S	State
😐	Stable	L	Low	R	Response
?	Unknown	U	Unknown		

4 Issue 1: Declining Water Quantity

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
River flow (discharge) (ML/d)[1, 2, 3, 4]	NOW	S	High	☹
Total annual volume of diversions / surface water extraction [2, 3, 4]	NOW	P	High	😐
Number and volume of groundwater allocations[3, 5]	NOW	P	High	☹
Groundwater extraction versus sustainable yield[1, 2, 4, 5]	NOW	S, P	Medium	☹
Average water usage per connection type	Council	P	High	☹
Water restrictions implemented	Council	R	High	☺
Water conservation programs (including number of participants, sector targeted and estimated water savings)	Council	R	Medium	?
Number of water sharing plans implemented[5]	NOW	R	High	☺
Overall trend: Declining water quantity				☹

4.1 Description of the issue

Water quantity is a function of a number of parameters, including climatic conditions (rainfall and evaporation) and usage, and is an issue common to both surface water and groundwater. The natural flows of many creeks and river systems in the Region have been substantially modified over the past century to meet economic and social demands for water within rural and urban areas. This includes the building of dams and the growing use of water for irrigated agriculture.

Regulation and water use have the major impact on the quantity of water available in the Region. This has resulted in over-allocation beyond sustainable extraction limits of the majority of surface and groundwater systems, which has contributed to poor creek and river health (MDBC, 2008 and DEC, 2006b). It is anticipated that the implementation of water sharing plans (WSPs) will address problems associated with access regimes that resulted in over-allocation in the Namoi Region (MDBC, 2008).

The WSPs currently in place in the Namoi Region include:

- Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated River Water Sources 2003;
- Water Sharing Plan for the Phillips Creek, Mooki River, Quirindi Creek and Warrah Creek Water Sources 2003; and
- Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003.

The status of water management planning for groundwater management areas in the Namoi catchment is as follows:

- Upper Namoi and Lower Namoi: plan commenced in November 2006. At this time the level of entitlement exceeded the long term average extraction limit (LTAEL). The plan reduces the level of available water over the 10 years of the plan to the LTAEL.
- Great Artesian Basin: plan commenced in July 2008.
- Peel Valley alluvium: this aquifer is highly connected to the Peel River. There is significant use of the system and the management plan is currently being developed.

The long term average annual extraction limit for the aggregated (i.e. Upper and Lower) Namoi Aquifer is 208 GL per year (DWE, 2008b). Key entitlements consist of the following:

- Water access licenses – 191 GL/yr
- Utility licenses for town water supply – 11 GL/yr
- Supplementary licenses – 58 GL.

At the start of the 2008–09 water year there were 210 aquifer access licences with a total of 81,593 unit shares, 130 supplementary water access licences with a total of 21,005 unit shares, and three local water utility access licences with a total volume of 4,407 ML. Supplementary water access licence allocations reduce by 0.1 ML per unit of share component each year until 2015, after which there will be no groundwater available under these licences. At the start of the 2008–09 water year, 170.7 GL of groundwater was held in accounts, with 161.3 GL of that being available for use.

4.2 LGA context

The proportion of the Namoi Region classified as being in drought has reduced significantly since July 2008 (Figure 27), which can be seen in the increased volume of water in two of the region's key water supply storages (see Box 1 for details). Whilst water availability from surface water systems increased in 2008/09, water use restrictions were implemented in all LGAs.

4.3 Pressures

4.3.1 Water usage

A diversity of water access arrangements are currently in place which govern the use of surface water and groundwater in the Region. This includes regulated water delivery from large storages, the use of unregulated or passing flows, groundwater and the harvesting of overland flows.

Groundwater

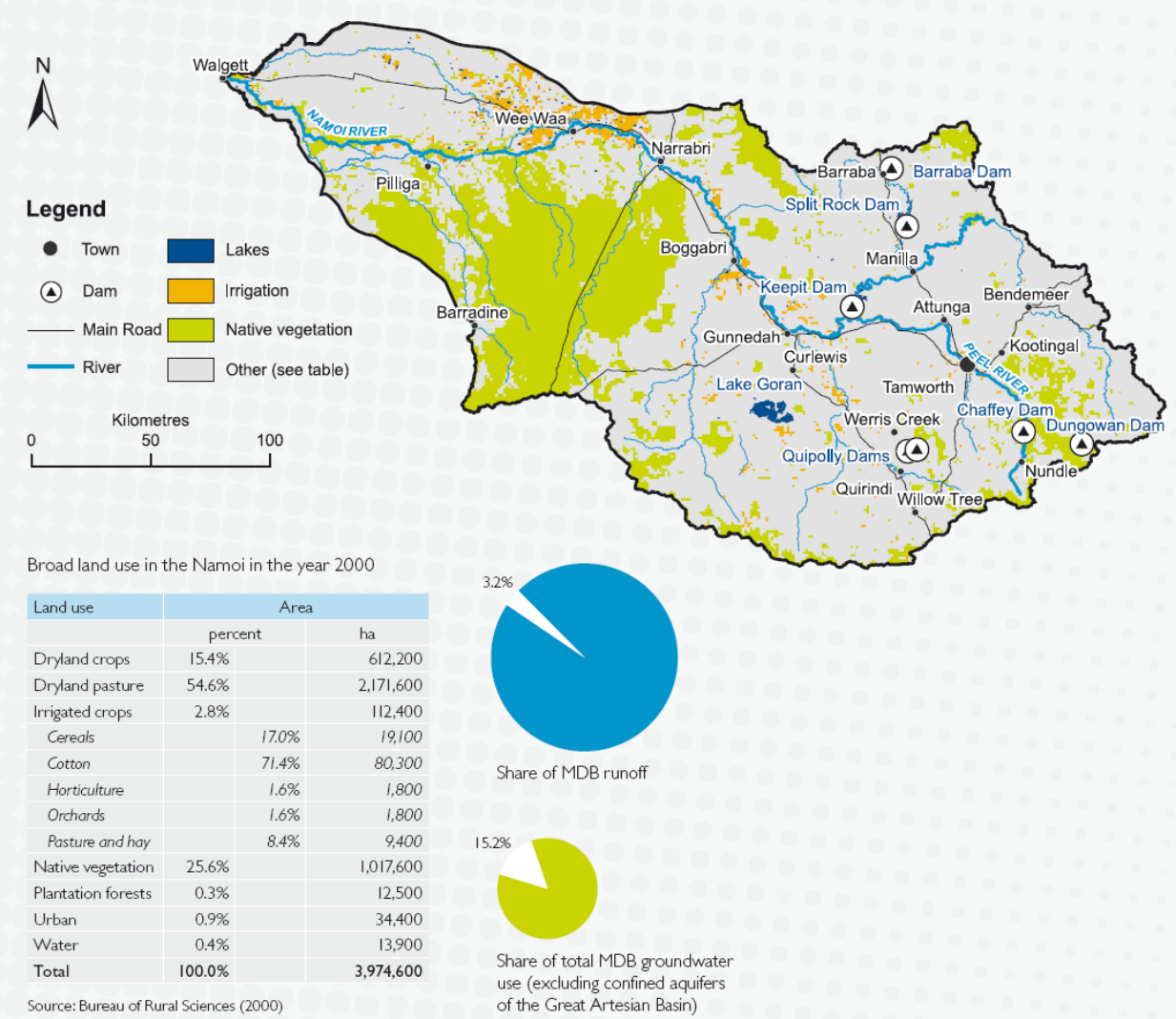
The Namoi Region has the highest level of groundwater development in NSW and one of the highest levels of groundwater extraction in the MDB. Much of the information regarding groundwater consumption presented in the 2008 Regional SoE remains current as estimates have not been updated. Groundwater use is approximately 261 GL, which comprises about 15% of the MDB total (DWE, 2008b and CSIRO, 2007). Approximately 39% of this extraction was from the Upper Namoi Alluvium groundwater management unit (GWMU) and about 35% was from the Lower Namoi Alluvium GWMU (CSIRO, 2007).

Surface Water

Again, data on regional surface water availability and usage has not been significantly updated since the preparation of the 2008 SoE report. Current average surface water availability in the Namoi Region is 965 GL/year, with 37% (357 GL) of this water being used. Surface water diversions account for 260 GL/year, and stream flow losses induced by groundwater use 99 GL/year. This reflects a high level of use (CSIRO, 2007).

The Namoi River basin has one of the largest irrigated areas in northern MDB, accounting for 15% of the total irrigated area in 2000-01 (MDBC, 2008). The region uses 2.8% of the surface water diverted for

irrigation in the MDB (CSIRO, 2007) (Figure 29). Water usage from regulated flows accounts for 60% or 160 GL of total river diversions in the Namoi Basin (MDBC, 2008).



Land use	Area		
	percent		ha
Dryland crops	15.4%		612,200
Dryland pasture	54.6%		2,171,600
Irrigated crops	2.8%		112,400
Cereals		*17.0%*	*19,100*
Cotton		*71.4%*	*80,300*
Horticulture		*1.6%*	*1,800*
Orchards		*1.6%*	*1,800*
Pasture and hay		*8.4%*	*9,400*
Native vegetation	25.6%		1,017,600
Plantation forests	0.3%		12,500
Urban	0.9%		34,400
Water	0.4%		13,900
Total	**100.0%**		**3,974,600**

Source: Bureau of Rural Sciences (2000)

Figure 29: Surface water and groundwater use in the Namoi Region (CSIRO, 2007).

Regulation and water use in the Namoi Region have increased variability in river flow and the amount of water available for the environment, as well as reducing the number and height of high flow events. An example of variability in river flow for the Namoi River at Gunnedah is shown in Figure 30. Regulation has also modified seasonal flooding patterns, with higher and more persistent flows than general in late summer (when water is being released for downstream users) and much lower flooding in late winter and spring (when water is being harvested by the dam for later release).

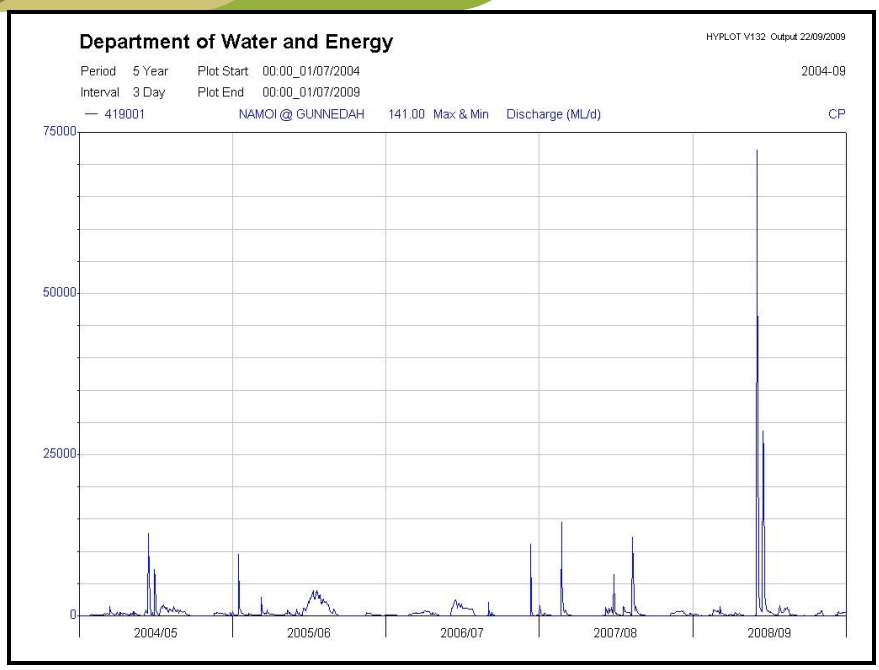


Figure 30: Namoi River flow at Gunnedah (ML/d) July 2004-July 2009. (Source: NSW Government NSW Water Information, 2009a).

4.3.2 Council Water Use

The details of water treatment and water use for participating LGAs is presented in Table 10. The total number of town water connections for Tamworth Regional LGA increased from 18,605 in 2008 to 19,058 in 2009 and during this period water usage in TRC has increased from 6,525 to 7,286 ML. There is total of 13 water treatment plants which provide the community with potable water in Tamworth Regional, Walgett and Narrabri councils. These treatment plants source water from creeks, rivers and groundwater.

Increased rainfall in the Region since July 2008 has resulted in more water for creeks and rivers. This has positive consequences downstream for the major storages in the Region and has boosted water resources of the catchment, as discussed in Box 1. The water levels for smaller dams in the Region have also remained near full capacity over the 2008/09 period, as shown in Figure 31.

Table 10: Water treatment and usage details for each LGA.

LGA	Volume of water treated (ML)	Water usage (ML)	Number of connections (residential, commercial and industrial)	Cost of water
Tamworth Regional	8,546.5	7,286	19,058	-
Walgett	1,666	-	1,911	N/A
Liverpool Plains	609	2,364	2,602	$920
Gunnedah	nil	2,028	4,370	$800
Narrabri	nil	1,206	4,423	-

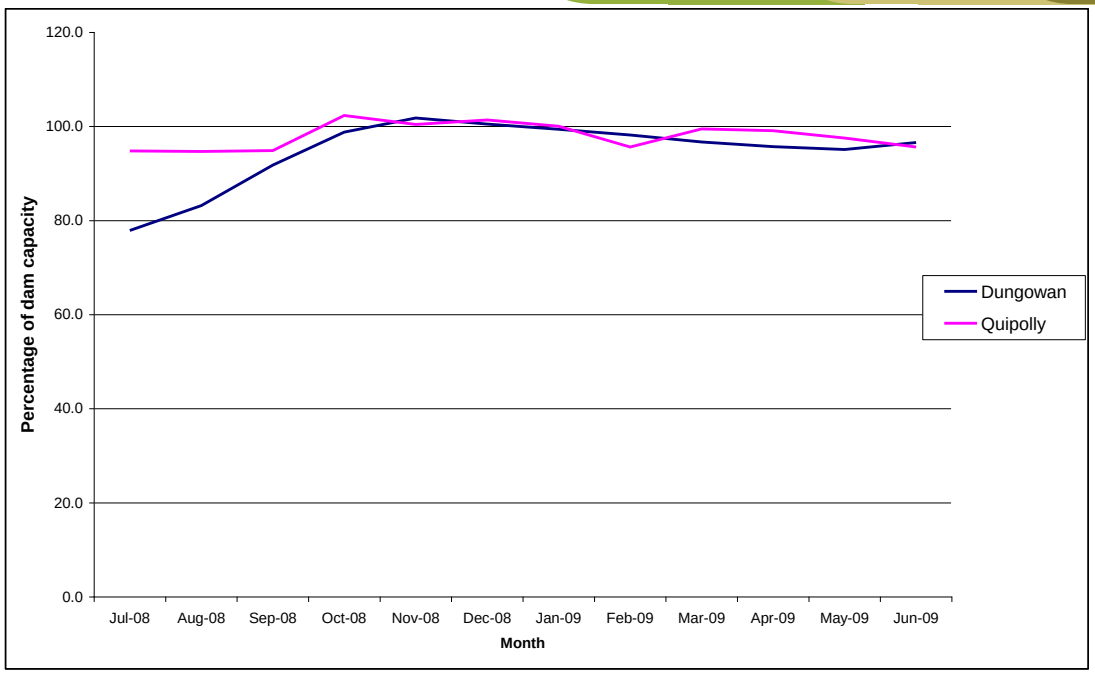


Figure 31: Dam capacity of Dungowan and Quipolly dams for 2008/09.

4.4 Stakeholder roles & responsibilities

Stakeholder roles and responsibilities relating to water quantity are shown in Table 11.

Table 11: Stakeholder roles and responsibilities relating to water quantity.

Stakeholder	Role	Responsibility
Department of Environment, Water, Heritage & the Arts (C'wealth)	Policy Water Purchase Program Commonwealth Environmental Water Holder to manage water purchased to deliver water to environmental assets consistent with new Basin Watering Plan	National Water Initiative 2004
Murray-Darling Basin Authority	Manage water in the Murray – Darling Basin	Establish new Basin Watering Plan by 2011
NSW Office of Water (NOW)	Policy, MER	WM Act (WSPs) Water Act
Industry	Water use in accordance with access entitlement	WM Act Water Act
Agricultural land managers	Water use in accordance with access entitlement	WM Act Water Act
Local government	Water supply and water use	LG Act WM Act POEO Act
CMA	Capacity building, funding, on-ground actions	CMA Act
Community	Water use	WM Act Water Act

Box 1: Changes in dam levels in the Namoi Region 2007/08-2008/09

Increased rainfall across the Namoi Region in 2008/09 has meant that the proportion of the region classified as being in drought has reduced significantly since July 2008 (refer to Figure 27). Increased rainfall has also resulted in an increased volume of water in two of the Regions three key water supply storages in 2008/09.

As evident in Figure 32 the volume of water in Keepit Dam for most of 2008/09 has remained at around 35% of capacity, compared to levels of less than 25% of capacity in 2007/08. The volume of water in Chaffey Dam has remained at 100% of dam capacity for most of 2008/09, compared to 2007/08 when storage was at less than 80% of capacity for most of the year (Figure 33). The mean volume of water stored in Split Rock Dam in 2008/2009 has been 5.7% of dam capacity, slightly higher than mean storage 5.4% recorded for 2007/08.

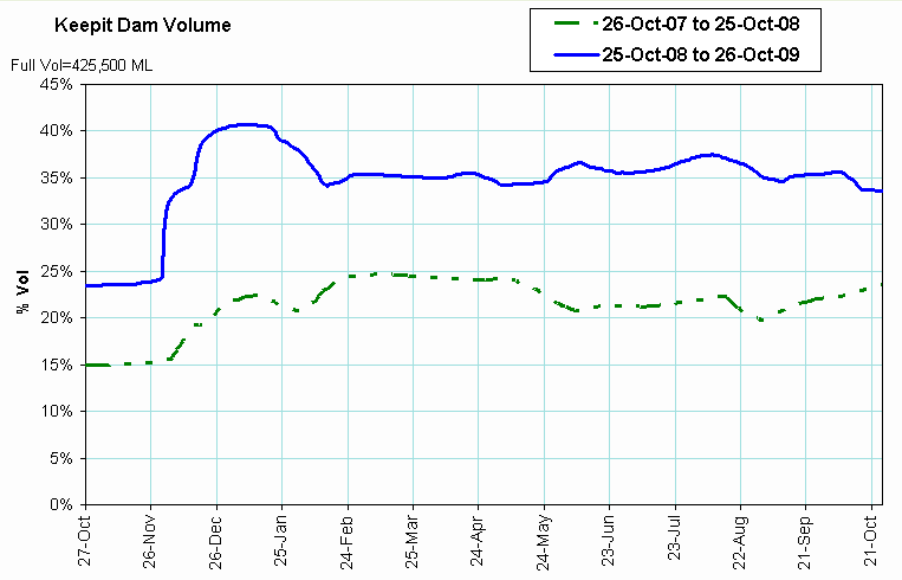


Figure 32: Water storage in Keepit Dam 2007/08 and 2008/09.

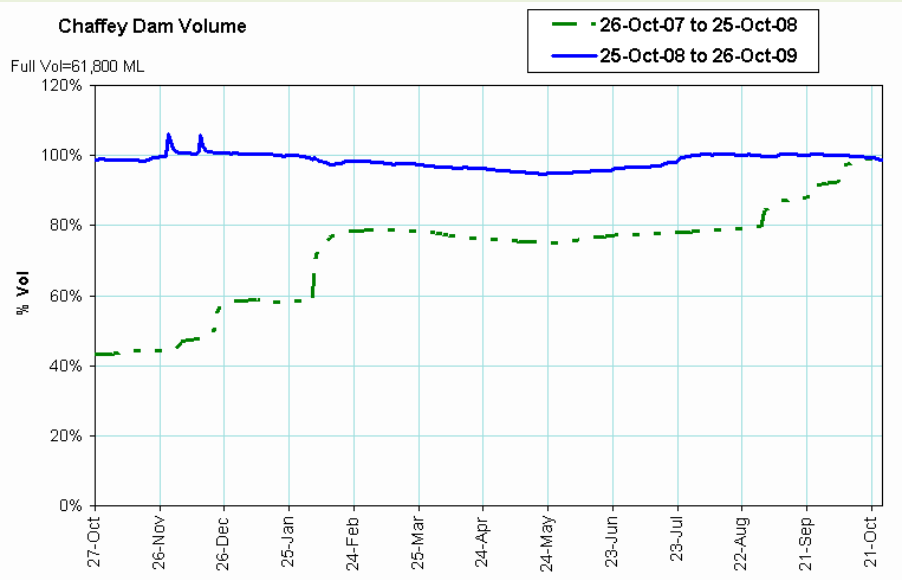


Figure 33: Water storage in Chaffey Dam 2007/08 and 2008/09. (Source: NSW Government NSW Water Information, 2009b).

4.5 Council influence & performance indicators for direct & indirect actions

The following table identifies the areas and actions relating to the management of water quantity where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

	Type of council influence	Performance indicator
Direct	Planning & development controls: ensure implementation of water efficiency initiatives for new developments & retrofits of existing developments (BASIX).	Development planning controls include water efficiency requirements. Number of type of water efficiency improvements implemented annually. Estimates of water demand reduction.
	Implementation of water restrictions (where responsible for water supply).	Estimates of water demand reduction
	Implement water efficiency programs (e.g. incentives on water efficient showerheads, rainwater tanks, etc.)	Number of efficiency programs implemented. Estimated savings from water efficiency programs.
	Report potential breaches of water legislation.	Number of potential breaches reported.
Indirect	Liaison with DWE regarding promotion of compliance (access entitlements).	Number of issues liaised on.
	Community education: promoting water efficiency.	Number of education programs; number of stakeholders targeted; estimates of water savings.

4.6 Response to the issue

Key responses implemented by state Agencies and Namoi Regional councils to address declining water quantity are outlined below.

4.6.1 Embargoes

An embargo, preventing any further applications for water access licences under Part 5 of the *Water Act 1912*, is currently in place for all aquifers in the Namoi catchment, with the exception of any groundwater located within the water sources to which the following water sharing plans apply:

- Water Sharing Plan for the Upper and Lower Namoi Groundwater Source 2003;
- Water Sharing Plan for NSW Great Artesian Basin Groundwater Sources 2008.

4.6.2 Council Water Conservation Programs

Water Restrictions

As at September 2009, water use restrictions were in place in all LGAs in the Namoi Region. All Councils in the Region are restricting the use of fixed hoses and sprinkler systems, with Tamworth and Narrabri Councils implementing permanent restrictions on the use of these items.

Table 12 summarises water restrictions in 2009 in each LGA.

Table 12: Water restrictions in Namoi Region September 2009.

Local Government Area (LGA)	Water supply area	Restriction Level	Restriction description
Tamworth Regional	All LGA except Barraba	Permanent	Use of sprinklers or fixed hoses not allowed during the heat of the day (i.e. not between 8am and 6pm during daylight saving or between 9am and 4pm at all other times).
	Barraba	Level 2	Use of sprinklers banned. Hand held hoses can only be used between 5pm to 7pm (EST). Washing of vehicles with a hand hose is only allowed between 5pm-7pm (EST) with use of a trigger nozzle. Washing of hard surfaces is banned unless using a high pressure cleaner. Council permission is required to fill a residential swimming pool.
Narrabri	All	Permanent	Use of sprinklers or fixed hoses not allowed between 10am and 2pm.
Walgett	All	Unknown	Use of sprinklers or fixed hoses not allowed between 10am and 5pm (businesses excepted).
Liverpool Plains	All	Level 1	Use of sprinklers or fixed hoses not allowed between 8am and 5pm. Washing of hard surfaces banned (except for health and safety reasons in commercial, industrial and public areas).
Gunnedah	All	Level 1	Use of sprinklers or fixed hoses not allowed between 9am and 5pm.

Strategies and Plans

TRC have in place a Demand Management Plan (2007a), which contains demand management measures for conservation of the town water supply, and a Drought Management Plan (2008) which outlines various demand and supply drought response actions. Sitting under both of these documents, TRC have also developed a Water Sustainability Strategic Plan (2008-2011), which is discussed in Box 2. Liverpool Plains Shire Council have also developed a LPSC Demand Management Plan.

Education/Other

TRC, Walgett Shire Council and Narrabri Shire Council are members of the **savewater! Alliance**. This group works with member businesses, government agencies and product companies to deliver water conservation programs. The Alliance offers a combination of web resources and practical programs to help all Australians change the way they use water.

Under their WSSP, TRC are also implementing a number of water use efficiency programs including:

- Waterwise Tamworth promotional and public education campaign
- Large water users reduction initiative
- Residential Water Saving Rebate Scheme
- Waterwise schools education campaign
- Quarterly Water News newsletters to residents
- Roadside water conservation signage
- Water usage information and efficiency tips on rate notices

Aside from water restrictions, water conservation program initiatives are not currently available for Gunnedah LGA.

Box 2: Tamworth Regional Council's *Water Sustainability Strategic Plan 2008-2011*

Recent long-term severe drought conditions in the Tamworth region and the threat of potential climate change impacts on water supplies, prompted Tamworth Regional Council to take action and create a formal water sustainability planning document. The Water Sustainability Strategic Plan 2008-2011 (WSSP) represents TRCs plan for water conservation in the region over the three year period, within a context that includes a planning framework, vision and goals to achieve sustainable water use in the region over the long term.

The WSSP sits under TRCs Drought Management Plan and water Demand Management Plan, linking into the Council's larger plan for water sustainability. The purpose of the WSSP is to develop and support an ongoing cooperative approach, as well as a range of integrated actions, to use and manage water in a sustainable manner across the Tamworth region.

The WSSP consists of a vision, guiding principles, four key themes, 8 goals and 17 Strategic Action Plans (SAPs). The themes represent the main areas identified by TRC where change needs to occur to achieve sustainable water use and management. The goals are related to the themes and reflect all the key outcomes that need to be achieved for water supply sustainability.

Each SAP consists of a project or program that aims to address/achieve one or more of the key themes and goals in the WSSP. The 17 SAPs have been formulated for implementation over the plan period 2008-2011. Examples of SAPs include engaging large water users in the region to prepare water management plans and reduce water consumption, offering financial assistance to residents to retrofit their properties with water saving devices, public education campaigns, conducting water audits and retrofits on TRC properties, and reviewing the current WSSP and integrating projects into a WSSP for 2010-2013.

TRC have employed a full-time Water Sustainability Officer to develop and implement the WSSP. Implementation of the plan and SAPs is well under way. Some achievements to date include:

- 65 businesses in the region are using water more efficiently since the introduction of the large water users program.
- TRC has conducted water audits on its properties and a number of properties have been retrofitted with water saving devices.
- Approximately $205,000 in rebates have been granted to residents in the LGA for purchase of water efficient appliances for their homes.

Through the implementation of the WSSP, TRC is providing a solution that meets the local community's long term needs for safe, secure and reliable water resources.

4.7 Linkages to targets and priorities

The targets and priorities relating to water quantity identified for the Region are presented in Table 13.

Table 13: Plan targets and priorities relevant to water quantity.

Plan	Target or priority
NSW State Plan 2006	Priority E1: A secure and sustainable water supply for all users.
	▪ In regional centres, increase the volume of recycled water.
	▪ Across NSW, meet the commitments under the National Water Initiative to restore water extraction from rivers to sustainable levels.
	Priority E4: Better outcomes for native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is an improvement in the ability of groundwater systems to support groundwater-dependent ecosystems and designated beneficial uses.
	▪ By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained.
	▪ By 2015 there is an improvement in the condition of riverine ecosystems.
Namoi CAP	CTW: From 2006, there is an improvement in the condition of surface and ground water ecosystems.
	MTW4: From 2006, oversee the review of water management plans and processes under the *Water Management Act 2000* so that Water Management Plans, including Water Sharing Plans (WSPs) result in fair a reasonable access to surface and ground water sources for the environment (water dependent ecosystems), economic uses (agricultural, industrial, town water supply) and social values (recreational, cultural).

5 Issue 2: Increasing Number, Distribution and Density of Invasive Species

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Number of noxious weeds species[1]	I&I	S	Medium	😐
Number of new invasive weed species established (significant)[2,3,5]	I&I	S	Medium	☹
Number of new invasive animal species established (significant)[2,3,5]	I&I	S	Medium	😐
Number of emerging invasive weed species[5]	I&I	S	Medium	☹
Number of emerging invasive animal species[5]	I&I	S	Medium	☹
Area and density of invasive species under active management[2,4]	Local Control Authorities/ Councils	R	Low/ Medium	😐?
Actions taken to manage the impact and spread of invasive species[4]	Local Control Authorities/ Councils	R	Low/ Medium	😐?
Overall trend: number, distribution and density of invasive species				☹

5.1 Description of the issue

Invasive exotic species include weeds, vertebrate and invertebrate pest animals that occur in terrestrial, freshwater and marine environments. Invasive species are acknowledged as the second greatest cause of biodiversity decline in the world after habitat loss (WRI *et al*., 1992). However, in NSW, invasive exotic species have been identified as a threat to 70% of species, populations and communities listed under the NSW TSC Act. This represents a greater threat than any other process including the destruction and disturbance of native vegetation (Coutts-Smith and Downey, 2006). Invasive species are also one of the most significant threats to primary production in NSW.

5.1.1 Invasive plants

Over 1,350 non-native plant species are naturalised in NSW, with more than 300 of them likely to have significant impacts on the environment. In terms of impact on biodiversity, the distribution and density of invasive plants, as well as the specific characteristics of the species (e.g. growth habit, toxicity) are generally more important than the number of species. Invasive exotic plants generally fall into two categories:

1 **Weeds of National Significance (WoNS):** this comprises a list of 20 weeds that represent the most serious weed problems in Australia. WoNS status brings a weed species under a national plan for the purpose of restricting its spread and/or eradicating it from parts of Australia. The criteria for determining a WoNS include:

- Invasiveness;
- Impacts;
- Potential for spread; and
- Socioeconomic and environmental impact.

2 **Noxious weeds**: include those weeds that have potential to cause harm to the community and individuals, primary production and the environment, can be controlled by reasonable means and most importantly, have the potential to spread within an area and to other areas.

In New South Wales the administration of noxious weed control is the responsibility of the Minister for Industry and Investment (I&I) under the *Noxious Weeds Act 1993* (NW Act). The Act is implemented and enforced by the Local Control Authority (LCA) for the area, usually local government.

The NW Act provides that:

- Private landholders (owners & occupiers) must control noxious weeds on their land as per the declaration.
- LCAs must control noxious weeds on their land, as per any declarations.
- Public authorities must control as necessary to prevent spread to adjoining land.

5.1.2 Invasive animals (vertebrates & invertebrate animals)

Invasive or pest animals pose a threat to 40% of the threatened biodiversity in New South Wales (Coutts-Smith and Downey, 2006). As a single factor, the threat posed to biodiversity by invasive animals in NSW was ranked fourth after other threatening processes of land clearing, altered fire regimes and weeds. Along with causing significant threats to biodiversity, pest animals can also cause financial losses to agriculture and other industries and damage areas of cultural significance. It is estimated that invasive animals cost the Australian economy over one billion dollars annually (NSW DPI, 2008).

Wild dogs, feral pigs, rabbits, foxes, feral goats, feral cats and European carp are the key pest animals occurring in NSW. Other pest animals such as wild deer, feral horses, rats and cane toads occur in the state but are more localised problems. Species such as common mynah birds, red-eared slider turtles and red fire ants are emerging as potential threats in the state. Terrestrial invasive animals in NSW can be classified as either predators or herbivores. Feral cats, red foxes and wild dogs are the main alien predators threatening biodiversity, while feral goats, rabbits and feral pigs are the main alien herbivores. Introduced herbivores compete with native animals for food, pose disease risks and have significant impacts on native vegetation and increased soil erosion through overgrazing.

Animal pest control orders are made under the *Rural Lands Protection Act 1998* (RLP Act). These may apply to individuals or all occupiers of land in a district and may impose a general or limited destruction obligation or a notification obligation requiring the occupier of land to give notice of the presence of the pest on the land. Aquatic pests are controlled under the FM Act administered by I&I.

5.2 LGA context

5.2.1 Invasive plants

The total number of noxious weed species listed under the NW Act for each LGA is shown in Figure 34. Of the totals, 70 species are declared across all NSW. Lists of the noxious weeds in each LGA (excluding species declared across NSW) are presented in Appendix B. There are moderate variations in the number of noxious weed species between LGAs in the Namoi Region (e.g. Liverpool Plains has 104 and Narrabri 94). The total number in the Region is less than in 2008, however, it appears that this is a result of sub-species now being included in the species listing (I&I, 2009c).

The distribution, density and type of impact are more relevant in terms of biodiversity and need to be considered by councils on a case-by-case basis. The distribution and densities, and therefore level of impact, will also vary over time due to climatic conditions, availability of food and control programs.

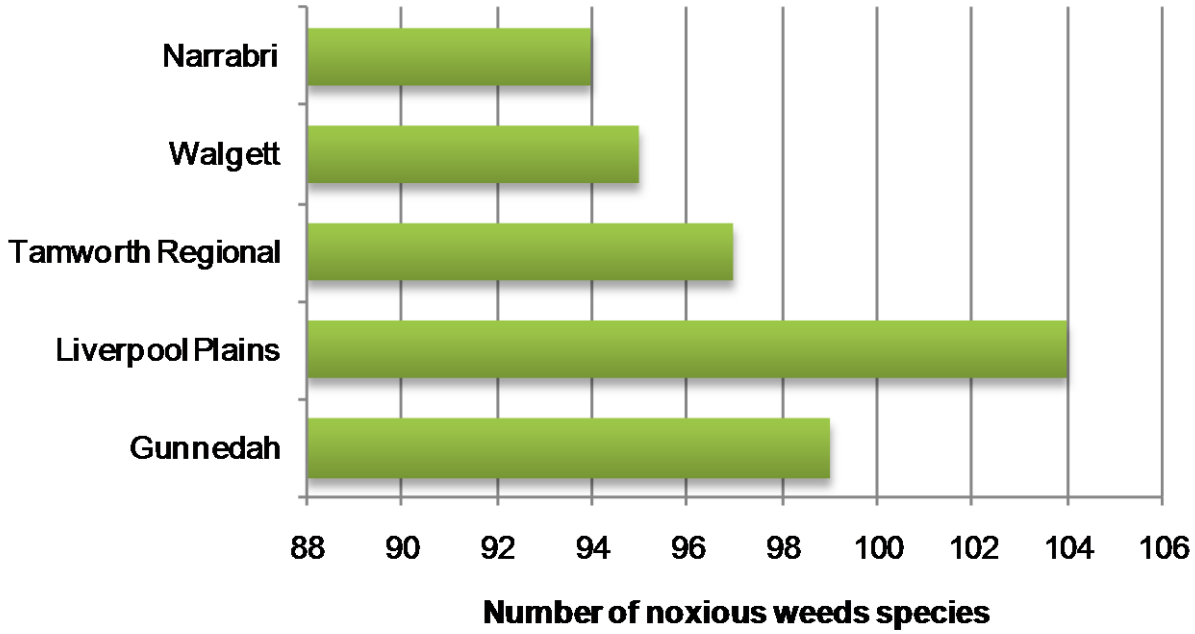


Figure 34: Number of listed noxious weeds in each LGA.

New invasive weed species

New invasive species are either introduced species that have not been recorded previously and whose impacts are likely to be significant, or species previously recorded that have since exhibited invasiveness. There are three new weed species reported in the Namoi region (DECCW, 2009) as the following:

- Horsetail spp (*Equisetum spp*).
- Parthenium weed (*Parthenium hysterophorus*)
- Rhizomatous bamboo (*Phyllostachys spp*)

The overall pressure ranking for new invasive weed species is low (DECCW, 2009).

Emerging weed species

An emerging species is a newly established species whose distribution and abundance are increasing. There are 16 emerging weeds reported in the Namoi CMA area as listed below. The overall pressure ranking for emerging invasive weed species is moderate (DECCW, 2009).

- Bridal creeper (*Asparagus asparagoides*)
- Balloon vine (*Cardiospermum grandiflorum*)
- Scotch,English & Spanish broom (*Cytisus scoparius*)
- Montpellier broom/cape broom (*Genista monspessulana*)
- Morning glory (purple) (*Ipomea indica*)
- Fountain grass (*Pennisetum setaceum*)
- Perennial ground cherry (*Physalis virginiana*)
- Gorse (*Ulex europaeus*)
- Lantana (creeping) (*Lantana montevidensis*)
- Japanese honeysuckle (*Lonicera japonica*)
- Cane needle grass (*Nassella hyaline*)
- Chilean needle grass (*Nassella neesiana*)
- Mexican feather grass (*Nassella tenuissima*)
- Serrated tussock (*Nassella trichotoma*)
- Firethorn (*Pyracantha sp.)*
- Spotted golden thistle (*Scolymus maculates*)

The new and emerging weed index is presented in Figure 35. The index is measured by adding the density scores for all weeds monitored for each grid square.

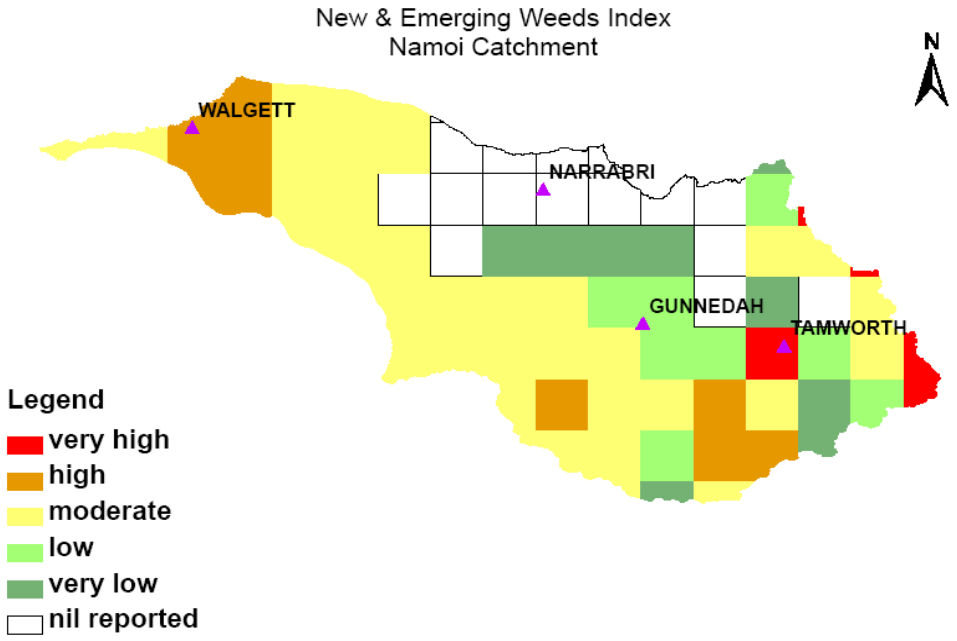


Figure 35: New and emerging weeds index (DECCW, 2009). Note: legend classes are: Very high = 12+, High = 7-11, Moderate = 4-6, Low = 3, Very Low = 1-2.

Hudson pear (*Cylindropuntia rosea* and *C. tunicata*) has also been identified as a major emerging weed species in the Lightning Ridge area, while Lippia (*Phyla canescens*) is a significant emerging problem, particularly along watercourses.

5.2.2 Invasive animals

Data from the *NSW Pest Animal Survey 2004-2006* (NSW DPI, 2006) showed the key vertebrate pests (in terms of density and distribution) in the Namoi region to be feral pigs, foxes and European carp. Pests that occurred in lower densities, or tended to be distributed over small areas in the Region in 2004-06, included feral goats, feral cats, rabbits, wild dogs and European starling. New pest animal survey data has been collected by I&I in 2009, however the data are currently unavailable. Distribution of the key vertebrate pests in the Region in 2004-06 is presented in Table 14.

Table 14: Key vertebrate pests in the Namoi Region 2004-06.

Species	Declared pest animal: RLP Act	Key threatening process		Distribution in Namoi Region
		TSC Act	EPBC Act	
Feral pigs (*Sus scrofa*)	yes	yes	yes	Crop damage throughout the northern & central slopes divisions substantially higher than elsewhere in NSW.
Foxes (*Vulpes vulpes*)	yes	yes	yes	Occur at a medium density across most of the Region with high densities in the east.
European Carp (*Cyprinus carpio*)	N/A	no	no	Inhabit the main rivers of the Darling, Barwon, Namoi and Keepit Dam.

I&I (Fisheries) and the Murray Darling Basin Sustainable Rivers Audit have recently completed collection of baseline data on freshwater invasive fish species at 470 sampling sites across NSW. The percentage of alien/invasive fish recorded at each of the sampling sites versus the total fish recorded at each site provides an indicator of the impact of alien fish on native fish. This data is also an indicator of the success of control programs for widespread invasive freshwater fish (DECCW, 2009).

Figure 36 depicts the percentage of invasive fish species recorded at a number of sites in the Namoi CMA Region in 2008. As evident, all sites around Tamworth, Bendemeer, Manilla, Barraba, as well as near Keepit and Split Rock Dams, recorded moderate to high percentages (41-80%) of invasive freshwater fish. A very high percentage (81-100%) of alien fish was recorded at only one site near Walgett. Low to very low percentages (0-40%) of alien fish were found at all sites on the Namoi River between Wee Waa and Gunnedah. The average of all site indicators in the Namoi CMA region was 39.83% (DECCW, 2009).

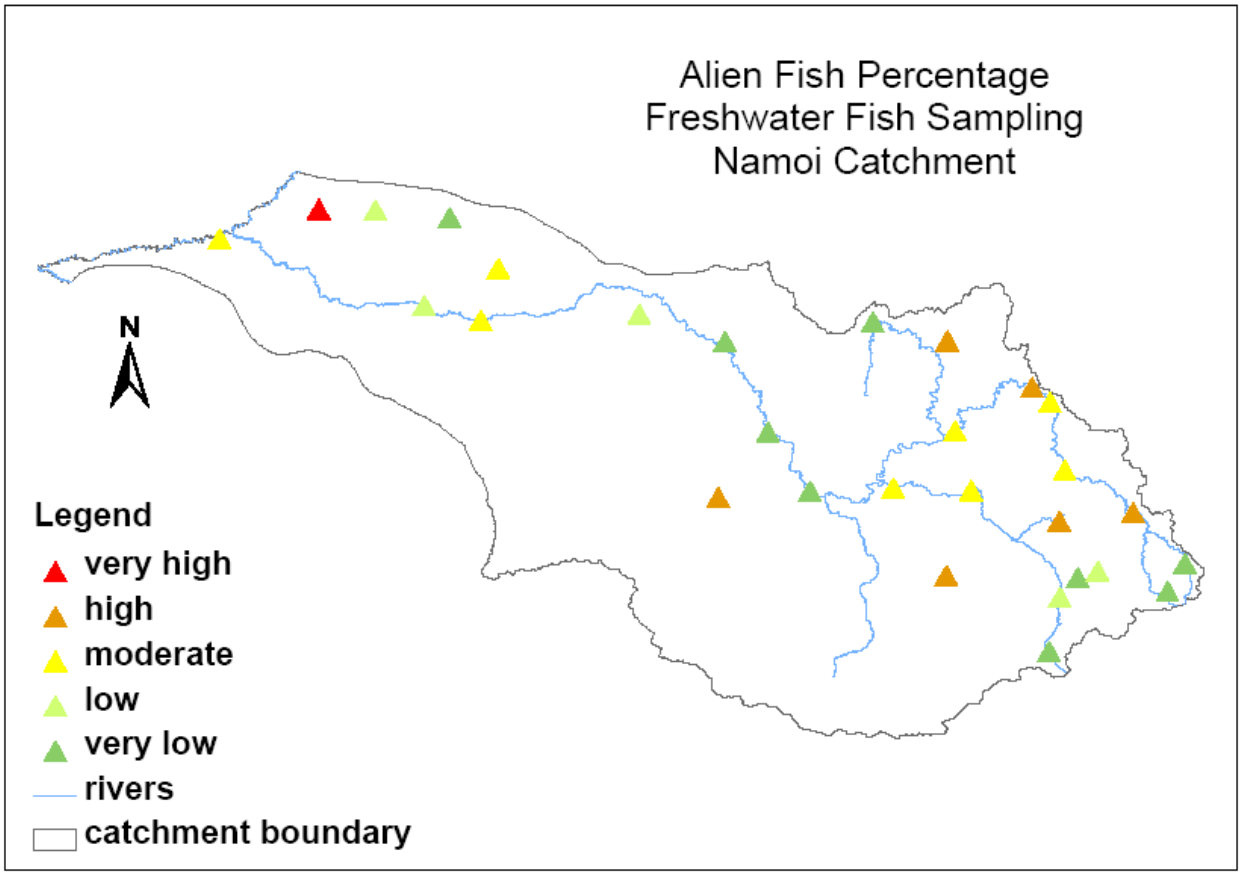


Figure 36: Percentage of invasive freshwater fish at sites in the Namoi CMA Region (DECCW, 2009**).** Note: legend classes are: Very high = 81-100%, High = 61-80%, Moderate = 41-60%, Low = 21-40%, Very Low = 0-20%.

New and emerging invasive animals

Data collected by I&I in 2008 (DECCW, 2009) on new and emerging pest animals in the Namoi CMA region showed that there were no new pest animals or freshwater pests recorded as occurring in the Namoi region. Five pest animals were found to be emerging in the Region (Table 15); three freshwater fish and two vertebrates. An emerging species is a newly established species whose distribution and abundance is increasing and therefore could become a significant threat. The overall pressure ranking for emerging invasive animal species is moderate.

Table 15: Emerging vertebrate pests in the Namoi CMA Region 2008 and their impacts.

Species	Impacts

Species	Impacts
Goldfish (*Carassius auratus)*	Reduced water quality, turbidity, predation upon native fish, algal blooms.
Rainbow trout (*Oncorhynchus mykiss)*	Effect native fish and invertebrates through predation and competition.
Brown trout (*Salmo trutta)*	Reduce native fish populations, especially other salmonids, through predation, displacement and food competition.
Feral Horses (*Equus caballus)*	Pose a threat to water quality and public safety, and impact on the agricultural production.
Feral & Wild Deer (*Dama, Cervus, Axis spp.)*	Overgrazing, browsing, trampling, ring-barking, antler rubbing, dispersal of weeds, creation of trails, concentration of nutrients, exposing soils to erosion, and the subsequent degradation of water quality in creek and river systems.

The pest animal index (Figure 37) is measured by adding the density scores for all pest animals monitored for each grid square. Species monitored are camels, horses. Donkeys, deer and cane toads.

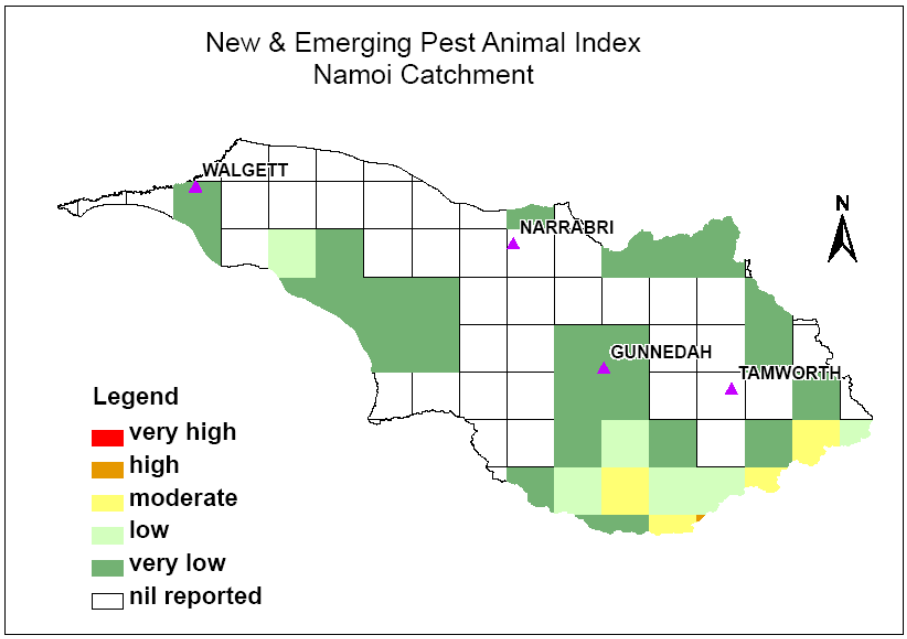


Figure 37: New and emerging pest animal index (DECCW, 2009). Note: legend classes are: Very high = 8-10, High = 6-7, Moderate = 4-5, Low = 2-3, Very Low = 1.

5.3 Pressures

Major pressures associated with the spread of invasive species are lack of effective monitoring programs to indentify emerging invasive species and the lack of a rapid, cooperative and integrated management response.

5.3.1 Invasive plants

Many weed species are the result of deliberate introductions. Approximately 65% of naturalised plants were imported for gardens or agriculture. This threat continues with 28% of identified weeds still available for sale in NSW and most weeds are already well-established in gardens or agricultural land. Aquatic weeds may be

spread through natural waterway flows, particularly floods or heavy rains, or through human activities, such as transmission on boats. Many weeds respond positively to disturbed conditions arising from a range of pressures, such as changing soil structure and water availability. For example, some aquatic weeds favour the increased sedimentation and nutrient levels in waterways experiencing carp infestations.

5.3.2 Invasive animals

Many invasive animals are opportunistic, can breed year round and are mobile. These characteristics allow them to move into and survive in many different habitats. There are also few natural predators to keep invasive populations under control. The dispersal of some species has been through human translocation and deliberate release or accidental escape.

5.4 Stakeholder roles & responsibilities

The effective management of invasive species and their adverse impacts requires a coordinated approach between government, regional organisations and landholders. All groups have a shared responsibility to address invasive species in the Region. The roles and responsibilities of stakeholders are listed in Table 16.

Table 16: Stakeholder roles and responsibilities in relation to the management of invasive species.

Stakeholder	Role	Responsibility
Councils & LCAs	Implementing the Act on private lands (e.g. issue *weed control notices*) Control declared pest species (animals) on their land Monitor noxious weeds in local area & maintain records	NW Act RLP Act NW Act
I&I	MER – invasive species Research, advisory & extension Implement actions Compliance (weeds) Noxious fish	NSW MER Strategy NSW Invasive Species Plan 2008-2015 NW Act FM Act
DECCW	Implement actions Research, advisory & extension	NSW Invasive Species Plan 2008-2015
LHPAs (invasive animals)	Strategy, policy Advice & assistance (eradication of declared animal species) Implementation of control strategies	RLP Act
Land managers	Control declared pest (weed & animal) species on their land Notify LCA of *notifiable weeds* on their land	RLP Act NW Act NW Act

5.5 Council influence & performance indicators for direct & indirect actions

The following table shows how councils can influence the management of invasive species either directly or indirectly through advocacy and lobbying.

Table 17: Direct and indirect influences councils may have over invasive species issues.

	Type of council influence	Performance indicator
Direct	Implementing the NW Act on private lands	Number of sites and area where NW Act has been implemented
	Control of declared pest species (animals & plants) on Council land.	Number of control programs; area under control; number of animals eradicated.
	Monitoring of invasive species.	Number of monitoring programs undertaken according to relevant monitoring protocols; number of species & area monitored
Indirect	Liaison & partnerships with relevant stakeholders (CMA, DPI, RLBPs, industry groups): control & education programs, funding bids, etc.	Number of cooperative programs & funding bids
	Education: landholder responsibilities under invasive species legislation; best practice control measures; emerging issues, etc.	Number of education initiatives & number of stakeholders involved

5.6 Response to the issue

Table 18 indicates the actions implemented by each LGA under Section 18 of the NW Act, including the species targeted the area controlled and the density of the infestation. The area of weeds treated by councils is also presented. In general the response by councils is low. No actions were taken by participating councils to manage invasive animals.

Table 18: Actions taken in each LGA to manage invasive plant species.

LGA	NW Act Section 18 actions				Weeds treated	
	Type of action taken	Species targeted	Area controlled (ha)	Density of infestation	Length of road treated (km)	Area along road treated (ha)
Gunnedah Shire (1)	Notice to control noxious weeds	African boxthorn	150.0	Heavy	1,594	956
Liverpool Plains Shire (8)	Court Action	St Johns wort	Nil	High	1,100	33,000
	PIN Notice	St Johns wort	0.1	High		
	Section 18 Notice Issued*	St Johns wort	1.0	Medium		
	Section 18 Notice Issued	St Johns wort	1.0	High		
	Section 18 Notice Issued	St Johns wort	Nil	Low		
	Section 18 Notice Issued	St Johns wort	120.0	High		
	Section 18 Notice Issued	St Johns wort	Nil	High		
	Section 18 Notice Issued	St Johns wort	Nil	High		
TRC	None				2,000	
Walgett Shire	None				none	none
Narrabri Shire	None				unknown	unknown

* two of these Notices were reissued.

Box 3: Tr@cer Weeds Program

Liverpool Plains Shire Council has been commissioned by the Namoi CMA to develop and implement weed mapping software - Tr@cer Weeds- in all Local Control Authorities across the catchment. Tr@cer Weeds takes the inspection and management of weeds into the "future of data collection and validation", an exacting process of mobile GPS satellite navigation combined with the power of "Smart Forms".

The Tr@cer Weeds system captures data regarding the type of weed, infestation size and geographic infestation trends enabling inspectors to pin point areas having potential risk on the environment. The system also offers a range of suggested treatment processes for landholders to reduce the incidence and potential spread of weed infestations. Weeds inspectors now have specific information at their fingertips enabling them to record weed infestation specific data, while an integrated cadastral map allows the inspectors to determine the owner details, address details, Lot/DP and global position. A unique user interface gives the inspectors the ability to accurately access their location and enables them to print inspection reports in the field reducing the time and cost of processing property inspections.

The first stage of the project is nearing completion and the "helicopter view" of the extent of the weed problem will soon be available to the CMA.

For further information on the Tr@cer Weeds program see http://www.lpsc.nsw.gov.au/weed.php

Of the councils in the region, Gunnedah has an invasive species management plan/strategy, while Tamworth Regional and Liverpool Plains Shire Council (LPSC Policy No. 3.14 – Noxious Weed Control) have prepared individual plans for Class 4 noxious weeds. Mapping of weed infestations by the constituent councils is limited.

5.7 Linkages to targets

The targets and priorities relating to invasive species identified for the Region are presented in Table 19.

Table 19: Plan targets and priorities relevant to invasive species.

Plan	Target or priority
NSW State Plan 2006	Priority E4: Better outcomes for native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is a reduction of the impact of invasive species
Namoi CAP	CTB: From 2006, there will be an improvement in the extent and condition of native plants and animals, and the environment in which they live, within each Interim Bio-Regional Assessment (IBRA) sub-region of the Namoi
	MTB3: From 2006, reduce the economic and environmental impacts of invasive plants and animals
NSW Invasive Species Plan 2008-2015	Vision: The environment, economy and community of NSW are protected from the adverse impacts of invasive species.

6 Issue 3: Decreasing Extent and Condition of Native Vegetation

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Extent (area) of native vegetation[1, 2, 3, 4, 5]	DECCW	S	High	☹
Area protected in conservation reserves & under voluntary conservation agreements[1, 4]	DECCW	S	High	☺
Native vegetation condition[2, 3, 5]	DECCW	S	Low	☹
Area & percentage of native vegetation cleared over time[4, 3]	DECCW/ CMA	P	Low	☹[4]
Implementation of actions (e.g. area revegetated)	Council	R	Low	☹
Overall trend: decreasing extent & condition of native vegetation				☹

6.1 Description of the issue

Native vegetation is made up of plant communities, comprising primarily indigenous species and includes canopy trees (where present), understory, ground cover and below ground biomass (roots, bulbs and the seed bank). Native vegetation provides numerous on-farm production and broader catchment values and links to a number of other environmental issues covered in this Regional SoE. It provides habitat and food for native flora and fauna, protects river banks from erosion and in turn mitigates negative impacts on water quality (e.g. sedimentation and nutrients), captures and stores greenhouse gases, increases pasture and crop productivity, regulates watertable levels and occurrence of salinity problems and maintains soil condition. Key threatening processes (KPIs) relating to native vegetation and biodiversity include:

- Clearing of native vegetation;
- The loss of hollow-bearing trees (KTP); and
- Removal of dead wood and dead trees (KTP).

Vegetation extent

Figure 38 shows the extent of vegetation in the Namoi CMA area for each of the four extent categories described below (DECCW, 2009). The actual percentage of the total catchment area represented in each category is provided in the key.

- Native – Intact: Native vegetation in which the structure has not been substantially altered by human activities, or has been altered and has since recovered.
- Native – Derived: Vegetation that is predominantly native but has been substantially altered by human activities and is no longer structurally intact.
- Native/Non-Native Mosaic: Vegetation that cannot readily be classified as either Native or Non-native using current remote sensing methods.

[4] Area cleared under the *Native Vegetation Act 2003* Property Vegetation Plans (PVP) is known, however, area cleared illegally is not known.

- Non-Native or Other: Non-native vegetation including crops, non-native plantations and non-native pastures, or other non-vegetation land cover types, including urban, industrial, infrastructure.

The overall condition rating for vegetation extent was fair, compared to the NSW average of good.

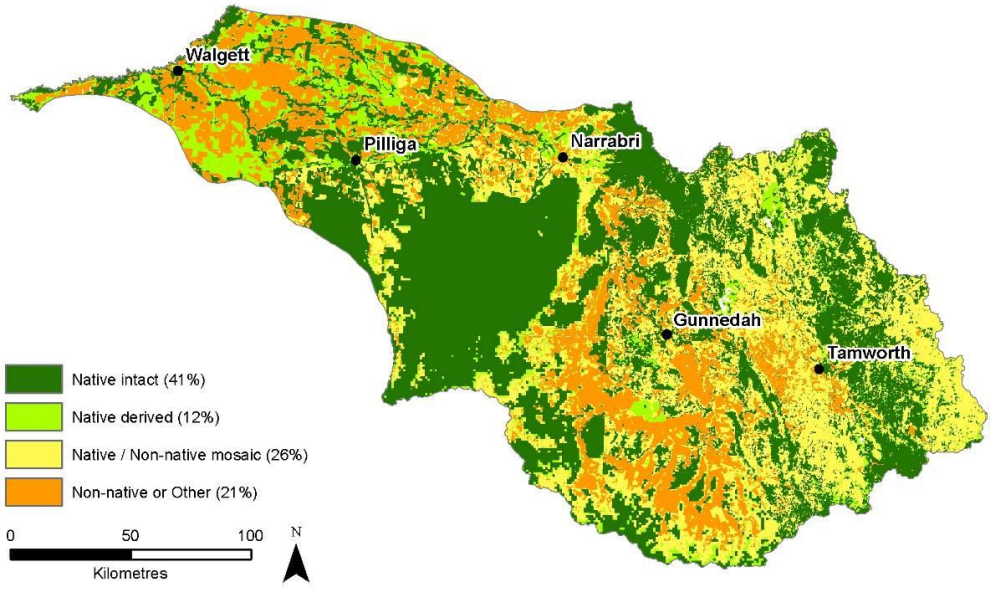


Figure 38: Distribution of vegetation extent categories across the Namoi CMA area.

Vegetation condition

Figure 39 shows the status of vegetation condition in the Namoi CMA area each of the six condition categories described below (DECCW, 2009). The actual percentage of the total catchment area represented in each category is provided in the key.

- Residual: Native vegetation community structure, composition and regenerative capacity intact – no significant perturbation from land use or land management practices.
- Modified: Native vegetation community structure, composition and regenerative capacity intact – perturbed by land use or land management practices.
- Transformed: Native vegetation community structure, composition and regenerative capacity significantly altered by land use or land management practices.
- Transformed/Replaced-Adventive Mosaic: Vegetation that cannot readily be classified as either Transformed (native) or Replaced-Adventive* (non-native) on the basis of available State-wide datasets.
- Replaced-Managed: Native vegetation replaced with cultivated vegetation.
- Removed: Vegetation removed to leave non-vegetated land cover.

The overall condition rating for vegetation condition was fair, the same as the NSW average.

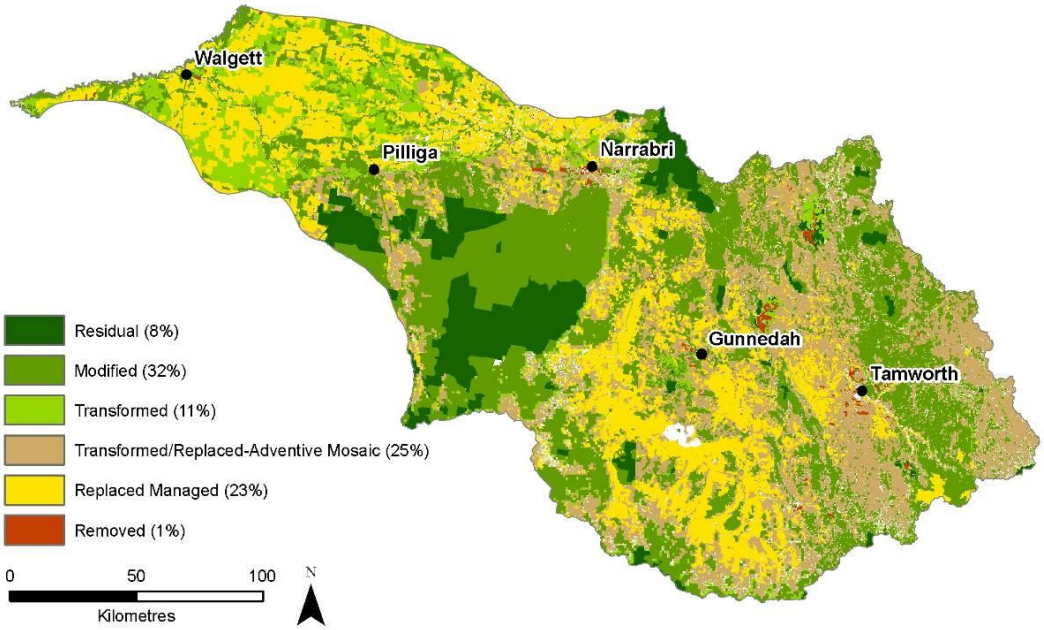


Figure 39: Distribution of vegetation condition categories across the Namoi CMA area.

Vegetation conservation

DECCW is responsible for establishing Voluntary Conservation Agreements (VCA) with landowners which provide permanent protection for significant native vegetation. A VCA is registered on the title of the land ensuring that if the land is sold, the agreement and management requirements remain in place. The number and area of VCAs in each LGA is shown in Table 20.

Table 20: Number and area of VCAs.

Local Government Area (LGA)	Number of VCAs	Area protected under VCA (ha)
Tamworth Regional	8	6,881
Narrabri	1	33.04
Walgett	none	-
Liverpool Plains	1	1.7
Gunnedah	none	-
Total	**10**	**6,915.74**

State Environmental Planning Policy No. 19: Bushland in Urban Areas applies to bushland zoned or reserved as public open space. It affects councils when they propose to rezone urban bushland reserves for urban subdivision. The policy requires that councils give priority to retaining bushland in LEPs, unless they are satisfied that significant environmental, economic or social benefits will outweigh the value of the bushland.

A Tree Preservation Order (TPO) is an order made by a council which makes it an offence to damage certain trees in a LGA or zone. The terms of TPOs vary from council to council and some councils do not have them.

The power to make a TPO for a Local Government Area is found in the LEP. As shown in Table 21 of the five LGAs in the region have a TPO in place.

Table 21: Details of TPOs for LGAs in the Region.

	Local Government Area (LGA)				
	Gunnedah Shire	Liverpool Plains Shire	Tamworth Regional Council	Walgett Shire	Narrabri Shire
TPO	Yes	No	No*	No	No**
Instrument	LEP	-	-	-	-
Area covered by TPO	All of Shire	-	Former Tamworth City LGA	-	-

* significant tree register only.

** TPO currently being drafted by Narrabri Shire Council

6.2 Pressures

The key pressure on the extent of native vegetation in the Namoi Region is clearing. Clearing is defined the destruction of a sufficient proportion of one or more layers within a stand or stands of native vegetation. The main reason for clearing is agricultural development, that is, for cropping and grazing. The extent of clearing for urban development and industrial and mining activities is less significant.

The number of each type of Property Vegetation Plans (PVPs) issued by the Namoi CMA and the area of vegetation removed is presented in Table 22. The area presented in the table does not include vegetation that may have been cleared illegally. As evident from the table the area of invasive native scrub clearing and thinning of vegetation under PVPs are both significantly less than the 2 years prior.

Table 22: Type of PVPs issued by the Namoi CMA and the areas cleared.

Type of PVP	2004		2005		2006		2007		2008		2009	
	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
Clearing	3	201	4	220	1	51.1	0	0	0	0	2	73.4
Thinning	3	100	1	73	0	0	3	265	1	200	1	53.4
INS*	1	881	0	0	4	163.2	20	2,540	1	2,935	4	265
Total	7	1,182	5	293	5	214.3	23	2,805	2	3,135	7	391.8

* INS = invasive native scrub

Native vegetation extent and condition are also significantly impacted by invasive weeds. Adverse effects include competition for space, light, water and nutrients and smothering of native vegetation and seedlings as well as prevent recruitment. The issue of invasive weeds is discussed further in the previous section.

6.3 Stakeholder roles and responsibilities

The roles and responsibilities of stakeholders with respect to the issue of managing native vegetation are listed in Table 23.

Table 23: Stakeholder roles and responsibilities in relation to the management of native vegetation.

Stakeholder	Role	Responsibility
DECCW	Ensuring compliance Policy & research MER	NV Act NSW MER Strategy
CMA	PVPs (clearing, offsets, incentives)	NV Act
Local government	TPOs in planning instruments Management on vegetation on council lands	EP&A Act and planning instruments
Developers/ Agricultural land managers	Compliance with legislation	NV Act TPOs

6.4 Council influence & performance indicators for direct & indirect actions

The key stakeholders and their specific role and responsibility in the management of native vegetation in the Region are presented in Table 24.

Table 24: Direct and indirect influences councils may have over native vegetation.

	Type of council influence	Performance indicator
Direct	Inclusion of TPO in local planning instruments.	TPO Number of trees protected under TPOs
	Revegetation programs (native species).	Number of projects & area of native vegetation replanted (by type)
Indirect	Educating developers on relevant vegetation legislation	Number of stakeholders/ individuals targeted
	Reporting potential NV Act breaches to DECC	Policy/ education for council staff
	Liaison with CMA regarding replanting, conservation, legislation, etc	Number of partnerships

6.5 Response to the issue

During 2008/09 the following councils undertook tree plantings:

- TRC planted a total of 17,276 native plants comprising 6,870 trees, 6,008 shrubs and 4398 grasses.
- Gunnedah Shire planted approximately 15,000 trees.

The area of plantings is unknown.

Box 4: *Regenesis* project

Regenesis is a three-year innovative carbon-trading partnership project between Liverpool Plains Shire Council and Blacktown City Council. The project is funded through the Urban Sustainability Program administered by the NSW Environmental Trust. The main focus of the project is to utilise large tracts of public and privately owned land for biodiversity plantings and carbon storage. The project provides funding and technical advice to landholders in the Liverpool Plains Shire to plant local native trees and shrubs on marginal and currently unused areas of their land.

Regenesis communities of vegetation are planted in accordance with accredited carbon trading requirements. Through the *Regenesis* project, those with the carbon sequestration rights on the planted land will receive carbon certificates that have a dollar value and are tradable. *Regenesis* will operate through the Carbon Pollution Reduction Scheme once that scheme is operational.

To be eligible for carbon trading the following conditions must be met:

- The planting site must have been clear of trees (<20% canopy cover) on the 31st December 1989.
- Revegetation must be “human induced”. Planting, direct seeding and management changes such as fencing to promote regeneration from remnant trees are all valid revegetation methods.
- The revegetated area must occupy a minimum of 0.2 ha.
- The minimum width of the revegetated area must be 10 m (canopy cover at maturity).
- Trees must be a minimum of 2 m high at maturity.
- Landholder must also be prepared to:
  - have carbon sequestration rights registered over the land title; and
  - retain the carbon (i.e. trees) for 100 years after the last payment is made (through legal covenant).

Plantings under the *Regenesis* project are preferably to use local native species to ensure that local biodiversity is maintained or enhanced. To date 27 ha have been planted under the Regenesis project, with 300 ha in applications.

For further information contact:

Gary Roughley, *Regenesis* Project Officer, Liverpool Plains Shire Council.
60 Station Street, Quirindi 2343.
Ph. 67464542. Email: gary.roughley@lpsc.nsw.gov.au Fax: 67463255

6.6 Linkages to targets

The targets and priorities relating to native vegetation identified for the Region are presented in Table 25.

Table 25: Plan targets and priorities relevant to native vegetation.

Plan	Target or priority
NSW State Plan 2006	Priority E4: Better outcomes for native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition
	▪ By 2015 there is an increase in the recovery of threatened species, populations and ecological communities
Namoi CAP	CTB: From 2006, there will be an improvement in the extent and condition of native plants and animals, and the environment in which they live, within each Interim Bio-Regional Assessment (IBRA) sub-region of the Namoi.
	MTB1: From 2006, maintain or improve the extent, distribution and condition of the existing native vegetation of the catchment

7 Issue 4: Declining Surface Water Quality

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Salinity (electrical conductivity)[1,2,3]	NOW/CMA	S	High	☹
Turbidity [1,2,3]	NOW/CMA	S	High	☹
Total phosphorus[1,2]	NOW/CMA	S	High	☹
Exceedances of license discharge consent recorded	LG	P	Medium	😐
Number of onsite wastewater treatment plants in LGA[1]	LG	P	High	☹
Proportion of annual failed wastewater treatment plant inspections	LG	P	High	?
Number of gross pollutant traps installed[1]	LG	R	High	😐
No. of participants involved in stormwater education programs	LG	R	Medium	?
			Overall trend: declining surface water quality	☹

7.1 Description of the issue

Water quality is a strong indicator of catchment health as it provides a useful signal for almost everything that occurs throughout a catchment, particularly in terms of detecting impacts associated with current and future land management practices. Water quality within the Region is influenced by a number of direct and indirect land use pressures, including urban and agricultural runoff, stormwater inflows, sewage discharges and the clearing of native vegetation.

High concentrations of nutrients are important triggers of algal blooms. Other factors such as water temperature, turbidity and water turbulence are also important determinants of bloom formation (DNR, 2005). In cases where the majority of nutrients are from diffuse sources there is a strong relationship between nutrient concentrations and flow, with nutrient levels increasing with flow (DLWC, 2002).

Water quality is monitored at a number of locations throughout the Region to assess impacts associated with land management practices, collect information to inform improved management of water resources and to monitor change over time. There are currently three water quality parameters which are of concern: nutrients, salinity and turbidity. Figure 40 presents the results of Waterwatch water quality monitoring for the past 12 months. As evident this monitoring program is limited to the eastern portion of the Namoi region. The parameters measured include pH, electrical conductivity (EC)[5], turbidity, dissolved oxygen, and total phosphorus.

[5] EC is proxy for salinity.

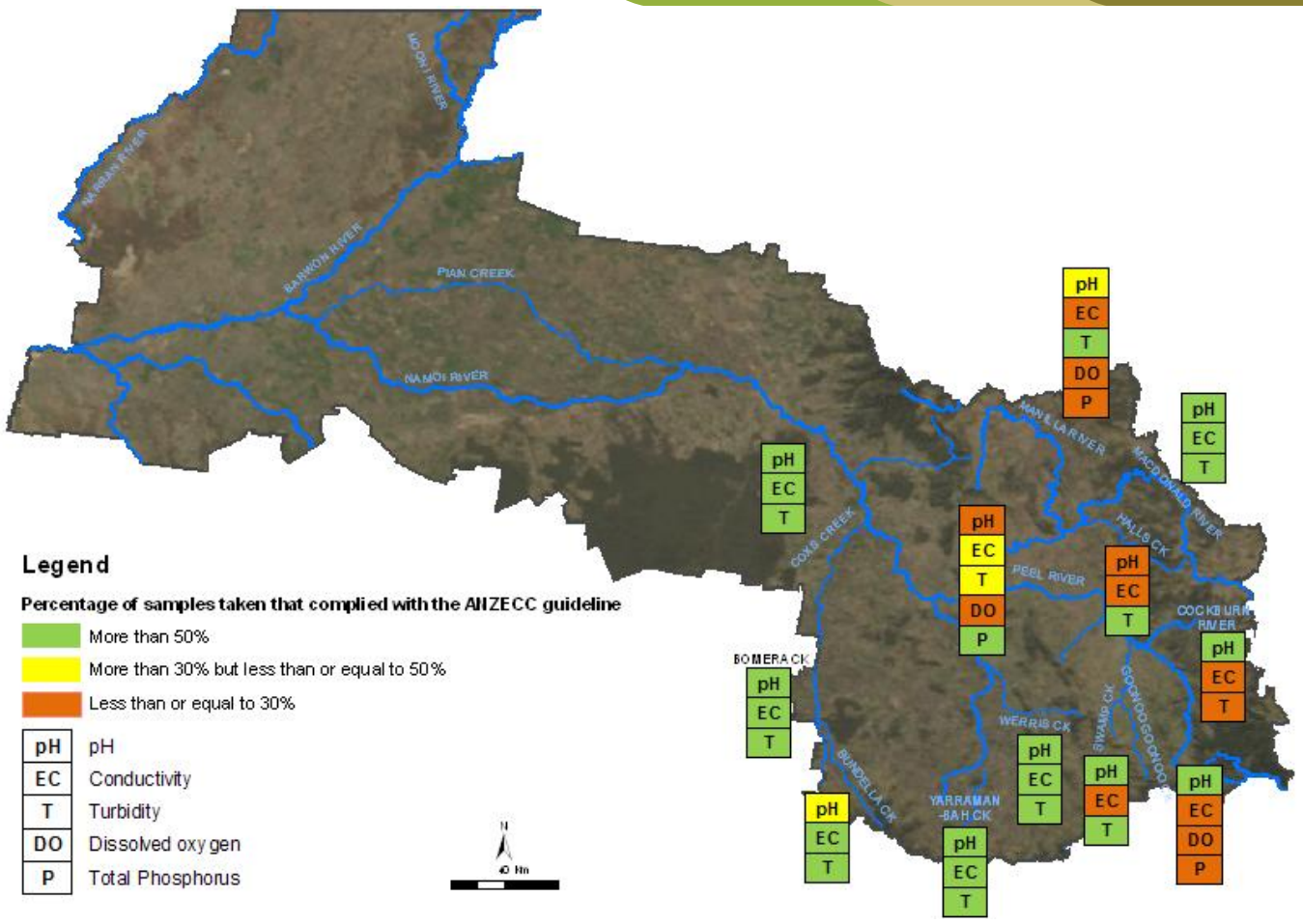


Figure 40: Summary of the November 2008 to September 2009 water quality data for monitoring stations in the Namoi Valley (Waterwatch, 2009).

7.1.1 Total phosphorus

Total phosphorus (TP) is the major nutrient of concern in the surface waters of the Region. High proportions of TP are transported attached to soil particles to wetlands and downstream systems. As stated in the 2008 SoE, most water quality monitoring sites across the Region exceed Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guidelines for TP most of the time for the period July 2005 to June 2008 (DWE, 2008a). The number of significant exceedances of ANZECC guidelines for total nitrogen (TN) were also recorded for the period July 2005 to June 2008. Duplicate data for 2009 is not currently available, however, based on the Waterwatch data (Figure 40) only the Peer River had an acceptable level of TP, while TP at Manilla River and Goonoo Goonoo Creek the levels recorded failed to comply with ANZECC trigger value. TP was not recorded for other waterways.

7.1.2 Water salinity

Electrical conductivity (EC) is a measure of salinity, with a high EC reading indicating high concentration of salts. Readings of EC over 650 µS/cm are considered to be of high salinity for irrigation water and can cause crop damage and/or soil salinity problems. Major irrigation areas in the lower Namoi Catchment have exceeded this level on occasions (DNR, 2005).

Figure 40 shows that most of the EC samples from Cockburn River, Manilla River, Goonoo Goonoo Creek and Halls Creek exceeded the ANZECC trigger value during 2008/09, while only 33% of EC recorded at Peel River complied. The rest of rivers and creeks sampled complied with the ANZECC trigger value for EC.

7.1.3 Turbidity

Turbidity is the key measure of water clarity and is affected by the amount of particulate matter suspended in the water column. Land use change resulting in removal of native vegetation can generate significant sediment loads, particularly where appropriate development controls are not applied (DLWC, 2002).

The trend is toward increasing turbidity levels from the upper catchments through to the lower catchments in the Region (DWE, 2008a). Based on the Waterwatch data turbidity levels at the sites sampled mostly complied with the ANZECC guidelines. The exception were Cockburn River where none of the samples complied and Swamp Creek where 50% of turbidity level recorded complied with the ANZECC trigger value, as shown in Figure 40.

7.1.4 pH and dissolved oxygen (DO)

The pH levels in most of rivers and creeks in Namoi Region are within the ANZECC trigger value. Low levels of pH were detected at Manilla River and Peel River (Figure 40).

Data for dissolved oxygen (DO) was only available for Cockburn River, Peel River and Goonoo Goonoo Creek (Figure 40). DO in these waterways are below the ANZECC trigger value. Low level of DO indicated the decline in water quality for the survival of fishes and aquatic species.

7.2 Pressures

Condition of rivers, creeks and wetlands in the Region is influenced by a number of key pressures:

- Changes in landuse or land management practices, in particular clearing of native vegetation and transformation of rural landscapes to urban areas.
- Changes to natural flow regimes. Surface water and groundwater abstractions or diversions affect sedimentation and concentrations of pollutants.
- Discharge of pollutants (chemicals, nutrients) into water bodies. This includes point-source discharges from a defined location (e.g. industry and sewage treatment plants) and diffuse sources (e.g. agricultural runoff).

The above pressures impact on water condition as a result of suspended solids, nutrients, habitat removal and disturbance (riparian and instream), spread of pest species, variations to flow regimes and increasing salinity. Information relating to constituent LGA pressures on the water environment are outlined below.

There are currently a total of 12 sewage treatment plants in the Region which treat council discharges. Many of the sewage discharges from these STPs are not discharged directly to rivers and creeks. Tamworth Regional, Narrabri and Gunnedah Councils all operate STPs which discharge to farmland environments where in some cases (e.g. Gunnedah STP) effluent is re-used for irrigation. Tamworth Swan Street and Tamworth Westdale STPs operated by TRC and Werris Creek operated by LPSC are the only treatment plants which discharge directly or indirectly to surface water systems.

The number of on-site wastewater treatment plants in each LGA in 2009 was: Tamworth Regional 3,192, Liverpool Plains 54, Walgett 2,755 and Gunnedah 848. data was not provided for Narrabri.

7.3 LGA context

Declining water quality is relevant to all constituent councils in the Region as evidenced by salinity and nutrients in the form of TP where exceedances of ANZECC guidelines are widespread throughout the Region. Turbidity is more significant to the surface water systems located in the lower Namoi Valley and is therefore likely to impact more heavily on Walgett, Narrabri and Liverpool Plains councils.

7.4 Stakeholder roles and responsibilities

The effective management of water quality requires a coordinated approach between state government, local government, regional organisations and landholders. All groups have a shared responsibility to ensure the sustainable management of natural resources and to address the water quality related impacts in the Region. The roles and responsibilities of stakeholders are listed in Table 26.

Table 26: Stakeholder roles and responsibilities relating to water quality.

Stakeholder	Role	Responsibility
NOW	Policy, MER	WM Act
Industry	Process/ water treatment	POEO Act
Agricultural land managers	Management of erosion, agricultural runoff etc	NV Act
Local government	Sewerage treatment outflows, erosion (urban development), onsite wastewater sewage treatment	LG Act POEO Act
CMA	Capacity building, funding, on-ground actions	CMA Act NV Act & Regulations WM Act Soil Conservation Act 1938

7.5 Council influence performance indicators for direct & indirect actions

The following table shows the areas and actions relating to the management of water quality where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 27: Direct and indirect influences councils may have over water quality issues.

	Type of council influence	Performance indicator
Direct	Planning and development controls (LEP, DCP) e.g. restrictions on development along waterways.	Water quality issues addressed in planning controls; effective DA procedure that considers water quality impacts.
	Water quality management plan or strategy: including goals, targets and management actions.	Water quality management plan or strategy developed.
	On-ground management actions (e.g. upgrade of sewerage treatment plant processes, installation of stormwater gross pollutant traps).	Number of management actions implemented.
	Wastewater discharge consent	Compliance with discharge consent
Indirect	Liaison with NOW regarding needs for water quality monitoring, protection of sites, etc.	Number of issues liaised on.
	Community education: ensuring developers and the community are aware of, and comply with, legislative and planning requirements.	Number of education programs; number of stakeholders targeted; incidence of non-compliance with legislation and/or planning controls.
	Liaison with Namoi CMA regarding needs for survey, protection of sites, support tools, etc.	Number of issues liaised on.

7.6 Response to the issue

The main ways in which councils can implement management actions to improve water quality include the installation of gross pollution traps (GPTs), the management of on-site waste water treatment plants (WTPs) and water quality education programs for the business and residential sectors. Table 28 presents the information relating to WTPs in the region, including the number of inspections by councils and the numbers failing inspections (including the percentage failing in parentheses). Walgett, Gunnedah and LPSC have trade waste policies.

Table 28: On-site waste water treatment plants in the Region.

	Gunnedah Shire	Liverpool Plains Shire	Tamworth Regional Council	Walgett Shire	Narrabri Shire
Total number of on-site waste water treatment plants (WTPs)	848	54	3,192	2755 (approx.)	-
Number of on-site WTPs installed 2008/09	5	8	27 installed (86 installations determined	5	-
Number of on-site WTPs inspected in 2008/09	12	7	1,021	20 (approx.)	-
Number of on-site WTPs failing inspection	0 (0%)	0 (0%)	85 (8.3%)	6 (approx.) (30%)	-

7.7 Linkages to targets

The targets and priorities relating to water quality identified for the Region are presented in Table 29.

Table 29: Plan targets and priorities relevant to water quantity.

Plan	Target or priority
NSW State Plan 2006	Priority E4: Better outcomes fro native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is an improvement in the ability of groundwater systems to support groundwater-dependent ecosystems and designated beneficial uses.
	▪ By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained.
	▪ By 2015 there is an improvement in the condition of riverine ecosystems.
MDBMC Basin Salinity Management Strategy 2001-2015	▪ End of valley salinity target of median (50%ile) EC 440 µS/cm and peak (80%ile EC) 650 µS/cm and salt load of 110,000 t/yr at Goangra on the Namoi River.
Namoi CAP	CTW: From 2006, there is an improvement in the condition of surface and ground water ecosystems.
	MTW2: From 2006, maintain or improve surface and groundwater quality suitable for irrigation, raw drinking water and aquatic ecosystem protection, as determined by the Australian and New Zealand Environmental Conservation Council Guidelines (ANZECC, 2000) and MDBC salinity targets at key sites.

8 Issue 5: Land Degradation

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Location and extent of areas impacted by erosion[2,3]	I&I, CMA	P	Low	?
Location and extent of dryland salt affected area[2,3, 4]	NOW	S	Medium	?
Location and extent of irrigation salt affected areas [2,3]	NOW	S	Medium	😐
Landuse (and changes in landuse)[1, 4]	Council	P	High	☹
Number of development consents and building approvals[4]	Council	P	High	😐
Number of contaminated land sites[1,4]	DECCW, Council	P	High	😐
Number of contaminated sites rehabilitated	Council	R	High	😐
Area covered by mining and mining exploration projects	I&I	P	High	😐
			Overall trend: land degradation	😐

8.1 Description of the issue

Land degradation is the decline in the value of the biophysical environment as a result of one or more human-induced processes acting upon the land (also termed land management practices). The main outcome of land degradation is a substantial reduction in the productivity of the land. The major causes of land degradation include:

- Land clearing;
- Agricultural depletion of soil nutrients through poor farming practices;
- Livestock including overgrazing;
- Poor irrigation processes;
- Urban development; and
- Land pollution including industrial waste.

The major impacts on land condition from these actions include:

- Soil erosion by wind and water;
- Soil acidification or alkalinisation;
- Salinisation;
- Contamination from chemicals; and
- Destruction of soil structure, including loss of organic matter.

Climate change has the potential to further exacerbate land degradation processes. For example, extensive periods of drought followed by extreme rainfall events has the potential to increase soil erosion. This is discussed further under Climate Change.

The landscape in the Region has been significantly modified since European settlement; primarily the removal of native vegetation for agriculture, mining and urban development. The cumulative transformation to support these landuses without detailed consideration of environmental constraints has resulted in degradation in the quality of land and vegetation resources. Land degradation has impacted agricultural production and productivity, biodiversity and on other natural resources such as water.

8.1.1 Land salinity

The two main causes of salinity in both the urban and rural areas of the Namoi Region are the application of saline water supplies and saline watertables that have risen close to the soil surface. The impacts of saline water supplies include damage to household and commercial water appliances (e.g. hot water services and water cooling units) and increased production costs for irrigators. The impacts of high saline watertables include lower agricultural yields, structural damage to buildings, deterioration of parks and gardens and damage to infrastructure such as roads, telephone, water, electricity and sewerage systems.

Figure 41 indicates the areas of salinity outbreaks in the Region. Salinity scalds caused by additional deep drainage under annual crops and pastures have become increasingly common on the Liverpool Plains, and across the Maules, Goonoo Goonoo and Manilla Creek sub-catchments (Namoi CMA, 2006). The area at risk from dryland salinity in the Namoi Region for watertable depths of less than 2 m and 5 m is predicted to increase significantly by 2050, as shown in Figure 42 (ANRA, 2008).

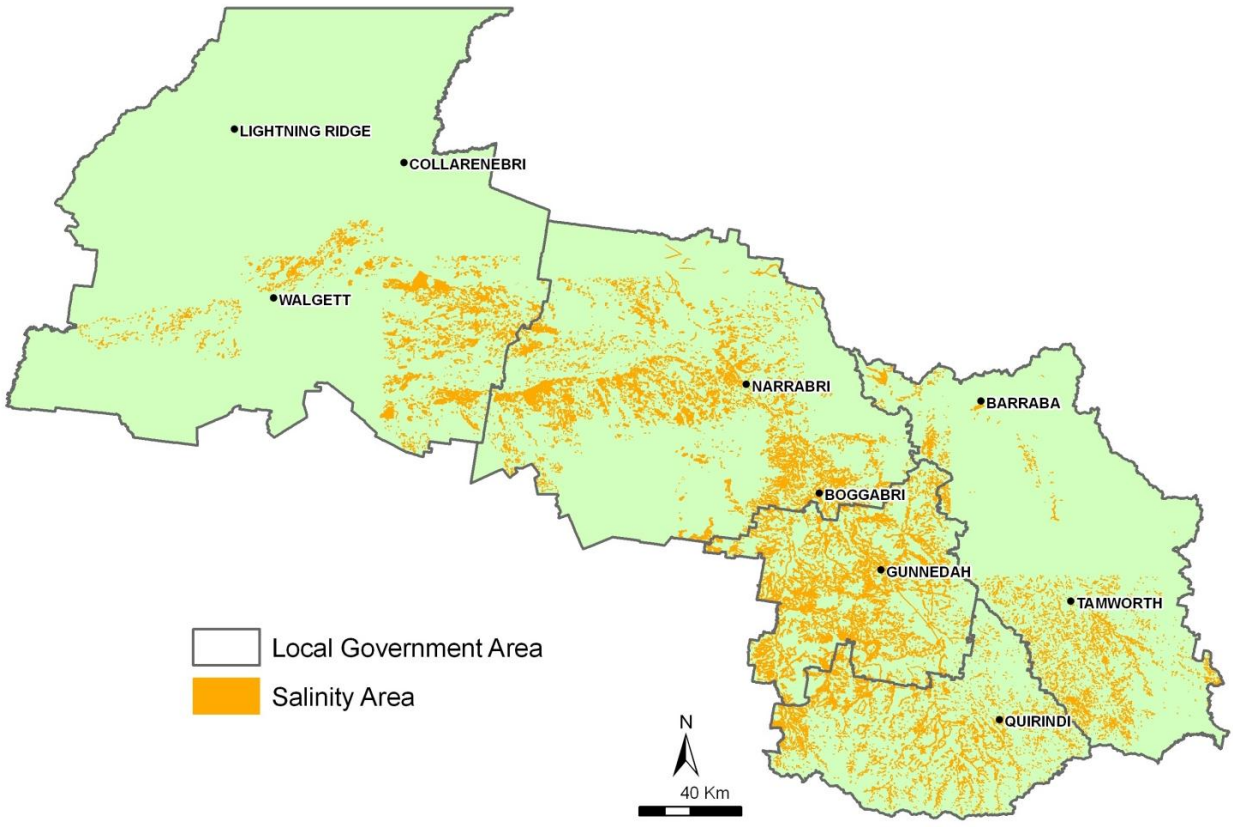


Figure 41: Salinity outbreak mapping.

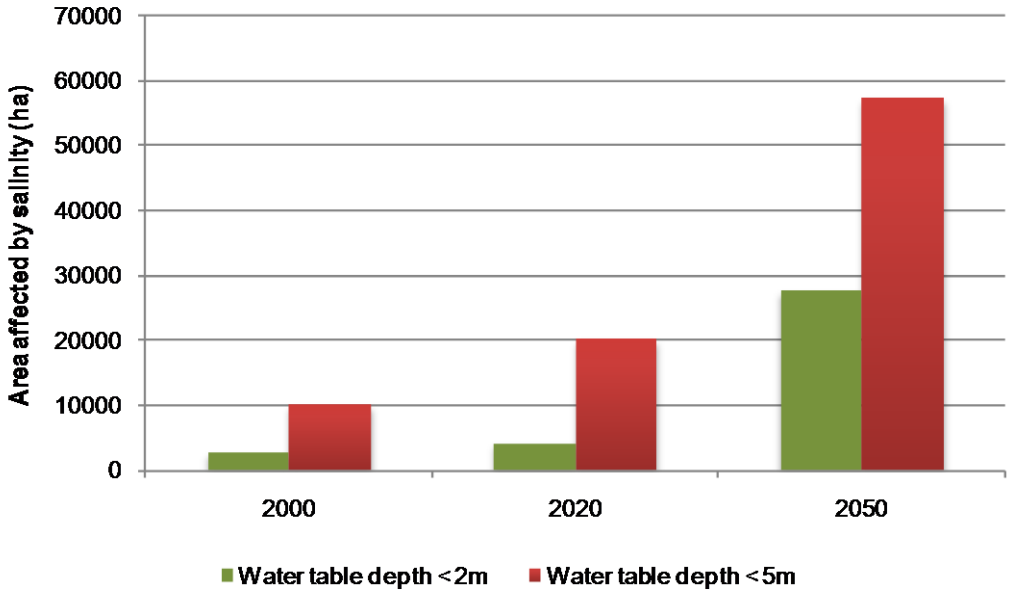


Figure 42: Predicted area at risk from dryland salinity (ANRA, 2008).

8.1.2 Land contamination

Contamination of land can arise from a number of sources including the application of pesticides, leaching of wastes from landfills or direct discharge from industrial sites. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals.

Contaminated land can have major economic, health, legal and planning implications for the community. Contamination can limit land use potential or increase costs for developers and councils. In NSW DECCW deals with contamination under the *Contaminated Land Management Act 1997* (CLM Act) in circumstances where there is 'significant risk of harm' (i.e. contaminated land with potential for immediate or long-term adverse effects on human health and the environment), while local government deals with cases of less serious contamination.

Sites posing a 'significant risk of harm' have notices issued under sections 35 and 36 of the *Environmentally Hazardous Chemicals Act 1985* (EHC Act). The number of contaminated sites (CLM and EHC Acts) and licensed sites (POEO Act) in the Region are identified in Table 30. Between 2008 and 2009 the number of contaminated sites has remained the same, however, the number of licensed sites has increased by 59%.

Table 30: Number of contaminated sites and licensed sites in each LGA.

Local Government Area (LGA)	Contaminated sites (CLM & EHC Acts)*		Licensed sites (POEO Act)#	
	2008	2009	2008	2009
Gunnedah Shire	3	3	9	14
Liverpool Plains Shire	0	0	12	13
Tamworth Regional Council	1	1	38	53
Walgett Shire	0	0	2	8
Narrabri Shire	1	1	8	22
Total Region	***5***	***5***	***69***	***110***

*Source: DECCW, 2009a.

number of activities licensed (as of the 25th September 2009) under Schedule 1 of the POEO Act.

8.1.3 Erosion & soil structure decline

Soil erosion affects the productivity of land by removing fertile top soil, leaving less fertile sub-soil for pasture growth and crops as well as reducing arability via rills and gullies. Off-site effects associated with soil erosion include increased sedimentation of waterways and reduced water quality. These impacts can result in additional costs to the community due to increased food production and water treatment costs.

Erosion can take on many forms including wind, sheet, rill and gully where the significance of an erosion event is influenced by a number of factors including: amount and intensity of rainfall; steepness of slope; soil type; organic content and the extent of vegetative cover on the soil surface.

The management of land in the Namoi Region has had a significant impact on the susceptibility of land to erosion processes. Urban development, forestry, agriculture and mining have greatly accelerated natural rates of soil erosion primarily through the reduction in vegetation cover, which has increased runoff and reduced resistance to water and wind erosion. Historically agricultural systems have impacted significantly on the soil resources of the Namoi Region as evidenced in the 1990's where 10% of the Region was classified as moderately to severely eroded (Namoi CMA, 2006).

Figure 43 shows that in 2009 sheet erosion is a widespread issue in most of the Namoi CMA Region.

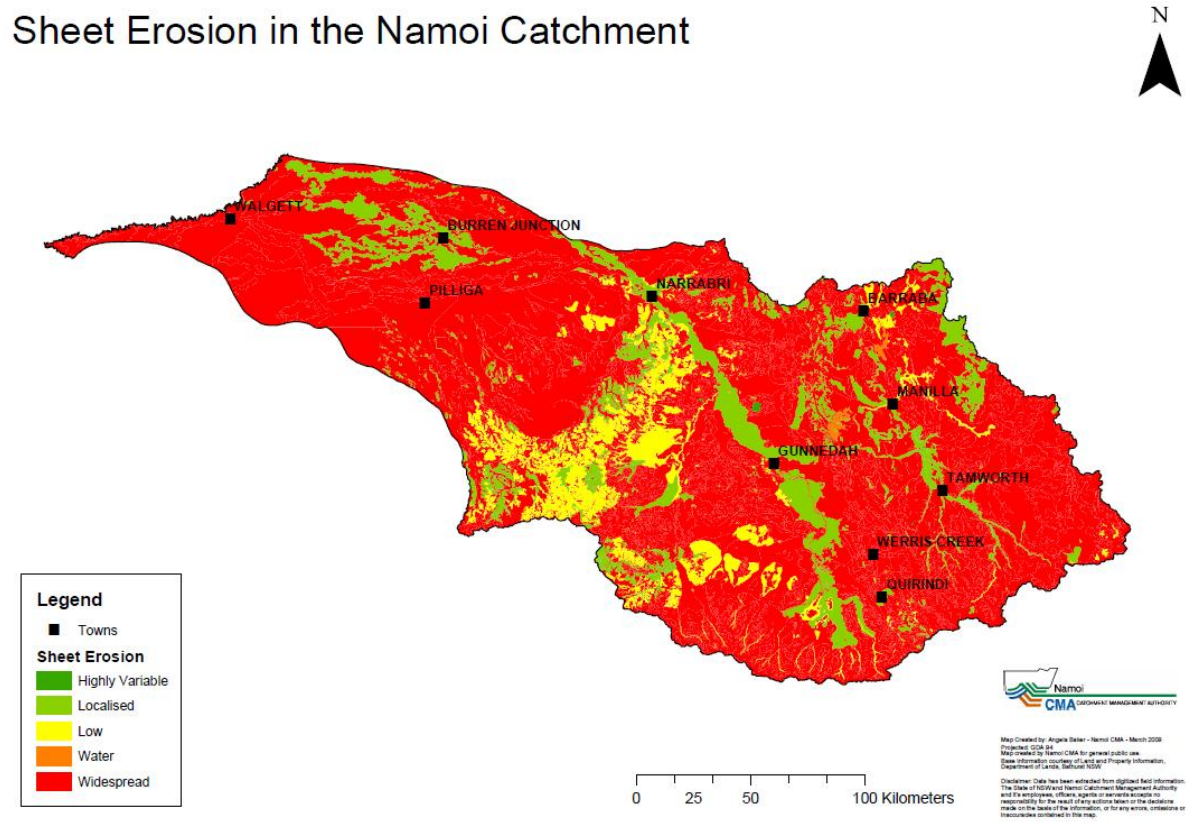


Figure 43: Map of Sheet Erosion in the Namoi CMA Region March 2009 (DECCW, 2009).

8.2 Pressures

The main pressures affecting land and soil condition in the Namoi Region are vegetation clearing, unsustainable agricultural practices, urban development, expansion of mineral extraction industries and invasive species. Underlying these pressures are population growth, economic trends and climatic conditions.

8.2.1 Urban development

The level of land degradation resulting from urban development generally depends on the status of the land prior to development. Urban development on cleared infill sites is likely to have less impact than development on greenfield sites where greater habitat disturbance and vegetation clearing often occurs.

In 2008/09 the constituent councils received 840 development applications (DAs) and approved 893[6]. The breakdown by LGA is presented in Table 31. This is less than the 1,814 Das approved in 2007/08. These applications were for a variety of uses including subdivisions, residential developments, commercial premises and industrial premises. Despite this recent decrease the pressure for urban development is likely to increase in council areas such as Gunnedah and Liverpool Plains Shire in the future as a result of projected increases in coal mining (see Box 5).

Table 31: Development approvals for 2008/09.

LGA	Number of rural residential allotments	New developments		
		Number of DAs received	Number of DAs approved	Area of land approved for development (ha)
Gunnedah Shire	17	155	153	?
Liverpool Plains Shire	4	79	86	5,436
Tamworth Regional Council	89	577	626	?
Walgett Shire	110	29	28	?
Narrabri Shire	8	107	102	-
Total	**228**	**840**	**893**	**?**

8.2.2 Clearing of native vegetation

Native vegetation protects and conserves land and soils by:

- Reducing erosion: vegetation cover protects soil from erosion caused by wind and water, and also reduces mass movement (land slides or land slips). Vegetation also contributes organic matter in the soil which can reduce erosion due to increased water infiltration and stable soil aggregate formation.
- Maintaining watertable levels: vegetation helps lower the watertable and reduces water intake into the upper catchment and discharge in the lower catchment.

8.2.3 Unsustainable land management practices

Unsustainable land management practices exacerbate land degradation processes and reduce the potential for recovery. Examples of unsustainable land management practices which contribute to land degradation include:

- Poor stock management (e.g. overgrazing);
- Illegal activities such as unpermitted vegetation clearing;
- Irrigation activities which contribute to land salinity;

[6] Some applications submitted in 2007/08 were not approved until 2008/09.

- Excessive application of fertilisers and herbicides; and
- Excessive tilling can destabilise soils and promote erosion.

It is important to note that these practices not only affect the environmental, economic and social aspects of the land but also the physical, chemical and biological processes occurring within waterways.

8.2.4 Mining disturbance

The location of coal, minerals and petroleum applications and titles across the Region is shown in Figure 44. Examples of current coal mining proposals include Sunnyside, Rocglen and Caroona. As evident in Figure 45 the area of coal applications in 2009 was less than in 2008, however, the area of coal titles has increased as a result of many of the 2008 applications being approved (1,734 ha of applications are still outstanding). Although the areas under mineral and petroleum title have both decreased since 2008, the area under application has increased.

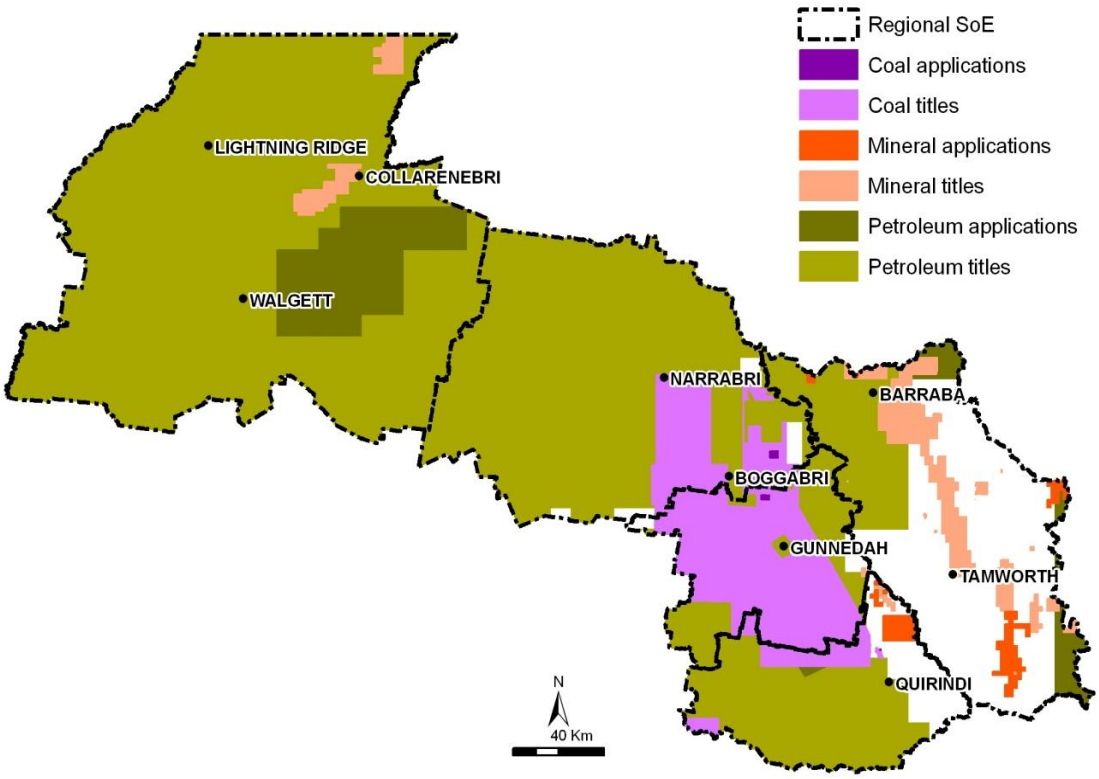


Figure 44: Mining applications and titles in the Namoi Region (adapted from DPI NSW, 2009c).

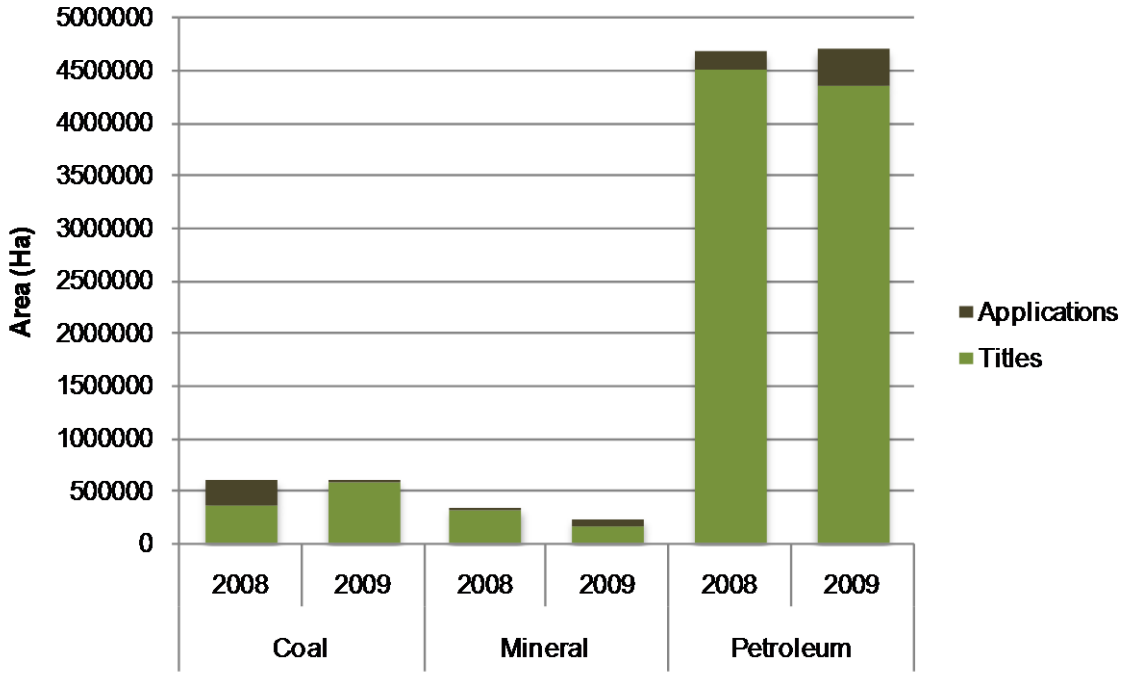


Figure 45: Area under mining applications and title for 2008 and 2009 in Namoi Region (adapted from DPI 2008 - 2009).

Opal mining is also a significant industry in the Walgett Shire. Currently there are approximately 3,000 mineral claims where opal is mined, and about 40 mining leases where opal bearing rock is processed.

8.2.5 Land use change & conflict

The key issue in the Namoi Region is the conversion of agricultural land for either mining and extractive industries or peri-urban development for housing and industry. Others may include the conversion of travelling stock routes and reserves to other land uses. Conflict arises when land use change results in social, economic or environmental impacts to all or part of the community. Box 5 provides a case study of a current landuse change facing the Namoi Region.

Box 5: Coal mining versus farming – the battle over landuse in the Liverpool Plains continues…

Figure 46: Community blockade at 'Rossmar Park' in Caroona

It's a case of David versus Goliath as the local farming community in the Liverpool Plains region continues to battle mining giants BHP Billiton, Shenua Energy and Santos over land use activities in the area.

Located in the south of the Namoi Region, the Liverpool Plains area boasts rich soils, underground water and crop yields of about 140 percent of the national average: the region is one of NSW's biggest food producing areas. It is also an area believed to be rich in coal deposits; it's estimated there may be up to 1.5 billion tonnes of coal under the plains and in the hills nearby.

In recent years, BHP Billiton and Shenua Energy have been prospecting for coal deposits in the area, under exploration licenses granted by the NSW government. Santos is exploring in the region for coal-seam gas. The mining companies insist they can co-exist with agriculture and have assured they will only mine the ridges not the fertile plains. The farming community are demanding that all exploration ceases until more is known about the potential impacts of the mining on their valuable underground aquifer. The farmers are arguing that the ridges play an important and not yet fully understood role in recharging the aquifer.

Local farmers have formed the Caroona Coal Action Group, a lobby group protesting the impact of coal and gas exploration on the agricultural land and water systems of the Liverpool Plains. In July 2008 a community blockade was set up at 'Rossmar Park' in Caroona. The blockade was established to stop the mining companies' exploration work by denying them access to properties. The blockade, which is still ongoing, has become one of Australia's longest continuous blockades. In a breakthrough for the farmers, the federal government, through the National Water Commission, offered $1.5 million for an independent study of surface and groundwater resources in the Namoi catchment in December 2008. This two year project will examine the potential local and cumulative impacts of mining on water resources. Detailed planning for the study is currently progressing.

At this stage neither BHP Billiton nor Shenua have applied for a mining lease in the area but advanced exploration continues. (Sources: AFR, 2009; CCAG, 2009; BHP Billiton, 2009).

8.3 LGA context

Land degradation issues such as erosion and salinity are relevant to all constituent councils in the Region, however, the extent of the problem is likely to be greater in some regions than others. Landuse conflict is likely to occur in hotspots across the region. For example, where there is a potential for mining and/or exploration to undermine prime agricultural food producing land.

8.4 Stakeholder roles and responsibilities

The effective management of land requires a coordinated approach between government, regional organisations and landholders. All groups have a shared responsibility to ensure the sustainable management of natural resources and to address the land related impacts in the Namoi Region. The roles and responsibilities of stakeholders are listed in Table 32.

Table 32: Stakeholder roles and responsibilities relating to land.

Stakeholder	Role	Responsibility
DECCW	MER, policy, compliance Compliance (illegal clearing of native vegetation)	SC Act NV Act
Industry	Minimisation of impacts from activities such as mining	EPA Act
Agricultural land managers	Management of vegetation removal, erosion, salinity etc	NV Act
Local government	Planning (urban development)	LG Act CLM Act
CMA	Vegetation clearing consents Capacity building, funding, on-ground actions	NV Act

8.5 Council influence & performance indicators for direct & indirect actions

The following table identifies the areas and actions relating to land management where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 33: Direct and indirect influences councils may have over water quality issues.

	Type of council influence	Performance indicator
Direct	Planning instruments, development controls and development assessment.	Planning instruments address land management considerations such as soil erosion; DA procedure considers impacts associated with development; audits of compliance with soil management requirements (% compliance).
	On-ground management actions: tree planting, education.	Number of management actions implemented.
	Remediation of land degradation, including contaminated sites.	Number and type of remediation activities.
Indirect	Liaison with DWE and DECC regarding needs for land condition monitoring, protection of sites.	Number of issues liaised on.
	Community education: ensuring developers and the community are aware of, and comply with, legislative and planning requirements.	Number of education programs; number of stakeholders targeted; incidence of non-compliance with legislation and/or planning controls.
	Liaison with Namoi CMA regarding needs for survey, protection of sites, support tools, etc.	Number of issues liaised on.

8.6 Response to the issue

In 2008 constituent councils in the Region estimated planting some 28,000 trees and shrubs, and over 4,000 grasses. This action will help to mitigate the impacts posed by land degradation issues.

In 2007 six contaminated sites were remediated in the Tamworth Regional Council area, while one contaminated site was remediated in both Walgett and Narrabri Council areas. No contaminated sites were rehabilitated in Gunnedah or Liverpool Plains Shire Council areas.

8.7 Linkages to targets

The targets and priorities relating to land degradation identified for the Region are presented in Table 34.

Table 34: Plan targets and priorities relevant to land

Plan	Target or priority
NSW State Plan 2006	Priority E4: Better outcomes for native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is a reduction of the impact of invasive species
	▪ By 2015 there is an increase in the area of land that is managed within its capability
MDBMC Basin Salinity Management Strategy 2001-2015	▪ End of valley salinity target of median (50%ile) EC 440 µS/cm and peak (80%ile EC) 650 µS/cm and salt load of 110,000 t/yr at Goangra on the Namoi River.
NSW Salinity Strategy 2000-2010	Sets targets which drive a strategic, coordinated approach to managing salinity. These guide where it is best to invest in actions to address salinity at the landscape and property scale.
Namoi CAP	CTW: From 2006, there is an increase in the extent of landscape managed sustainably
	MTL1: From 2006, increase the area of land managed according to Best Management Practice.
	MTL2: From 2006, increase the area of land used in accordance with land capability
	MTL3: By 2010, local and state government planning strategies and instruments will be consistent with the objectives of the CAP.

9 Issue 6: Climate Change (human induced)

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
GHG emission from major regional sectors	I&I, Council	P	Medium	☹
GHG emissions from LGA energy usage	Country Energy	P	High	☹
Climate projections for 2030 and 2070	CSIRO	S	Medium	☹
Number of GHG reduction programs implemented	Councils	R	Medium	😐
			Overall trend: climate change	☹

9.1 Description of the issue

The term climate change is commonly used interchangeably with "global warming" and "the greenhouse effect". Climate change refers to the build-up of man-made gases in the atmosphere that trap the suns heat, causing changes in weather patterns on a global scale. These gases arise from human activities, particularly those associated with burning of fossil fuels (coal, oil and natural gas), agriculture and land clearing. The greenhouse gases of most concern are carbon dioxide, methane, and nitrous oxides. The effects include changes in rainfall patterns, sea level rise, potential droughts, habitat loss, and heat stress.

A co-ordinated regional, state, national and international response is required if action to reduce greenhouse gas emissions is to be effective. Three types of response are likely to be required, including:

- producing energy from less greenhouse gas intensive fuel sources;
- consuming less energy for the same socio-economic outcomes; and
- responding/adapting to potential impacts posed by climate change.

9.1.1 Future climate in the Namoi Region

The CSIRO (2006) suggests that the future climate for the Namoi Region is likely to be warmer and drier. The number of days above 35^{o}C and 40^{o}C is likely to increase under projected climate scenarios for 2030 and 2070 Key impacts potentially arising from current climate change scenarios which may impact on activities and assets in the Namoi Region are summarised in Table 35.

This trend also has the potential to increase evaporation, extreme heat events, extreme winds, extreme rainfall events and greater fire risk. Temperatures in the Namoi Region have warmed by about 0.8^{o}C since 1950, a trend likely to be at least partly attributable to human activities. Rainfall trends across the region have been highly variable with some areas experiencing trends toward increasing rainfall, while others have experienced decreasing trends.

Table 35: Current and Projected Climate Change in the Namoi Region (CSIRO, 2006).

	Present	Projected Change	
		2030	2070
Temperature			
Average	Gunnedah 16-32°C Tamworth 16-32°C Walgett 17-35°C	0.2 - 2.1°C	0.7 – 6.4°C
No. days below 0°C	Gunnedah 3 Walgett 13	Gunnedah 1 - 3 Walgett 4 - 11	Gunnedah 0 - 2 Walgett 0 - 8
No. days below 35°C	Gunnedah 19 Walgett 56	Gunnedah 22 - 40 Walgett 61 - 87	Gunnedah 290 - 103 Walgett 71 - 153
No. days below 40°C	Gunnedah 0 Walgett 13	Gunnedah 1 - 3 Walgett 10 - 23	Gunnedah 2 - 26 Walgett 16 - 38
Rainfall			
Annual average	Gunnedah 636 Tamworth 673 Walgett 475	-13 – 7%	-40 – 20%
Extreme rainfall		3%	10%
Evaporation		2 – 13%	2 – 40%
No. droughts per decade	2	2 - 4	1 - 8
Extreme winds		-5 – 8%	-16 – 24%

Table 36: Potential climate change impacts upon key assets in the Namoi Region.

Assets	Climate Change Impacts/Risks
Water	▪ Less water for streams and rivers, presenting downstream consequences for water storages (-) ▪ Water users may face long-term reductions in water allocations and increasing costs for water transfers. (-) ▪ Water quality issues such as nutrients, algal blooms and turbidity may be exacerbated by lower flows (-) ▪ Reduction in extent and function of freshwater wetlands due to decreases in runoff (-)
Farms	▪ Dryland cropping and grazing may benefit from longer growing seasons and higher CO2 levels that increase efficiency with which pasture and crops such as wheat use water(+) ▪ Benefits to plant productivity may not be sufficient to offset large reductions in rainfall or extreme temperatures (-). ▪ Warmer temperatures may increase heat stress for livestock ▪ Increases in frequency, intensity and length of drought events may have significant consequences for dryland farming activities (-). ▪ Direct and indirect impacts for irrigated crops (e.g. higher temperatures will result in inadequate winter chilling for some fruit trees) (-). ▪ Changes in distribution and impact of pests, weeds and wildfires.

Assets	Climate Change Impacts/Risks
Biodiversity	▪ Further degradation of natural assets (-) ▪ Changes in distribution of native plant and animal species (-) ▪ Potential impacts on iconic species such as Brush Tailed Rock Wallaby ▪ Reductions in stream flows have negative impact on aquatic biodiversity, including wetland ecosystems ▪ Lack of suitable habitat for migration may leave some plants and animals stranded in isolated climate zones (-) ▪ More frequent droughts and fires likely to increase stress on plant and animal communities (-)
Forests	▪ May increase in productivity with higher temperatures and increased CO2 (+) ▪ Changes in composition of tree species, increased invasion by weeds and changes to habitat these areas provide for local plants and animals
Communities	▪ Warmer winters likely to reduce cold related illnesses (+) ▪ Warmer summers increase risk of heat related health problems (-) ▪ Vulnerability in built environment to climate change (e.g. Austroads (2004) found that climate change would increase road maintenance costs by up to 25% by 2010 (-) ▪ Risk of property loss due to bushfire likely to increase (-) ▪ Insurance risks premiums may increase as a result of increases in frequency and intensity of extreme events (e.g. floods) (-)

9.2 Pressures

9.2.1 Greenhouse gas emissions

Emissions data for the Namoi Region was available for agriculture[7], residential and business energy use and waste[8]. GHG emissions from these sources are estimated to be 2,479,491 tonnes CO_2e. These sources are considered to be significant emission sources within the Region. A breakdown of the GHG contribution from these sources is shown in Figure 47. GHG emissions from agriculture, household and business energy use and waste for 2008/09 are 1,528,188 tonnes, 347,322 tonnes 460,351 tonnes and 143,630 tonnes of CO2e respectively. It is not possible to compare emissions to last year as the 2008/09 data includes waste data for all LGAs, whereas 2007/08 included data for three LGAs only.

9.3 LGA context

Climate change is a significant issue for all constituent councils in the Namoi Region. Although it will be difficult to determine projected impacts associated with climate change it is likely that natural and man made assets across the Region will become increasingly vulnerable to risks posed by climate change. For example, predicted increases in the frequency and intensity of bushfires may impact on the Regions protected area network.

[7] Agricultural emissions calculated using ABS data for sheep and cattle numbers and agriculture GHG emissions calculator developed by University of Melbourne.

[8] Waste emissions calculated from Council waste data for municipal solid waste, construction and demolition and commercial and industrial.

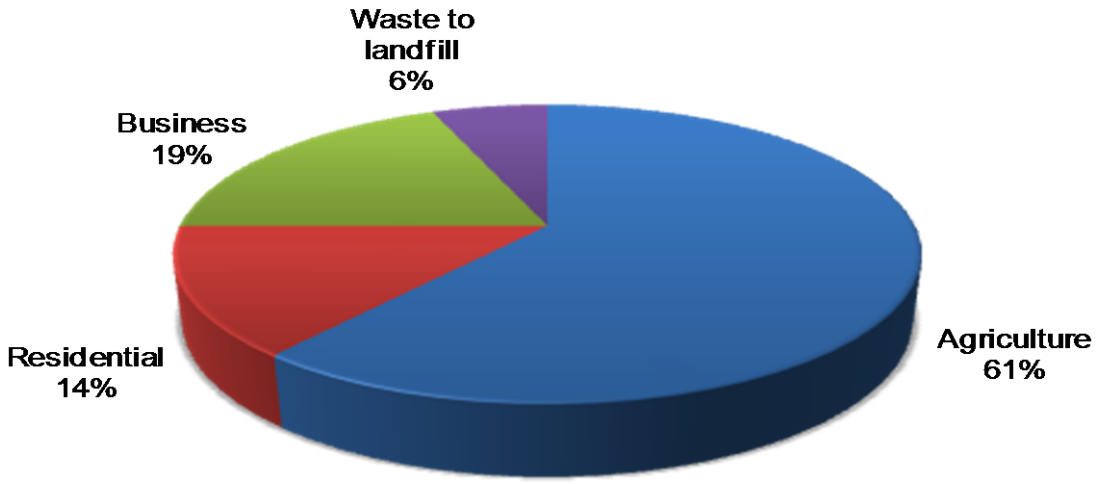


Figure 47: Key sources of GHG emissions for Namoi Region.

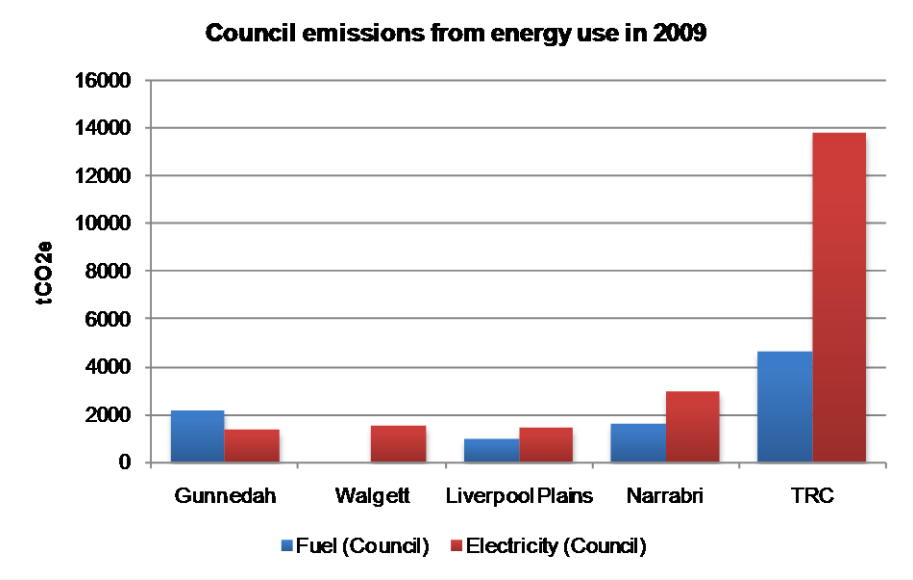
The Regional energy consumption and CO_2 emissions per sector (business and residential) is presented in Table 37. Narrabri has the greatest per capita CO_2 emissions (which is based on the total for each LGA), with Tamworth Regional having the lowest. The overall CO_2 emissions in the Region have increased by less than 1% between 2007/08 and 2008/09, which is due to an increase in the business rather than residential sector.

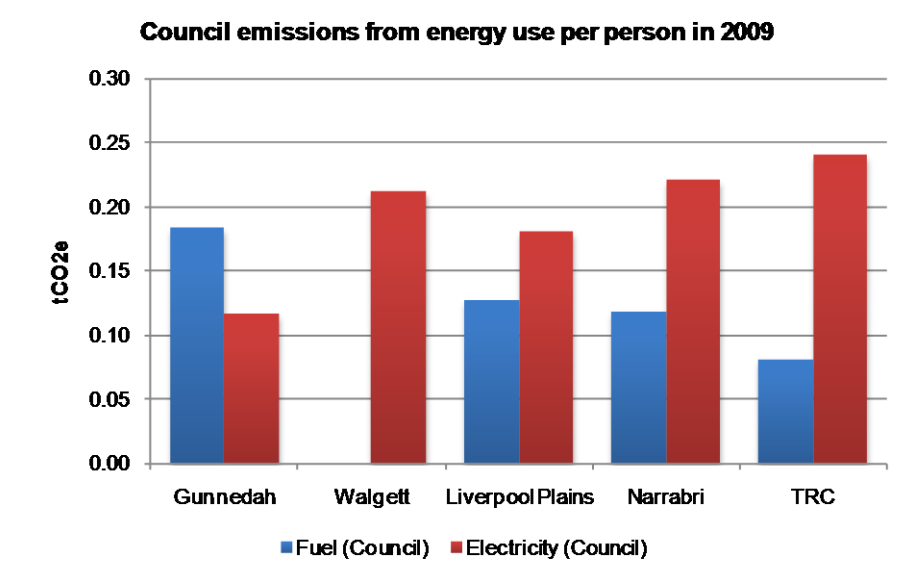
Table 37: Energy consumption and CO_2 emissions per sector for 2008/09.

LGA	Business MWh	Residential MWh	Total MWh	Business CO_2 t	Residential CO_2 t	Total CO_2 t
Regional Total (2008/09)	434,293	327,662	761,955	460,351	347,322	807,672
Regional Total (2007/08)	438,050.8	313,612.7	751,663.5	466,086.1	333,683.9	799,769.9

Box 6: Carbon Footprint – Gunnedah, Walgett, Liverpool Plains, Narrabri, Tamworth Regional

GHG emissions from council energy use (fuel and electricity) for Gunnedah, Walgett, Liverpool Plains, Narrabri and TRC is shown below. The figure shows total emissions are 3,599 tCO_2-e, 1,529 tCO_2-e, 2,433 tCO_2-e, 4,601 tCO_2-e and 18,439 tCO_2-e respectively. Although TRC has the highest level of absolute emissions it should be noted that it provides services for the largest council population in the Region. Furthermore, when comparing council per capita emissions from electricity use TRC has a similar per person emissions profile to the other Councils.





9.4 Stakeholder roles and responsibilities

The effective management of land requires a coordinated approach between government, regional organisations and landholders. All groups have a shared responsibility to ensure the sustainable management of natural resources and to address the potential impacts and risks posed by climate change in the Namoi Region. The roles and responsibilities of stakeholders are listed in

Table 38.

Table 38: Stakeholder roles and responsibilities relating to climate change.

Stakeholder	Role	Responsibility
Department of Environment & Climate Change (C'wealth)	Collation of greenhouse gas emissions & energy data for States, Territories and Commonwealth	NGER Act 2007 RE Act & Renewable Energy (Electricity) Regulations 2001
Dept Water & Energy	Policy, MER	National Electricity Act (NSW) 1997
DECCW (EPA)	Implementation of air pollution laws Compliance	POEO (Clean Air) Regulation 2002
Industry	Responsibility for reporting on emissions & purchase of emissions permits	POEO (Clean Air) Regulation 2002 NGERS Act CPRS
Agricultural land managers	Management of vegetation removal	NV Act
Local government	Report on GHG emissions, implement reduction plans for GHG emissions	LG Act POEO (Clean Air) Regulation 2002 National Pollutant Inventory) Measure 1998
CMA	Capacity building, funding, on-ground actions (e.g. tree planting)	

9.5 Council influence & performance indicators for direct & indirect actions

The following table identifies the areas and actions relating to the management of land where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 39: Direct and indirect influences councils may have over climate change.

	Type of council influence	Performance indicator
Direct	Planning and development controls	Planning instruments include energy efficiency & climate change considerations DA procedure considers energy & climate change impacts
	On-ground management actions (e.g. energy efficient appliances, tree planting)	Number of management actions implemented Estimated reduction in energy & GHG emissions
	Develop a climate change plan/ strategy & identify reduction targets	Plan developed, communicated & implementation initiated
Indirect	Liaison with DWE, Country Energy regarding renewable energy investment in the Region	Number of issues liaised on
	Community education: promoting energy efficiency & GHG reduction measures to developers & the community	Number of education programs; number of stakeholders targeted; estimated reduction in energy and GHG emissions
	Liaison with Namoi CMA regarding needs for bio-sequestration activities., etc	Number of issues liaised on

9.6 Response to the issue

A number of projects are being implemented in the Namoi Region that aim to reduce greenhouse gas emissions, including *Regenesis* (LPSC) and Green is the New Black (Namoi ROC). For details of these projects refer to Box 3 and 7, respectively.

TRC is currently the only council in the Region with a climate change impact mitigation strategy in place. This action plan has been developed under the “Cities for Climate Protection” program. TRC is currently at milestone 5 in the program and has number of greenhouse reduction initiatives in place to reduce electricity, fuel, water and waste.

Box 7: *Green is the New Black* Project

Funded by the NSW Environmental Trust under their Urban Sustainability grants program, *Green is the New Black* is a new two million dollar project set to commence in the Namoi Region in 2009. The project is managed by the Namoi ROC group of councils and will include involvement from Namoi CMA and Northern Inland Regional Waste, as well as the five Namoi ROC member council's: Narrabri Shire, Gunnedah Shire, Liverpool Plains Shire, Walcha and Tamworth Regional Council. The project will implement environmentally sustainable outcomes across the Namoi region.

Working with priorities from the Namoi Catchment Sustainability Plan, *Green is the New Black* will commence with capacity building of the Namoi ROC member councils. Activities will include training, auditing/eco-foot printing, implementation of initiatives with high environmental benefit, and integration of planning and policy frameworks to support sustainable outcomes.

Green is the New Black will also implement a range of activities across industry, businesses and householders in the region, and will build community capacity to identify, understand and respond to sustainability issues. Innovative, practical and cost-effective actions to reduce energy and water usage, increase use of renewable energy, improve waste management and improve urban riverine environments will be promoted and implemented.

Priority environmental outcomes for the project include reduction in greenhouse emissions, improved water management and restored riverine environments.

9.7 Linkages to targets

The targets and priorities relating to climate change identified for the Region are presented in Table 40.

Table 40: Plan targets and priorities relevant to land.

Plan	Target or priority
National Strategy for Ecologically Sustainable Development 1992	Objective 8.1: to limit harmful emissions arising from energy production and distribution wherever economically efficient, and to promote alternative energy sources. Objective 8.2: to improve energy efficiency of residential buildings and domestic appliances; and to influence householders to become more economical in their use of energy, and to switch to energy sources with lower GHG emissions. Objective 8.3: to influence industries and businesses to adopt behaviour, practices, technology and equipment that make them minimise their energy use; or lead them to switch to energy sources with lower greenhouse gas emissions.
NSW State Plan 2006	Priority E2: a reliable electricity supply with increased use of renewable energy. Priority E3: Cleaner air and progress on greenhouse gas reductions.
	▪ By 2010, 10% of electricity consumed in NSW will be from renewable sources, rising to 15% by 2020. ▪ Clean air target – we will meet national air quality targets as identified in the National Environment Protection Measure for Ambient Air Quality. ▪ Greenhouse Gas Target – we will achieve a 60% cut in GHG emissions by 2050 and a return to year 2000 greenhouse levels by 2025.

10 Issue 7: Increasing Number of Threatened Species

Summary information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Number of threatened species[1, 2]	DECCW	S	Low/ medium	☹
Number and extent endangered ecological communities[1]	DECCW	S	Low/ medium	☹
Key threatening processes[1]	DECCW	P	High	☹
Number of threatened species actions implemented (e.g. PAS, recovery plans)[4]	Councils	R	Low	😐
Overall trend: increasing number of threatened species				☹

10.1 Description of the issue

Numbers of threatened species, populations and ecological communities provide a simple measure of the status of biodiversity. In New South Wales, as at August 2009, 942 native species, 42 populations and 90 ecological communities were listed as threatened with extinction under schedules 1 and 2 of the NSW *Threatened Species Conservation Act 1995* (TSC Act). These figures represent an increase on numbers listed in 2008.

The 942 native species listed on the NSW TSC Act schedules is comprised of over 600 plant species, over 300 animal species, one alga and five fungi. To break this down further, 40 animal species and 34 plant species are presumed extinct, 94 animal species and 364 plant species are classified as endangered, and 170 animal species and 230 plant species are listed as vulnerable.

Further, of the species listed as threatened under the NSW TSC Act, 14 amphibians, 16 reptiles, 42 birds, 40 mammals, 6 invertebrates and almost 350 plants are also listed as threatened under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999.*

Threatened species data was obtained from the following sources:

- NPWS Wildlife Atlas (amphibians, reptiles, mammals, birds and plants); and
- BioNet (fish).

The number of species listed as threatened in the Namoi Region for each participating council for 2009 is shown in Table 41. The number of threatened species listed in the Namoi region increased in all LGAs in 2009 with the exception of Walgett Shire (change in the number of species based on 2008 and 2009 data only). These increases are due to the new listing of three bird species in the Region. Complete lists of all threatened species for each LGA are provided in Appendix A. Species newly listed in 2009 are marked with an asterisk.

Table 41: Threatened species recorded in each LGA.

	Local Government Area (LGA)														
	Gunnedah Shire			Liverpool Plains Shire			Tamworth Regional Council			Walgett Shire			Narrabri Shire		
Year	2006 /07	2008	2009	2005	2008	2009	2006 /07	2008	2009	2005	2008	2009	2005	2008	2009
Amphibians	N/A	0	0	N/A	0	0	2	2	2	N/A	0	0	1	2	2
Birds	N/A	18	19	10	13	15	25	19	21	24	25	25	30	30	31
Mammals	N/A	11	11	15	19	19	14	15	15	11	12	12	19	19	19
Reptiles	N/A	3	3	N/A	1	1	3	2	2	2	2	2	3	3	3
Fish	N/A	1	1	N/A	1	1	3	1	1	N/A	1	1	3	1	1
Total animals	***N/A***	***33***	***34***	***25****	***34***	***36***	***44****	***39***	***41***	***37***	***40***	***40***	***56***	***55***	***56***
Plants	N/A	3	3	8	3	3	20	25	25	5	6	6	22	15	15
TOTAL TS	***N/A***	**36**	**37**	**33**	**37**	**39**	**64**	**64**	**66**	**42**	**46**	**46**	**78**	**70**	**71**

*2005 SoE did not include reptiles, amphibians and fish.
**2006/07 SoE included frogs but not amphibians as a class.

Box 8: How do species become listed as threatened?

The *NSW Threatened Species Conservation Act, 1995* provides for the identification, conservation and recovery of all threatened species and their populations and ecological communities in NSW (with the exception of fish and marine plants). The Act is administered by NSW DECCW.

There are three schedules under the TSC Act:

- Schedule 1 lists threatened species, populations and ecological communities and species that are endangered or presumed extinct;
- Schedule 2 lists vulnerable species; and
- Schedule 3 lists key threatening processes.

The Act defines 'presumed extinct' as a species that has not been located in nature during the preceding 50 years despite the searching of known and likely habitats. A species, population or ecological community is defined as 'endangered' if it is considered they are likely to become extinct or are in immediate danger of extinction. Species are classified as 'vulnerable' if they are likely to become endangered unless the circumstances and factors threatening their survival or evolutionary development cease to operate.

The NSW Scientific Committee is an independent committee of 10 scientists who are responsible for the listing of threatened species, populations and ecological communities under the TSC Act. Anyone can make a nomination to the Scientific Committee to list or de-list a species, population or ecological community. The Scientific Committee considers all nominations for listing and makes a preliminary determination that is published for public comment. Once submissions are reviewed the Scientific Committee then makes a final determination to list, de-list or vary the status of a species, population or ecological community. The NSW Scientific Committee does not make decisions about threatened fish and marine plants; this is the responsibility of the NSW Fisheries Scientific Committee.

Box 9: The vulnerability of birds to threatening processes

When it comes to members of the animal kingdom, bird species are particularly vulnerable to threatening processes. In much of the world, many of the familiar bird species that we value are in decline. In 2008 one in eight of all bird species globally were considered to be threatened with extinction (BirdLife International, 2008).

So why are birds particularly susceptible to pressures? There are a number of threatening processes driving declines in bird populations. Expanding and intensifying agriculture and forestry cause habitat destruction, degradation and fragmentation. The spread of invasive species, pollution and over-exploitation of wild birds are also major threats. Human-induced climate change represents an emerging and increasingly serious threat to species; one that often exacerbates existing threats. Exotic diseases such as *Psittacine circoviral*, a disease that affects the parrot family, are also causing declines. These threats can cause direct mortality or reduced reproductive success ultimately causing a drop in numbers.

Some bird families are more susceptible to decline than others. There are particularly high proportions of threatened species among albatrosses, cranes, parrots, pheasants and pigeons. Overall, larger-bodied species and those with low reproductive rates (owing to small clutch sizes) are more likely to be threatened.

The increase in the number of threatened species in the Namoi region in 2009 is due to the new listing of three bird species in the region:

- The Little Lorikeet (*Glossopsitta pusilla*) has been listed as vulnerable in all LGAs except Walgett Shire. It is an endemic Australian parrot species measuring 16–19 cm in length, making it the smallest of the Australian Lorikeets. Its body is bright green in colour and the head is green with red forehead and throat patches. Major threats to Little Lorikeets are loss of breeding sites and food resources from ongoing land clearing.

Figure 48: Little lorikeet

- The Osprey (*Pandion haliaetus*) has been listed as vulnerable in Tamworth Regional LGA. It is a large, water-dependent bird of prey, distinctive in flight due to its bowed wings that are dark brown above, barred underneath, and with white underwing coverts. Major pressures on the Osprey are the decline of nest sites owing to removal of large trees near the coast, disturbancesto water quality that increase turbidity in feeding areas, and ingestion of fish containing discarded fishing tackle.

Figure 49: Osprey (Image: Matthew Jones)

- The Bush Stone-curlew (*Burhinus grallarius*) has been newly listed as endangered in Liverpool Plains LGA. The Bush Stone-curlew stands about 55 cm tall. It has a grey to light brown back, marked with black blotches, and a streaked rump. The main threats to the Bush Stone-curlew are thought to be predation by foxes and cats, trampling of eggs by cattle, loss of habitat from clearing for agriculture and development, introduction of exotic pasture grasses, grazing and frequent fires.

Figure 50: Bush Stone-curlew (Image: Matthew Jones)

(Sources: BirdLife International, 2008a & 2008b; DECCW, 2009b; DECCW, 2009c).

Ecological communities listed as endangered or vulnerable (Endangered Ecological Communities (EEC)) are recorded in the NSW NPWS Wildlife Atlas according to CMA area. In the Namoi CMA region a total of twelve EECs were listed in 2009, as shown in Table 42. The Ribbon Gum, Mountain Gum, Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion EEC has been listed since 2008.

Table 42: EEC in the Namoi CMA region.

Scientific Name	Common Name	Known or predicted to occur
Artesian Springs Ecological Community	Artesian Springs Ecological Community	Predicted
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Brigalow Community	Known
Cadellia pentastylis (Ooline) community in the Nandewar and Brigalow Belt South Bioregion	Ooline Community	Known
Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Known
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South Bioregions	Predicted
Fuzzy Box on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	Fuzzy Box on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	Predicted
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Inland Grey Box Woodland	Known
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes Bioregions	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes Bioregions	Known
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Known
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	Semi-evergreen Vine Thicket	Known
White Box Yellow Box Blakely's Red Gum Woodland	Box-Gum Woodland	Predicted
**Ribbon Gum, Mountain Gum, Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Ribbon Gum, Mountain Gum, Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Known

** listed since 2008.

10.2 LGA context

The issue of increasing numbers of threatened species is relevant to all constituent councils in the region however, the extent of the problem is greater in some regions than others. For example, Walgett Shire which makes up 40% of the Region has a total of 46 threatened species, while Narrabri which comprises 23% of the Region has 71 listed species.

10.3 Pressures

The specific pressures or impacts on a particular species or ecological community varies. The DECCW has identified a total of 31 **Key Threatening Processes** (KTPs) under the TSC Act. Some of these KTPs are not relevant to the Namoi Region such as anthropogenic debris on marine and estuarine environments. Others can be grouped according to the following:

- Habitat loss/change (9): includes large-scale land clearing and loss of native vegetation, alteration of river flows, climate change and altered fire regimes.
- Introduced species: includes pest animals (13) and weeds (4). Introduced animal species can compete with, and prey upon, native animals, as well as degrade natural habitats. Weeds compete with native plants for resources such as light and nutrients. They can aggressively invade areas, displacing native plants and animals.
- Diseases (3): exotic fungal infections, viruses and other pathogens can weaken and kill native species.

10.4 Stakeholder roles and responsibilities

The key stakeholders and their specific role and responsibility in the management of threatened species in the Region are presented in Table 43.

Table 43: Stakeholder roles and responsibilities in relation to the management of threatened species.

Stakeholder	Role	Responsibility
DECCW	Policy, strategy, coordination & compliance with legislation Implementation of KTP management programs MER – threatened species & fauna	TSC Act PAS NSW MER Strategy
I&I (Fisheries)	Policy, strategy & compliance with legislation	FM Act
Local government	Plans of management for land that comprises a recovery plan or threat abatement plan[9]. Assessment of development applications	LG Act (section 36B) LG Act/ EP&A Act/ TSC Act
CMA	Develop & implement strategies & actions	Threatened species CAP target

[9] "Recovery plan" under Part 4 of the TSC Act or Division 5 of Part 7A of the FM Act. "Threat abatement plan" under Part 5 of the TSC Act or Division 5 of Part 7A of the FM Act.

10.5 Council influence & performance indicators for direct & indirect actions

The following table identifies the areas and actions relating to the management of threatened species where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 44: Direct and indirect influences councils may have over threatened species issues.

	Type of council influence	Performance indicator
Direct	Development assessment process that effectively addresses threatened species requirements.	Process developed; relevant staff trained.
	Plans of management for community land under their care, control & management that comprises a recovery plan or threat abatement plan.	Identification & development of appropriate plans of management (number &/or percentage of required plans developed). Implementation of actions identified in plans of management (number &/or percentage of actions).
	Inclusion of PAS priority actions, recovery strategies & threat abatement strategies (see below) in council projects & programs.	Number & type of PAS priority actions, recovery strategies & threat abatement strategies addressed.
Indirect	Liaison with DECC regarding threatened species MER, management advice., etc.	Number & type of issues liaised on.
	Community education: ensuring developers & the community are aware of, and comply with, threatened species legislative & planning requirements.	Number of education programs; number of stakeholders targeted; incidence of non-compliance with legislation &/or planning controls.
	Liaison/ partnerships with Namoi CMA regarding on-ground management actions threatened species.	Number of actions/ partnerships.

DECCW has prepared a Priorities Action Statement (PAS) to promote the recovery of threatened species and the abatement of KTPs in NSW. The PAS identifies a number of broad strategies to help the recovery of threatened plants and animals. Each of these strategies have more specific priority actions within them. They cover:

- surveys to clarify the distribution of a species;
- weed and pest management programs;
- guidelines for threatened species issues in development assessments;
- research into factors influencing the survival of threatened species; and
- community education programs to raise awareness of a species or threat in a particular area.

The number of priority actions, recovery and threat abatement strategies for each LGA in the Namoi Region are presented inTable 45. There was an increase in the number of medium priority actions for threatened species, populations and communities for all LGAs in the Namoi region in 2009. However, the number of high priority actions decreased for all LGAs except TRC. Table 45: Threatened species priority actions and recovery and treat abatement strategies for each LGA.

	Local Government Area (LGA)									
	Gunnedah Shire		Liverpool Plains Shire		Tamworth Regional Council		Walgett Shire		Narrabri Shire	
	2008	2009	2008	2009	2008	2009	2008	2009	2008	2009
Priority actions	287	287	279	279	415	418	317	317	445	445
High	*111*	*109*	*103*	*101*	*181*	*181*	*123*	*121*	*180*	*178*
Medium	*150*	*152*	*148*	*150*	*178*	*181*	*164*	*166*	*220*	*222*
Low	*26*	*26*	*28*	*28*	*56*	*56*	*30*	*30*	*45*	*45*
Recovery strategies	21	21	21	21	22	22	21	21	22	22
Threat abatement strategies	4	4	4	4	4	4	6	6	6	6

(Source: DECCW, 2009d)

10.6 Response to the issue

Of the five councils in the Region, Tamworth Regional and Liverpool Plains have a current biodiversity plan or strategy in place. None of the councils implemented any programs or actions to protect, manage or conserve native fauna in 2009.

10.7 Linkages to targets

The targets and priorities relating to threatened species identified for the Region are presented in Table 46.

Table 46: Plan targets and priorities relevant to threatened species.

Plan	Target or priority
NSW State Plan 2006	Priority E4: Better outcomes for native vegetation, biodiversity, land rivers and coastal waterways.
	▪ By 2015 there is an increase in the recovery of threatened species, populations and ecological communities.
	▪ By 2015 there is an increase in the number of sustainable populations of a range of native fauna species.
Namoi CAP	CTB: From 2006, there will be an improvement in the extent and condition of native plants and animals, and the environment in which they live, within each Interim Bio-Regional Assessment (IBRA) sub-region of the Namoi.
	MTB2: From 2006, support the recovery of priority fauna populations and Threatened Species, Populations and Communities

11 Issue 8: Waste Generation

Summary information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Solid waste disposal[1, 4]	Council	S	Medium	☹
Waste recycling[1,4]	Council	R	Medium,	☹
			Overall trend: Waste generation	☹

11.1 Description of the issue

Achieving a reduction in waste generation and turning waste into recoverable resources is a priority for NSW. The key legislation for waste management in NSW is the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) administered by DECCW. In 2003 the NSW Government introduced the NSW Waste Avoidance and Resource Recovery Strategy 2003 to meet the challenge of reducing waste and making better use of resources. This has since been superseded by the NSW Waste Avoidance and Resource Recovery Strategy 2007 (DECC, 2007).

The amount of domestic waste generated by households has increased as a result of increased consumption, increased packaging, a reduced lifetime of goods and population growth and economic growth. However, the percentage of waste going to landfill has declined as a result of recycling.

11.2 LGA context

Table 47 and Figure 51 show the amount of waste generated in the Tamworth Regional, Gunnedah, Walgett, Narrabri and Liverpool Plains LGAs according to the category of waste. For theses councils the total waste generated was 122,639.66 tonnes. Walgett LGA generated the most waste in 2008/2009 with the average of 2.52 tonnes of waste generated for capital.

While the total waste generated in Gunnedah LGA has been decreased from previous year by 16%, total waste generated in the Tamworth Regional LGA increased by 15%.

Table 47: Waste generation by category.

LGA	Waste category			TOTAL (tonnes)
	A. Municipal solid waste (MSW) (tonnes)	B. Commercial and industrial waste (CNI) (tonnes)	C. Construction and demolition waste (C&D) (tonnes)	
Gunnedah	5,641.08	#	2,071.7	7,712.78
Liverpool Plains	13,988	0	10	13,998
Tamworth Regional	36,568	30,821	7,777	75,166
Walgett	17,872.04	1,683.26	2,207.36	21,762.66
Narrabri	4,000			4,000

included in A.

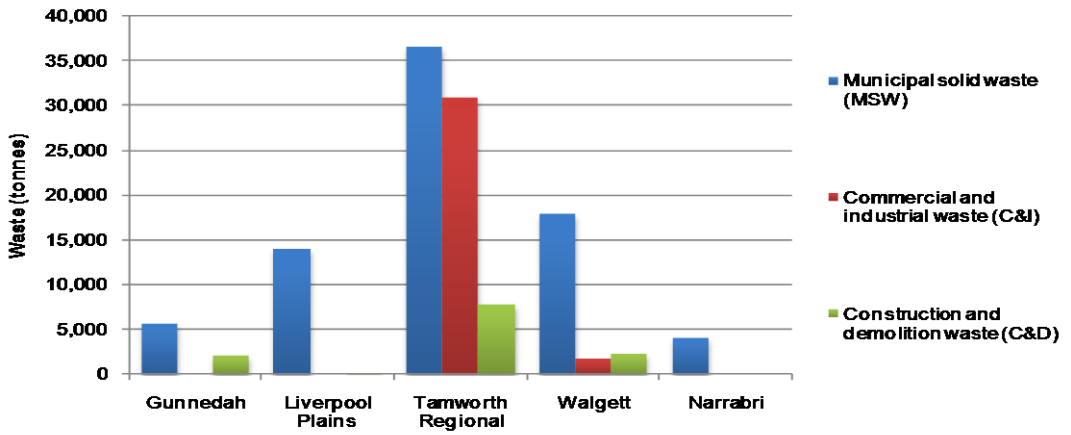


Figure 51: Waste generated by category.

11.3 Stakeholder roles & responsibilities

The key stakeholders and their specific role and responsibility in the management of waste in the Region are presented in Table 48.

Table 48: Stakeholder roles and responsibilities in relation to the management waste.

Stakeholder	Role	Responsibility
DECCW	Regulatory & policy framework	POEO Act WARR Act
Northern Inland Regional Waste (NIRW)	Facilitates collaboration between councils on waste issues, co-ordinates regional and sub-regional waste management programs.	Voluntary collaboration auspiced by DECCW
Council	Collection, disposal, recycling, facilities management Education	POEO Act WARR Act
Community (including industry and businesses)	Reducing, reusing and recycling	
Environment Protection and Heritage Council (Federal)	Used Packaging Materials	

11.4 Council influence & performance indicators for direct & indirect actions

The following table identifies the areas and actions relating to the management of waste management where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 49: Direct and indirect influences councils may have over waste management issues.

	Type of council influence	Performance indicator
Direct	Increase the range of materials able to be recycled (e.g. new processes or sharing facilities with other councils)	New materials able to be recycled; decrease in landfill
	Increased number of recycling collection facilities	Increase in the number of recycling facilities
	Actively participate in NIRW as a means to deliver regionally effective and sustainable waste management programs	Number of meetings with NIRW representatives
Indirect	Education: reduce, reuse, recycle	Number of education program implemented; number of household/ businesses/ etc targeted; estimates of waste reduction (volume/ weight)
	Lobbying/ support for: Container deposit system for beverage containers for NSW & nationally The revision of the National Packaging Covenant to establish targets for recovery of packaging / containers, to increase them substantially from their current rates Extended Producer Responsibility (EPR)	Number of actions undertaken (e.g. written submissions)

11.5 Response to the issue

Of the constituent councils in the Region all except Walgett are members of Northern Inland Regional Waste (NIRW), and through this involvement participate in a range of programs. Walgett is a member of NetWaste. Most of the councils, except Narrabri, have a waste management strategy or plan in place[10].

Table 50 indicates the number of recycling facilities in each LGA. The recycling centre at the Gunnedah Waste Management Facility takes recycling from all seven rural facilities. The amount of waste recycled by material class is shown in Figure 52. Some LGAs do not have the facilities to recycle some types of waste. Data was not received for Narrabri and Walgett. Figure 52 shows that recycling collection in Tamworth Region has declined by 18% from a previous year. This is due to the figure for 2007/08 including all materials collected from kerbside and commercial collections, as well as the materials dropped off at the Material Recovery Facility, while in 2008/09 represents the materials collected from kerbside. Data was not available for Liverpool Plains, Walgett and Narrabri in 2008.

Table 50: Number of recycling facilities in each LGA.

	Gunnedah	LPSC	Tamworth Regional	Walgett	Narrabri
Number of waste facilities with recycling services	1 + (7)	9	13	2	5

[10] Tamworth Regional Council have a draft plan completed and awaiting approval.

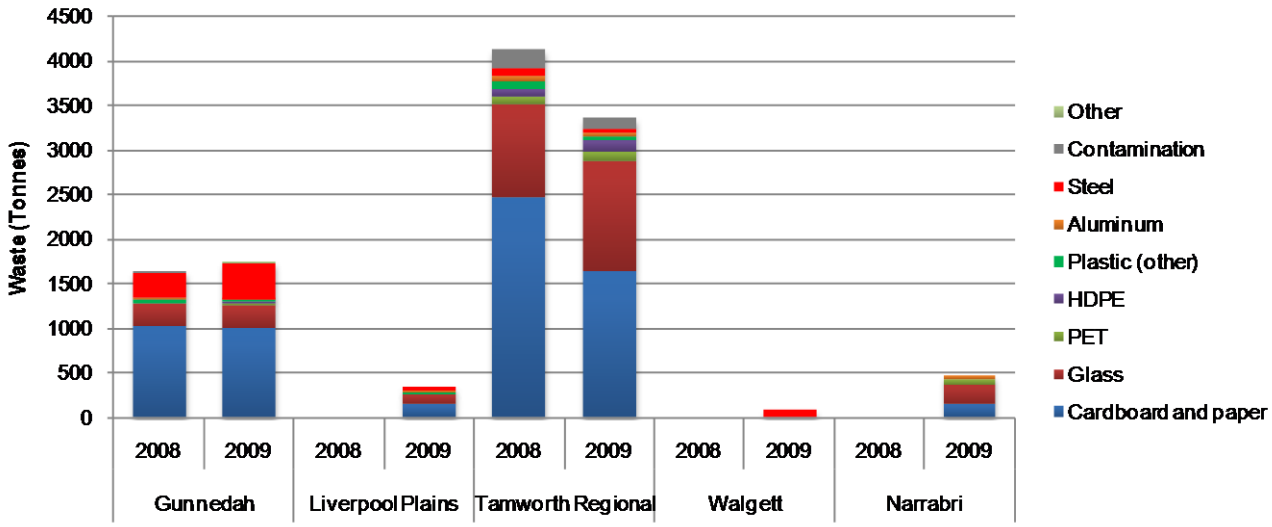


Figure 52: Weight of recycling collected from kerbside and drop-off (tonnes).

The range of waste programs implemented by each council is shown in Table 51. In comparison to 2007/08 when the focus of many council programs was community education, most of the programs implemented in 2008/09 by councils involved collection and recycling programs. In addition to these programs the Namoi CMA partnered with NIRW on a Sustainable On Farm Waste Management project during 2008/2009. The objectives of this campaign were:

- Diversion of waste from the rural environment;
- Encourage the remediation of eroded gullies and surrounding land;
- Provide the farming community with education on sustainable waste management practices; and
- Reduce the likelihood of rural lands and waterways becoming contaminated through correct management of waste.

Table 51: Waste projects implemented by councils in the Namoi Region in 2008.

LGA	Program Name	Focus and Outcomes
Northern Inland Regional Waste	Metal waste and wet cell battery collections	All LGAs except Walgett participate in these programs
	Greenwaste processing	
	DrumMUSTER	
	Used oil collections	
Tamworth Regional	Annual Household & Rural Chemical Collection Program	Entire region
	Printer toner cartridge recycling	Entire region
	Clean Up Australia Day	Entire region
	Mobile Muster	Entire region
	Coledale Community Cleanup Day	4,000 households
	Don't Waste Tamworth Anti Litter and Recycling Program	100,000 people
	National Recycling Week	Entire region
Narrabri	Kerbside recycling	3,677 households

Gunnedah	Chemical collection	all shire – 3,725 households
	Sharps disposal bin installation	Gunnedah
	Computer and TV recycling	all shire -3,725 households
	Mobile phone collection	all shire -3,725 households
	Fluorescent light collection	all shire -3,725 households
	Primary School Waste Education	all shire -3,725 households
	Bower Bird Shop	all shire -3,725 households
	Kerbside recycling and greenwaste collection	Gunnedah and Curlewis
LPSC	Recycling objectives	2,700 households
Walgett	Drum muster facility	2 sites
	Oil recycling facility	2 sites
	Battery collection	2 sites
	Metal collection	2 sites

11.6 Linkages to targets

The targets and priorities relating to waste identified for the Region are presented in Table 52.

Table 52: Plan targets and priorities relevant to waste.

Plan	Target or priority
NSW Waste Avoidance and Resource Recovery Strategy 2007 (DECC, 2007)	NSW Government resource recovery (recycling) targets
	▪ Municipal: Target recovery rate (2014) 66% (current recovery rate 26%)
	▪ Commercial and industrial: Target recovery rate (2014) 63% (current recovery rate 28%)
	▪ Construction and demolition: Target recovery rate (2014) 76% (current recovery rate 65%)

12 Issue 9: Aboriginal and Non-Aboriginal Heritage

Summary Information

Condition Indicator	Data source/ custodian	P/ S/ R	Data confidence	Trend
Aboriginal				
Type and number of Aboriginal sites[1, 4]	DECCW	S	High	☺
Inclusion in planning controls and instruments[1]	Council	R	High	☺
Extent of liaison with Aboriginal communities[1]	Council	R	Low/ medium	?
Management plan/ strategy in place[1]	Council	R	High	😐
Number management actions/ responses	Council	R	Medium	☺
Non-Aboriginal				
Number of heritage sites registered with National Estate[1, 4]	DEWHA[11]	S	High	☺
Number of items in the State Heritage register of NSW[1, 4]	Heritage Council NSW	S	High	☺
Number of local heritage items in council's LEP[1, 4]	Council	S	High	☺
Number of actions to identify & protect non-Aboriginal heritage (including management plans)	Council	R		?
Overall trend: knowledge & management of non-Aboriginal heritage				☺

12.1 Aboriginal Heritage

12.1.1 Description of the issue

Aboriginal heritage includes not only sites of burials, rock art, carved trees and stone artefacts; it is a living, ongoing thing which includes attributes such as dreaming stories and cultural learning, and is deeply linked to the environment. Aboriginal heritage links Aboriginal people with who they are and where they belong - it is a central element to their spirituality and customary law. It also represents the physical and cultural history of our country for all Australians.

The following legislation applies to the management and protection of Aboriginal heritage in NSW:

[11] Following amendments to the *Australian Heritage Commission Act 1975,* the Register of the National Estate (RNE) was frozen on 19 February 2007. The Register will continue until February 2012 to allow for states, territories, local and the Australian Government to transfer places to appropriate heritage registers and to amend legislation that refers to the RNE as a statutory list.

- Commonwealth *Aboriginal and Torres Straight Islander Protection Act 1984*: aims to preserve and protect areas and objects that are of particular significance to Aboriginal people.
- NSW *National Parks and Wildlife Act 1974* (NPW Act): specifies that a licence is required for works which could impact on Aboriginal heritage objects or places.

The effective protection of Aboriginal heritage requires both knowledge of Aboriginal artefacts and sites and the development and implementation of strategies and processes to manage them. As there is overlap in these issues they have been considered collectively in the following section.

Management of Aboriginal heritage refers to the identification, protection and conservation of relevant sites and artefacts. A number of options are available to councils to promote effective management, including: preparation of a management plan or strategy, conducting surveys, addressing heritage issues in planning instruments such as LEPs and DCPs, community education and maintaining an up-to-date database.

The accumulation of knowledge of Aboriginal artefacts and sites requires processes to ensure the assessment and consideration of Aboriginal heritage when assessing a development and a system to store and readily retrieve information that is collected. This is primarily facilitated by legislation (NPW Act) and planning instruments. Under the standard Local Environmental Plan (LEPs) template all councils are required to map heritage items and sites. Furthermore, DECCW maintains an information system (AHIMS - Aboriginal Heritage Information Management System) to manage cultural heritage information and assist stakeholders (private landholders, community groups, local councils and government agencies) to locate, identify, conserve and interpret Aboriginal heritage values, sites and objects.

12.1.2 LGA context

Table 53 gives a breakdown of the current number of known Aboriginal site features within each LGA in the Region from the AHIMS database managed by DECCW. It is essential to note that information from AHIMS does not necessarily represent a comprehensive list of all Aboriginal objects or Aboriginal places in each LGA. AHIMS reports list recorded sites only. In each LGA there may be a number of undiscovered and/or unrecorded Aboriginal objects.

Of the recorded Aboriginal sites in the Namoi Region, Walgett Shire contains the greatest number of known Aboriginal site features and Liverpool Plains Shire contains the least.

Table 53: Number of Aboriginal Site Features in each LGA in the Namoi Region (DECCW, 2009e)

Aboriginal Site Feature	Gunnedah Shire	Liverpool Plains Shire	Tamworth Regional	Walgett Shire	Narrabri Shire
Aboriginal Resource and Gathering	4	0	2	16	12
Aboriginal Ceremony and Dreaming	1	1	2	10	8
Art (Pigment or Engraved)	0	2	31	2	9
Artefact	121	47	334	176	349
Burial	3	3	5	21	9
Ceremonial Ring (Stone or Earth)	0	1	7	8	1
Conflict	0	1	0	0	0
Earth Mound	0	0	0	3	0
Fish Trap	0	0	0	0	0

Aboriginal Site Feature	Gunnedah Shire	Liverpool Plains Shire	Tamworth Regional	Walgett Shire	Narrabri Shire
Grinding Groove	49	21	9	8	42
Habitation Structure	1	0	1	0	17
Hearth	0	1	0	6	5
Non-Human Bone and Organic Material	0	0	0	0	0
Ochre Quarry	1	1	0	0	4
Potential Archaeological Deposit (PAD)	1	0	0	3	1
Shell	0	0	0	8	2
Stone Arrangement	7	2	4	1	0
Stone Quarry	2	1	10	19	1
Modified Tree (Carved or Scarred)	98	39	43	430	183
Water Hole	1	0	0	3	5
Total Number of Features	**289**	**120**	**448**	**714**	**648**

12.1.3 Stakeholder roles and responsibilities

The following table identifies the stakeholders who have a role in the management of Aboriginal heritage in the Region.

Table 54: Stakeholder roles and responsibilities with respect to Aboriginal heritage.

Stakeholder	Role	Responsibility
DECCW	Legislative MER & information management	Manage NPW Act Maintains site register
Local government	Survey and document	LEP, DCP, EP&A Act
Developers & community	Identify & consider Aboriginal heritage likely to be impacted by development	EP&A Act
CMA	Consider Aboriginal heritage in property vegetation plans (PVP) Engagement with local Aboriginal communities in CAP process	

12.1.4 Council influence over the issue & performance indicators

The following table identifies the areas and actions relating to the management of Aboriginal heritage where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 55: Direct and indirect influences councils may have over Aboriginal heritage issues.

	Type of council influence	Performance indicator
Direct	Planning and development controls: LEP and development assessment.	LEP finalised; DA procedure addresses Aboriginal heritage.
	Aboriginal heritage plan or strategy: including goals, targets and management actions.	Aboriginal heritage plan or strategy developed.
	On-ground management actions: survey, protection of sites, etc.	Number of management actions implemented.
	Liaison with, and support of, Aboriginal groups	Extent of liaison with Aboriginal community (% of representative groups, number of interactions).
	Ensuring AHIMS database is updated with local information	Procedure in place or responsibility allocated to ensure database is updated.
Indirect	Liaison with DECCW regarding needs for survey, protection of sites, support tools, etc.	Number of issues liaised on.
	Community education: ensuring developers and the community are aware of, and comply with, legislative and planning requirements.	Number of education programs; number of stakeholders targeted; incidence of non-compliance with legislation and/or planning controls.
	Liaison with Namoi CMA regarding needs for survey, protection of sites, support tools, etc	Number of issues liaised on.

12.1.5 Response to the issue

A management plan covering Aboriginal heritage issues is currently being prepared by Gunnedah. Other LGAs in the Region identified that they did not have a plan in place.

12.1.6 Linkages to targets

The management of Aboriginal heritage is not specifically addressed as either a NSW State Plan target or Namoi CAP target.

12.2 Non-Aboriginal Heritage

12.2.1 Description of the issue

Non-aboriginal heritage consists of those places and objects that we as a community have inherited from the past and want to hand on to future generations. Such places or items gives us a sense of living history and provide a physical link to the work and way of life of earlier generations, helping us to understand who we are today. Non-aboriginal heritage is NSW is diverse and includes buildings, objects, monuments, gardens, bridges, landscapes, shipwrecks, relics, bridges, streets, industrial structures and conservation precincts.

There are three levels of statutory listing for non-aboriginal heritage items in NSW. A place or item is formally recognised as being of heritage significance if it is listed:

- in the heritage schedule of a local council's local environmental plan (LEP) or a regional environmental plan (REP). These are heritage places or objects that are important for the community in a LGA and managed by the local council;
- on the State Heritage Register, a register of places and items of particular importance to the people of NSW and the state's history; and
- on the National Heritage List established by the Australian Government to list places of outstanding heritage significance to Australia.

The following legislation applies to the management and protection of Non-aboriginal heritage in NSW:

- NSW *Heritage Act 1977* (amended 1998): administered by the Heritage Council, the Act advises the Minister for Planning in relation to the placing of Heritage Orders on sites of heritage significance. If a place is subject to a heritage order, it is illegal to demolish or damage it without making an application to the Heritage Council.
- NSW *Environmental Planning and Assessment Act 1979*.

Places/items on the National Heritage List are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EBPC Act establishes a formal mechanism for the preparation of priority assessment lists (formal work plans) for the Council's assessments of places for the National Heritage List and Commonwealth Heritage List.

As with Aboriginal heritage, the effective protection of non-Aboriginal heritage requires both knowledge of structures and sites, and development and implementation of strategies to manage these. As there is overlap in these issues they have been considered collectively in the following section.

The legislative frameworks outlined above ensure the accumulation of knowledge of non-Aboriginal items and sites, and provide the registers for stakeholders to store and retrieve this information when undertaking activities that may impact on such heritage sites.

Management and conservation of non-Aboriginal heritage items and sites generally relies on initiatives by the owner, or advisory and financial support from external bodies such as the NSW Heritage Branch. Local council initiatives for management of non-Aboriginal heritage within their LGA may include: the development of management plans or strategies, local heritage assistance funds and undertaking heritage studies.

12.2.2 LGA context

The number of non-aboriginal heritage sites/items listed on statutory local government, state and national heritage schedules in each LGA in the Namoi Region in 2008/09 are presented in Table 56. These listings have not changed from 2007/08.

Table 56: Number of Non-aboriginal heritage listings for each LGA in the Namoi Region 2008/09.

Listing	Gunnedah	Liverpool Plains	Tamworth Regional	Walgett	Narrabri
National Estate#	10	11	55	13	11
NSW Heritage Act*	1	3	9	0	1
LEP*	27	7	271	0	23

Source: DEWHA, 2009
* Source: Heritage Branch, 2009

12.2.3 Stakeholder roles and responsibilities

The following table identifies the stakeholders who have a role in the management of non-Aboriginal heritage in the Region.

Table 57: Stakeholder roles and responsibilities with respect to non-Aboriginal heritage.

Stakeholder	Role	Responsibility
Heritage Council NSW	Establishes Heritage Orders	Heritage Act 1977
Local Government	Identify & list items of local heritage significance in LEP	EP&A Act
Developers & community	Compliance with legislation	Heritage Act 1977 EP&A Act/ LEP

12.2.4 Council influence over the issue & performance indicators

Most powers of control are vested in local councils, which consider various criteria when they determine building and development applications. Councils adopt Local Environmental Plans (LEPs) and Development Control Plans (DCPs), which usually contain a schedule of properties of identified heritage significance. The following table identifies the areas and actions relating to the management of non- Aboriginal heritage where councils can have either a direct influence through their operational activities or indirect influence through advocacy and lobbying.

Table 58: Direct and indirect influences councils may have over non-Aboriginal heritage issues.

	Type of council influence	Performance indicator
Direct	Planning and development controls: LEP and development assessment.	LEP finalised; DA procedure addresses non-Aboriginal heritage.
	Non-Aboriginal heritage plan or strategy: including goals, targets and management actions.	Non-Aboriginal heritage plan or strategy developed.
	On-ground management actions: survey, protection of sites, etc.	Number of management actions implemented.
	Liaison with, and support of, heritage groups	Extent of liaison with heritage groups (% of representative groups, number of interactions).
	Ensuring heritage database is updated with local information	Procedure in place or responsibility allocated to ensure database is updated.

	Type of council influence	Performance indicator
Indirect	Liaison with DECC regarding needs for survey, protection of sites, support tools, etc.	Number of issues liaised on.
	Community education: ensuring developers and the community are aware of, and comply with, legislative and planning requirements.	Number of education programs; number of stakeholders targeted; incidence of non-compliance with legislation and/or planning controls.
	Liaison with Namoi CMA regarding needs for survey, protection of sites, support tools, etc	Number of issues liaised on.

12.2.5 Response to the issue

Local councils play an important role in heritage management by identifying, assessing and managing heritage places and objects in their local area. Table 59 below indicates LGAs which have a plan or strategy in place for the management of non-Aboriginal heritage items and sites. The number of sites listed in relevant LEPs are also shown. Tamworth Regional is currently in the process of preparing a new LEP based on the standard template which identifies: 174 items in Barraba, Manilla and Nundle community-based heritage study (2008); 226 items identified in Parry community-based heritage study (2002) and 20 European archaeological sites and structures of environmental heritage in Schedule 2 of the Tamworth City Council LEP.

Table 59: Non- Aboriginal heritage management activities in each LGA.

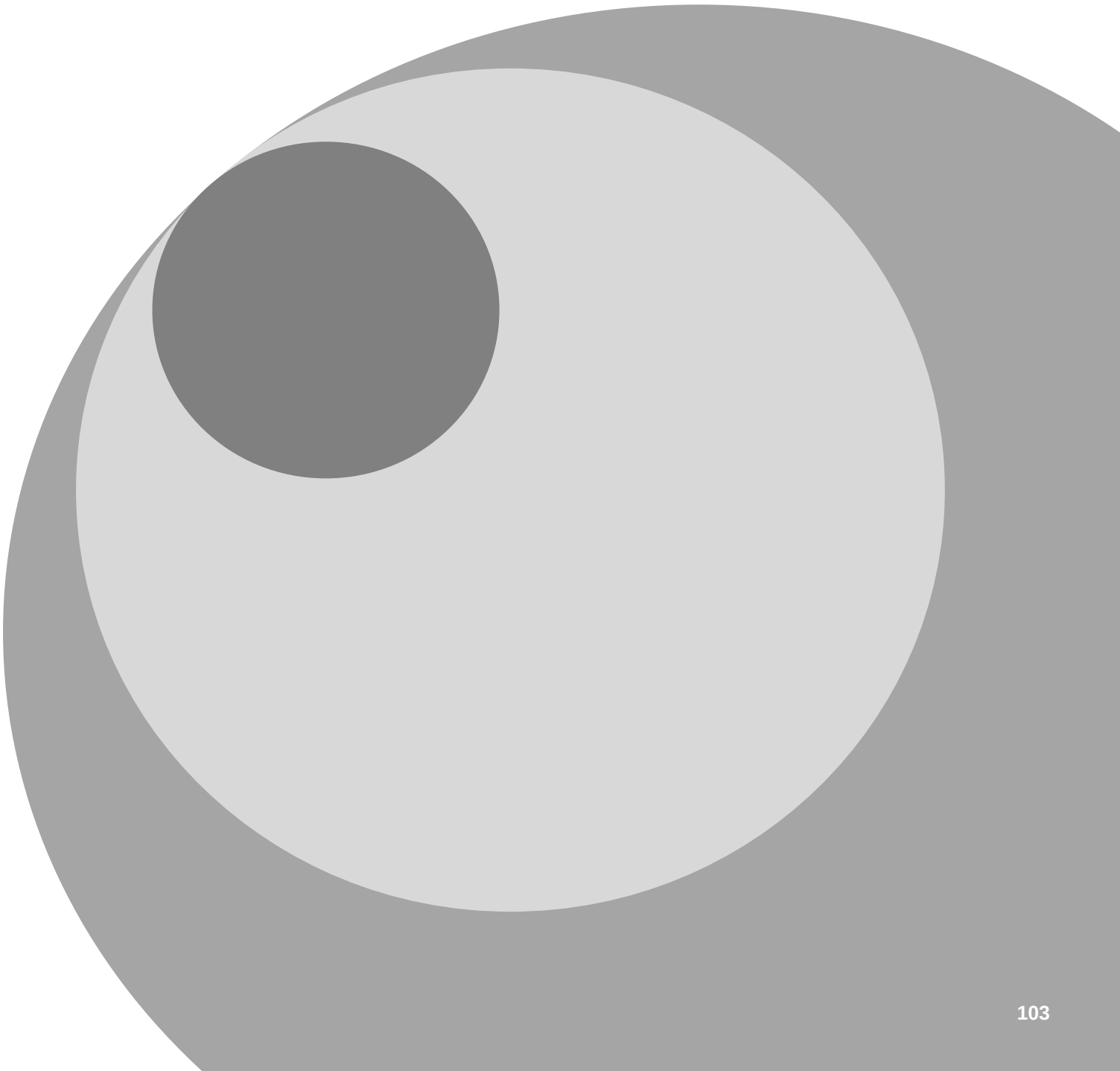
	Number of sites in each LGA				
	Gunnedah Shire	Liverpool Plains Shire	Tamworth Regional Council	Walgett Shire	Narrabri Shire
Management plan/ strategy	No*	Yes	Yes	Yes	No
Number of non-Aboriginal local heritage items in LEP	25	14	271	N/A#	29

* currently being prepared.
# till operating under an Interim Development Order gazetted in 1968.

12.2.6 Linkages to targets

The management of non-Aboriginal heritage is not specifically addressed as either a NSW State Plan target or Namoi CAP target.

PART 3 – CONCLUSIONS, REFERENCES & APPENDICIES



1 Conclusions

Table 60 provides a summary of the overall condition trends for the priority environmental issues identified for the Namoi Region. As evident the trend appears to be worsening for most of the issues. This assessment is primarily based on the trend associated with the condition indicators, so although the overall trend for a particular environmental issue may be a decline in condition, there may be an improvement in some of the indicators.

One of the problems associated with reporting on changes in environmental state or condition is that it is usually detectable over longer timeframes (10 - 50 years). As a result it is not possible to determine if a trend is due human influences or if it is a result of natural variations (e.g. declining water quantity as a result of climatic conditions). This is particularly true in this instance as regional SoE reporting has only been in place for the past 2 years. Longer term trends based on previous SoE reporting for individual councils could not be assessed as often different indicators were used. Monitoring the performance of environmental management programs is often detectable over a much shorter timeframe.

Table 60: Summary of trends for the environmental issues.

Environmental issue	Trend	Comment
Declining water quantity	Worsening	Although dam capacities have increased as a result of improved climatic conditions, the pressures on groundwater and surface water usage have increased.
Increasing number, distribution and density of invasive species	Worsening	The numbers of new and emerging evasive plants and emerging invasive animals has increased. The extent of infestations is unknown.
Decreasing extent and condition of native vegetation	Worsening	The area of native vegetation being lost is greater than the area being protected and replanted. The trend in condition is unknown.
Declining surface water quality	Worsening	High levels of exceedences of accepted values for most water quality parameters.
Land degradation	Worsening	Increasing trends in most of the pressures contributing to land degradation. Information on trends in agricultural land management practices which has a significant impact is not available.
Climate change (human induced)	Worsening	The data indicates a slight increase in the amount of GHG emissions.
Increasing number of threatened species	Worsening	This assessment is primary based on the increased number of threatened species and EECs.
Waste generation	Worsening	Waste generated increased while recycling decreased.
Heritage	Improving	Increasing heritage items are being discovered or listed, and managed through inclusion in plans and planning instruments

The monitoring of the indicators which are linked to council activities (e.g. water consumption, implementation of actions) is only effective when agreed and consistent collection of data by participating councils is established, as this enables information to be aggregated and compared. Due to the timeframe for preparing the initial Namoi Regional SoE in 2008 councils did not have the opportunity to put in place systems to collect environmental data. As a result there were significant gaps in the information councils were able to provide and the presentation of information at a regional level was only possible for a limited number of indicators. Prior to the compilation of this report councils were consulted regarding the appropriate indicators and the format for collecting data, which resulted in far more data was available from the 2009 report. Where gaps in indicator data still exist, it is recommended that the relevant councils put processes in place to collect the data for 2010.

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Appendix A: Threatened Species

Gunnedah: Threatened species: Animals

Birds	Scientific Name	Common Name
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard
	Lophoictinia isura	Square-tailed Kite
Anatidae	*Stictonetta naevosa*	Freckled Duck
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo
Climacteridae	*Climacteris picumnus*	Brown Treecreeper
Estrildidae	*Stagonopleura guttata*	Diamond Firetail
Megapodiidae	*Leipoa ocellata*	Malleefowl
Meliphagidae	*Grantiella picta*	Painted Honeyeater
	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
	Xanthomyza phrygia	Regent Honeyeater
Petroicidae	*Melanodryas cucullata*	Hooded Robin
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Psittacidae	*Lathamus discolor*	Swift Parrot
	*Glossopsitta pusilla**	Little Lorikeet*
	Neophema pulchella	Turquoise Parrot
Strigidae	*Ninox connivens*	Barking Owl
Tytonidae	*Tyto novaehollandiae*	Masked Owl
Mammals	*Scientific Name*	Common Name
Burramyidae	*Cercartetus nanus*	Eastern Pygmy-possum
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat
Macropodidae	*Macropus dorsalis*	Black-striped Wallaby
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat
Muridae	*Pseudomys pilligaensis*	Pilliga Mouse
Petauridae	*Petaurus norfolcensis*	Squirrel Glider
Phascolarctidae	*Phascolarctos cinereus*	Koala
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat
	Chalinolobus picatus	Little Pied Bat
	Nyctophilus timoriensis	Eastern Long-eared Bat
Reptiles	*Scientific Name*	Common Name
Elapidae	*Hoplocephalus bitorquatus*	Pale-headed Snake
Gekkonidae	*Underwoodisaurus sphyrurus*	Border Thick-tailed Gecko
Pygopodidae	*Aprasia parapulchella*	Pink-tailed Legless Lizard
Fish	*Scientific Name*	Common Name
Terapontidae	*Bidyanus bidyanus*	Silver Perch

* new listing

Gunnedah: Threatened species: Plants

Plants	*Scientific Name*	Common Name
Poaceae	*Digitaria porrecta*	Finger Panic Grass
Proteaceae	*Hakea pulvinifera*	Lake Keepit Hakea
Surianaceae	*Cadellia pentastylis*	Ooline

Liverpool Plains: Threatened species: Animals

Birds	*Scientific Name*	Common Name
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler
Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk
Burhinidae	*Burhinus grallarius**	Bush Stone-curlew*
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo
Climacteridae	*Climacteris picumnus*	Brown Treecreeper
Estrildidae	*Stagonopleura guttata*	Diamond Firetail
Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)
	Xanthomyza phrygia	Regent Honeyeater
Petroicidae	*Melanodryas cucullata*	Hooded Robin
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Psittacidae	*Glossopsitta pusilla**	Little Lorikeet*
	Lathamus discolor	Swift Parrot
	Neophema pulchella	Turquoise Parrot
Strigidae	*Ninox strenua*	Powerful Owl
Tytonidae	*Tyto novaehollandiae*	Masked Owl
Mammals	*Scientific Name*	Common Name
Dasyuridae	*Dasyurus geoffroii*	Western Quoll
	Dasyurus maculatus	Spotted-tailed Quoll
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat
Macropodidae	*Lagorchestes leporides*	Eastern Hare-wallaby
	Onychogalea fraenata	Bridled Nailtail Wallaby
	Petrogale penicillata	Brush-tailed Rock-wallaby
Muridae	*Conilurus albipes*	White-footed Tree-rat
	Pseudomys australis	Plains Rat
	Pseudomys gouldii	Gould's Mouse
	Rattus villosissimus	Long-haired Rat
Perameliidae	*Perameles bougainville fasciata*	Western Barred Bandicoot (mainland)
Petauridae	*Petaurus australis*	Yellow-bellied Glider
	Petaurus norfolcensis	Squirrel Glider
Phascolarctidae	*Phascolarctos cinereus*	Koala
Potoroidae	*Bettongia penicillata penicillata*	Brush-tailed Bettong (South-East Mainland)
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat
	Chalinolobus picatus	Little Pied Bat
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
	Vespadelus troughtoni	Eastern Cave Bat
Reptiles	*Scientific Name*	Common Name
Gekkonidae	*Underwoodisaurus sphyrurus*	Border Thick-tailed Gecko
Fish	*Scientific Name*	Common Name
Terapontidae	*Bidyanus bidyanus*	Silver Perch

* new listing

Liverpool Plains: Threatened species: Plants

Plants	*Scientific Name*	Common Name
Fabaceae (Faboideae)	*Swainsona murrayana*	Slender Darling Pea
Poaceae	*Digitaria porrecta*	Finger Panic Grass
Santalaceae	*Thesium australe*	Austral Toadflax

Tamworth Regional: Threatened species: Animals

Amphibians	*Scientific Name*	Common Name
Hylidae	*Litoria booroolongensis*	Booroolong Frog
	Litoria daviesae	Davies' Tree Frog
Birds	*Scientific Name*	Common Name
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler
Accipitridae	*Lophoictinia isura*	Square-tailed Kite
	*Pandion haliaetus**	Osprey*
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork
Climacteridae	*Climacteris picumnus*	Brown Treecreeper
	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Estrildidae	*Stagonopleura guttata*	Diamond Firetail
Meliphagidae	*Grantiella picta*	Painted Honeyeater
	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
	Xanthomyza phrygia	Regent Honeyeater
Pachycephalidae	*Pachycephala olivacea*	Olive Whistler
Petroicidae	*Melanodryas cucullata*	Hooded Robin
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Psittacidae	*Glossopsitta pusilla**	Little Lorikeet*
	Lathamus discolor	Swift Parrot
	Neophema pulchella	Turquoise Parrot
Strigidae	*Ninox connivens*	Barking Owl
	Ninox strenua	Powerful Owl
Tytonidae	*Tyto novaehollandiae*	Masked Owl
	Tyto tenebricosa	Sooty Owl
Mammals	*Scientific Name*	Common Name
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat
Macropodidae	*Onychogalea fraenata*	Bridled Nailtail Wallaby
	Petrogale penicillata	Brush-tailed Rock-wallaby
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat
Muridae	*Pseudomys australis*	Plains Rat
Petauridae	*Petaurus australis*	Yellow-bellied Glider
	Petaurus norfolcensis	Squirrel Glider
Phascolarctidae	*Phascolarctos cinereus*	Koala
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat
	Falsistrellus tasmaniensis	Eastern False Pipistrelle
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
	Nyctophilus timoriensis	Eastern Long-eared Bat
	Scoteanax rueppellii	Greater Broad-nosed Bat
Reptiles	*Scientific Name*	Common Name
Chelidae	*Elseya belli*	Bell's Turtle
Gekkonidae	*Underwoodisaurus sphyrurus*	Border Thick-tailed Gecko
Fish	*Scientific Name*	Common Name
Terapontidae	*Bidyanus bidyanus*	Silver Perch

* new listing

Tamworth Regional: Threatened species: Plants

Plants	*Scientific Name*	Common Name
Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant
	Tylophora linearis	
Brassicaceae	*Stenopetalum velutinum*	Velvet Thread-petal
Fabaceae (Mimosoideae)	*Acacia pubifolia*	Velvet Wattle
Haloragaceae	*Haloragis exalata subsp. velutina*	Tall Velvet Sea-berry
Myrtaceae	*Eucalyptus mckieana*	McKie's Stringybark
	Eucalyptus nicholii	Narrow-leaved Black Peppermint
	Eucalyptus oresbia	Small-fruited Mountain Gum
	Eucalyptus rubida subsp. barbigerorum	Blackbutt Candlebark
	Homoranthus bornhardtiensis	Barraba Homoranthus
	Homoranthus prolixus	Granite Homoranthus
	Syzygium paniculatum	Magenta Lilly Pilly
Orchidaceae	*Chiloglottis platyptera*	Barrington Tops Ant Orchid
	Diuris pedunculata	Small Snake Orchid
Poaceae	*Dichanthium setosum*	Bluegrass
	Digitaria porrecta	Finger Panic Grass
Proteaceae	*Hakea pulvinifera*	Lake Keepit Hakea
Rutaceae	*Asterolasia sp. "Dungowan Creek"*	Dungowan Starbush
	Boronia ruppii	Rupp's Boronia
Santalaceae	*Thesium australe*	Austral Toadflax
Scrophulariaceae	*Euphrasia arguta*	
	Euphrasia ciliolata	Polblue Eyebright
	Euphrasia ruptura	
Winteraceae	*Tasmannia glaucifolia*	Fragrant Pepperbush
	Tasmannia purpurascens	Broad-leaved Pepperbush

* new listing

Walgett: Threatened species: Animals

Birds	*Scientific Name*	Common Name
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler
Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk
	Hamirostra melanosternon	Black-breasted Buzzard
Anatidae	*Oxyura australis*	Blue-billed Duck
	Stictonetta naevosa	Freckled Duck
Anseranatidae	*Anseranas semipalmata*	Magpie Goose
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Cacatuidae	*Cacatua leadbeateri*	Major Mitchell's Cockatoo
	Calyptorhynchus banksii	Red-tailed Black-Cockatoo
	Calyptorhynchus lathami	Glossy Black-Cockatoo
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork
Climacteridae	*Climacteris picumnus*	Brown Treecreeper
Estrildidae	*Stagonopleura guttata*	Diamond Firetail
Falconidae	*Falco hypoleucos*	Grey Falcon
Gruidae	*Grus rubicunda*	Brolga
Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)
Otididae	*Ardeotis australis*	Australian Bustard
Petroicidae	*Melanodryas cucullata*	Hooded Robin
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Psittacidae	*Neophema pulchella*	Turquoise Parrot
	Polytelis swainsonii	Superb Parrot
Rostratulidae	*Rostratula benghalensis australis*	Painted Snipe (Australian subspecies)
Scolopacidae	*Limosa limosa*	Black-tailed Godwit
Strigidae	*Ninox connivens*	Barking Owl
Mammals	*Scientific Name*	Common Name
Dasyuridae	*Antechinomys laniger*	Kultarr
	Dasyurus maculatus	Spotted-tailed Quoll
	Sminthopsis macroura	Stripe-faced Dunnart
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat
Muridae	*Pseudomys apodemoides*	Silky Mouse
	Rattus villosissimus	Long-haired Rat
Perameliidae	*Perameles bougainville fasciata*	Western Barred Bandicoot (mainland)
Phascolarctidae	*Phascolarctos cinereus*	Koala
Potoroidae	*Bettongia tropica*	Northern Bettong
Vespertilionidae	*Chalinolobus picatus*	Little Pied Bat
	Nyctophilus timoriensis	Eastern Long-eared Bat
	Vespadelus baverstocki	Inland Forest Bat
Reptiles	*Scientific Name*	Common Name
Elapidae	*Hoplocephalus bitorquatus*	Pale-headed Snake
Scincidae	*Anomalopus mackayi*	Five-clawed Worm-skink
Fish	*Scientific Name*	Common Name
Terapontidae	*Bidyanus bidyanus*	Silver Perch

* new listing

Wallgett: Threatened species: Plants

Plants	*Scientific Name*	Common Name
Brassicaceae	*Lepidium monoplocoides*	Winged Peppercress
Convolvulaceae	*Ipomoea diamantinensis*	Desert Cow-Vine
Cyperaceae	*Cyperus conicus*	
Euphorbiaceae	*Phyllanthus maderaspatanus*	Phyllanthus maderaspatensis
Fabaceae (Faboideae)	*Desmodium campylocaulon*	Creeping Tick-trefoil
	Swainsona murrayana	Slender Darling Pea

Narrabri: Threatened species: Animals

Amphibians	*Scientific Name*	Common Name
Hylidae	*Litoria booroolongensis*	Booroolong Frog
Myobatrachidae	*Crinia sloanei*	Sloane's Froglet
Birds	Scientific Name	Common Name
Acanthizidae	*Pyrrholaemus saggitatus*	Speckled Warbler
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard
	Lophoictinia isura	Square-tailed Kite
Anatidae	*Oxyura australis*	Blue-billed Duck
	Stictonetta naevosa	Freckled Duck
Anseranatidae	*Anseranas semipalmata*	Magpie Goose
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew
Cacatuidae	*Calyptorhynchus banksii*	Red-tailed Black-Cockatoo
	Calyptorhynchus lathami	Glossy Black-Cockatoo
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork
Climacteridae	*Climacteris picumnus*	Brown Treecreeper
	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Estrildidae	*Stagonopleura guttata*	Diamond Firetail
Gruidae	*Grus rubicunda*	Brolga
Megapodiidae	*Alectura lathami*	Australian Brush-turkey population in the Nandewar and Brigalow Belt South Bioregions
	Leipoa ocellata	Malleefowl
Meliphagidae	*Certhionyx variegatus*	Pied Honeyeater
	Grantiella picta	Painted Honeyeater
	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
	Xanthomyza phrygia	Regent Honeyeater
Otididae	*Ardeotis australis*	Australian Bustard
Petroicidae	*Melanodryas cucullata*	Hooded Robin
Pomatostomidae	*Pomatostomus temporalis temporalis*	Grey-crowned Babbler (eastern subspecies)
Psittacidae	*Glossopsitta pusilla**	Little Lorikeet*
	Neophema pulchella	Turquoise Parrot
	Polytelis swainsonii	Superb Parrot
Rostratulidae	*Rostratula benghalensis australis*	Painted Snipe (Australian subspecies)
Strigidae	*Ninox connivens*	Barking Owl
Tytonidae	*Tyto capensis*	Grass Owl
	Tyto novaehollandiae	Masked Owl
Mammals	*Scientific Name*	Common Name
Burramyidae	*Cercartetus nanus*	Eastern Pygmy-possum
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll
	Sminthopsis macroura	Stripe-faced Dunnart
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat
Macropodidae	*Lagorchestes leporides*	Eastern Hare-wallaby
	Macropus dorsalis	Black-striped Wallaby
	Petrogale penicillata	Brush-tailed Rock-wallaby
Muridae	*Leporillus conditor*	Greater Stick-nest Rat
	Pseudomys pilligaensis	Pilliga Mouse

Petauridae	*Petaurus norfolcensis*	Squirrel Glider
Phascolarctidae	*Phascolarctos cinereus*	Koala
Potoroidae	*Aepyprymnus rufescens*	Rufous Bettong
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat
	Chalinolobus picatus	Little Pied Bat
	Miniopterus australis	Little Bentwing-bat
	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat
	Nyctophilus timoriensis	Eastern Long-eared Bat
	Vespadelus troughtoni	Eastern Cave Bat
Reptiles	*Scientific Name*	Common Name
Elapidae	*Hoplocephalus bitorquatus*	Pale-headed Snake
Gekkonidae	*Underwoodisaurus sphyrurus*	Border Thick-tailed Gecko
Scincidae	*Anomalopus mackayi*	Five-clawed Worm-skink
Fish	*Scientific Name*	Common Name
Terapontidae	*Bidyanus bidyanus*	Silver Perch

* new listing

Narrabri: Threatened species: Plants

Plants	*Scientific Name*	Common Name
Brassicaceae	Lepidium aschersonii	Spiny Peppercress
Cyperaceae	Cyperus conicus	
Euphorbiaceae	Bertya sp. A Cobar-Coolabah	Coolabah Bertya
Fabaceae (Faboideae)	Swainsona murrayana	Slender Darling Pea
Haloragaceae	Haloragis exalata	
Malvaceae	Sida rohlenae	Shrub Sida
Orchidaceae	Pterostylis cobarensis	Greenhood Orchid
Poaceae	Dichanthium setosum	Bluegrass
	Digitaria porrecta	Finger Panic Grass
Polygalaceae	Polygala linariifolia	Native Milkwort
Proteaceae	Hakea pulvinifera	Lake Keepit Hakea
Rhamnaceae	Pomaderris queenslandica	Scant Pomaderris
Rutaceae	Philotheca ericifolia	
Sterculiaceae	Rulingia procumbens	
Surianaceae	Cadellia pentastylis	Ooline

Appendix B: Noxious Weeds Lists

Legal requirements

Class	Legal requirements
1	The plant must be eradicated from the land and the land must be kept free of the plant
2	The plant must be eradicated from the land and the land must be kept free of the plant
3	The plant must be fully and continuously suppressed and destroyed
4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed
5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with

Noxious weeds listed for all NSW

Weed	Class
African feathergrass (Pennisetum macrourum)	5
African turnipweed (Sisymbrium runcinatum)	5
African turnipweed (Sisymbrium thellungii)	5
Anchored water hyacinth (Eichhornia azurea)	1
Annual ragweed (Ambrosia artemisiifolia)	5
Arrowhead (Sagittaria montevidensis)	5
Artichoke thistle (Cynara cardunculus)	5
Athel pine (Tamarix aphylla)	5
Athel tree (Tamarix aphylla)	
Bear-skin fescue (Festuca gautieri)	5
Black knapweed (Centaurea nigra)	1
Blackberry (Rubus fruticosus aggregate species)	4
Bridal creeper (Asparagus asparagoides)	5
Broomrapes (Orobanche species)	1
Burr ragweed (Ambrosia confertiflora)	5
Cabomba (Cabomba caroliniana)	5
Cayenne snakeweed (Stachytarpheta cayennensis)	5
Chinese violet (Asystasia gangetica subspecies micrantha)	1
Clockweed (Gaura parviflora)	5
Corn sowthistle (Sonchus arvensis)	5
Dense waterweed, Egeria (Egeria densa)	
Dodder (Cuscuta species)	5
East Indian hygrophila (Hygrophila polysperma)	1
Espartillo (Achnatherum brachychaetum)	5
Eurasian water milfoil (Myriophyllum spicatum)	1
Fine-bristled burr grass (Cenchrus brownii)	5
Fountain grass (Pennisetum setaceum)	5
Gallon's curse (Cenchrus biflorus)	5
Glaucous starthistle (Carthamus glaucus)	5
Golden thistle (Scolymus hispanicus)	5
Harrisia cactus (Harrisia species)	4
Hawkweed (Hieracium species)	1
Horsetail (Equisetum species)	1

Weed	Class
Hymenachne (Hymenachne amplexicaulis)	1
Karoo thorn (Acacia karroo)	1
Kochia (Bassia scoparia)	1
Lagarosiphon (Lagarosiphon major)	1
Lantana (Lantana species)	5
Leafy elodea (Egeria densa)	5
Long-leaf willow primrose (Ludwigia longifolia)	5
Mexican feather grass (Nassella tenuissima)	1
Mexican poppy (Argemone mexicana)	5
Miconia (Miconia species)	1
Mimosa (Mimosa pigra)	1
Mossman River grass (Cenchrus echinatus)	5
Onion grass (Romulea species)	5
Oxalis (Oxalis species and varieties)	5
Parthenium weed (Parthenium hysterophorus)	1
Pond apple (Annona glabra)	1
Prickly acacia (Acacia nilotica)	1
Prickly pear (Cylindropuntia species)	4
Prickly pear (Opuntia species except O. ficus-indica)	4
Red rice (Oryza rufipogon)	5
Rhus tree (Toxicodendron succedaneum)	4
Rubbervine (Cryptostegia grandiflora)	1
Sagittaria (Sagittaria platyphylla)	5
Sand oat (Avena strigosa)	5
Senegal tea plant (Gymnocoronis spilanthoides)	1
Siam weed (Chromolaena odorata)	1
Smooth-stemmed turnip (Brassica barrelieri subspecies oxyrrhina)	5
Soldier thistle (Picnomon acarna)	5
Spotted knapweed (Centaurea maculosa)	1
Texas blueweed (Helianthus ciliaris)	5
Water caltrop (Trapa species)	1
Water lettuce (Pistia stratiotes)	1
Water soldier (Stratiotes aloides)	1
Willows (Salix species)	5
Witchweed (Striga species)	1
Yellow burrhead (Limnocharis flava)	1
Yellow nutgrass (Cyperus esculentus)	5

*Clockweed (Gaura lindheimeri) was listed in 2008, but not 2009.

Noxious weeds listed for Gunnedah Shire

Weed	Class
African boxthorn (Lycium ferocissimum)	4
Alligator weed (Alternanthera philoxeroides)	2
Bathurst/Noogoora/Californian/cockle burrs (Xanthium species)	4
Blue heliotrope (Heliotropium amplexicaule)	4
Chilean needle grass (Nassella neesiana)	4
Columbus grass (Sorghum x almum)	4
Galvanised burr (Sclerolaena birchii)	4
Giant Parramatta grass (Sporobolus fertilis)	3
Golden dodder (Cuscuta campestris)	4
Green cestrum (Cestrum parqui)	3
Hemlock (Conium maculatum)	4
Italian bugloss (Echium species)	
Johnson grass (Sorghum halepense)	4
Lippia (Phyla species)	4
Long-style feather grass (Pennisetum villosum)	4
Mesquite (Prosopis species)	2
Mother-of-millions (Bryophyllum species and hybrids)	4
Pampas grass (Cortaderia species)	4
Parkinsonia (Parkinsonia aculeata)	2
Paterson's curse, Vipers bugloss, Italian bugloss (Echium species)	4
Perennial ragweed (Ambrosia psilostachya)	4
Salvinia (Salvinia molesta)	2
Serrated tussock (Nassella trichotoma)	4
Silk forage sorghum (Sorghum species hybrid cultivar)	4
Silver-leaf nightshade (Solanum elaeagnifolium)	3
St. John's wort (Hypericum perforatum)	3
Tree-of-heaven (Ailanthus altissima)	4
Water hyacinth (Eichhornia crassipes)	2
Wild radish (Raphanus raphanistrum)	4

Spiny burrgrass (Cenchrus incertus) and Spiny burrgrass (Cenchrus longispinus) were listed in 2008, but not 2009.

Noxious weeds listed for Liverpool Plains Shire

Weed	Class
African boxthorn (Lycium ferocissimum)	4
Alligator weed (Alternanthera philoxeroides)	2
Bathurst/Noogoora/Californian/cockle burrs (Xanthium species)	4
Chilean needle grass (Nassella neesiana)	4
Cockle burrs (Xanthium species)	
Columbus grass (Sorghum x almum)	4
English broom (Cytisus scoparius)	
Galenia (Galenia pubescens)	4
Galvanised burr (Sclerolaena birchii)	4
Giant Parramatta grass (Sporobolus fertilis)	3
Golden dodder (Cuscuta campestris)	4
Green cestrum (Cestrum parqui)	3
Italian bugloss (Echium species)	
Johnson grass (Sorghum halepense)	4
Lippia (Phyla species)	4
Long-style feather grass (Pennisetum villosum)	4
Mesquite (Prosopis species)	2
Mother-of-millions (Bryophyllum species and hybrids)	4
Nodding thistle (Carduus nutans)	4
Pampas grass (Cortaderia species)	4
Parkinsonia (Parkinsonia aculeata)	2
Paterson's curse, Vipers bugloss, Italian bugloss (Echium species)	4
Perennial ragweed (Ambrosia psilostachya)	4
Scotch broom (Cytisus scoparius)	4
Scotch, Stemless, Illyrian and Taurian thistles (Onopordum species)	4
Serrated tussock (Nassella trichotoma)	3
Silk forage sorghum (Sorghum species hybrid cultivar)	4
Silver-leaf nightshade (Solanum elaeagnifolium)	3
Spiny burrgrass (Cenchrus incertus)	4
Spiny burrgrass (Cenchrus longispinus)	4
St. John's wort (Hypericum perforatum)	4
Star thistle (Centaurea calcitrapa)	4
Sweet briar (Rosa rubiginosa)	4
Water hyacinth (Eichhornia crassipes)	2

Noxious weeds listed for Tamworth Regional Council

Weed	Class
African boxthorn (Lycium ferocissimum)	4
Alligator weed (Alternanthera philoxeroides)	2
Bathurst/Noogoora/Californian/cockle burrs (Xanthium species)	4
Chilean needle grass (Nassella neesiana)	4
English broom (Cytisus scoparius)	
Espartillo (Achnatherum brachychaetum)	5
Galenia (Galenia pubescens)	4
Galvanised burr (Sclerolaena birchii)	4
Giant Parramatta grass (Sporobolus fertilis)	3
Golden dodder (Cuscuta campestris)	4
Green cestrum (Cestrum parqui)	3
Lippia (Phyla species)	4
Mesquite (Prosopis species)	2
Mother-of-millions (Bryophyllum species and hybrids)	4
Nodding thistle (Carduus nutans)	4
Pampas grass (Cortaderia species)	4
Parkinsonia (Parkinsonia aculeata)	2
Perennial ragweed (Ambrosia psilostachya)	4
Salvinia (Salvinia molesta)	2
Scotch broom (Cytisus scoparius)	4
Scotch, Stemless, Illyrian and Taurian thistles (Onopordum species)	4
Serrated tussock (Nassella trichotoma)	3
Silver-leaf nightshade (Solanum elaeagnifolium)	3
St. John's wort (Hypericum perforatum)	4
Sweet briar (Rosa rubiginosa)	4
Water hyacinth (Eichhornia crassipes)	2

Cockle burrs (Xanthium species) was listed in 2008, but not 2009.

Noxious weeds listed for Walgett Shire

Weed	Class
African boxthorn (Lycium ferocissimum)	4
Alligator weed (Alternanthera philoxeroides)	2
Bathurst/Noogoora/Californian/cockle burrs (Xanthium species)	4
Blue heliotrope (Heliotropium amplexicaule)	4
Chilean needle grass (Nassella neesiana)	4
Cockle burrs (Xanthium species)	
Columbus grass (Sorghum x almum)	3
Galvanised burr (Sclerolaena birchii)	4
Golden dodder (Cuscuta campestris)	4
Green cestrum (Cestrum parqui)	3
Johnson grass (Sorghum halepense)	3
Mesquite (Prosopis species)	2
Mintweed (Salvia reflexa)	4
Nodding thistle (Carduus nutans)	4
Pampas grass (Cortaderia species)	4
Parkinsonia (Parkinsonia aculeata)	2
Salvinia (Salvinia molesta)	2
Serrated tussock (Nassella trichotoma)	4
Silk forage sorghum (Sorghum species hybrid cultivar)	3
Silver-leaf nightshade (Solanum elaeagnifolium)	4
Spiny burrgrass (Cenchrus incertus)	4
Spiny burrgrass (Cenchrus longispinus)	4
St. John's wort (Hypericum perforatum)	4
Sweet briar (Rosa rubiginosa)	4
Water hyacinth (Eichhornia crassipes)	2

Noxious weeds listed for Narrabri Shire

Weed	Class
African boxthorn (Lycium ferocissimum)	4
Alligator weed (Alternanthera philoxeroides)	2
Bathurst/Noogoora/Californian/cockle burrs (Xanthium species)	4
Blue heliotrope (Heliotropium amplexicaule)	4
Chilean needle grass (Nassella neesiana)	4
Cockle burrs (Xanthium species)	
Columbus grass (Sorghum x almum)	4
Galvanised burr (Sclerolaena birchii)	4
Golden dodder (Cuscuta campestris)	4
Green cestrum (Cestrum parqui)	3
Hemlock (Conium maculatum)	4
Johnson grass (Sorghum halepense)	4
Mesquite (Prosopis species)	2
Mother-of-millions (Bryophyllum species and hybrids)	4
Pampas grass (Cortaderia species)	4
Parkinsonia (Parkinsonia aculeata)	2
Perennial ragweed (Ambrosia psilostachya)	4
Salvinia (Salvinia molesta)	2
Serrated tussock (Nassella trichotoma)	4
Silver-leaf nightshade (Solanum elaeagnifolium)	3
Spiny burrgrass (Cenchrus incertus)	4
Spiny burrgrass (Cenchrus longispinus)	4
St. John's wort (Hypericum perforatum)	3
Water hyacinth (Eichhornia crassipes)	2