Catchment Management Planning and Landcare in the Little River Catchment

Little River Big Picture

Little River Landcare Group Inc.

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Water

The Little River is a major tributary of the Macquarie River—they join 20 kilometres upstream of Dubbo. It rises just east of the Goobang National Park in the south of the Macquarie Catchment. The Macquarie is part of the Murray Darling Basin and lower in the catchment are the Macquarie Marshes—an internationally significant wetland.

Tributaries of the Little River include Buckinbah, Baldrudgery, Wandawandong, Myrangle, Hanover, Googodery, Gundy, Sandy and Barney's Creeks. The main creek of the catchment is the Buckinbah Creek, which rises near Killenbutta State Forest. It has a major tributary, Spring Creek, which contributes significant amounts of salt when in flow. A small part of the Landcare area drains into the Curra Creek, a tributary of the Bell River.

The headwaters of the Little River can be highly saline, but salt concentrations rapidly drop as the river flows through the Granite Groundwater Flow System (GFS). The granite provides 'fresh' baseflow to the river and, when the river flows back out of the Granite GFS, the salinity increases again mainly due to flows from the Wandawandong and Gundy Creeks. Googodery and Doughboy Creeks in the east are considerably fresher than Buckinbah, Myrangle and Hanover Creeks in the west. Currently, the discharge from the Little River into the Macquarie is better than WHO drinking water quality standards for less than 30% of the time.

The Little River has a high population of native fish. It has few floodplains so there is little cropping adjacent to the river, removing the danger of chemical contamination. It is regarded as "a 1950s river" because of its condition and habitat value. Trout cod, an endangered species, is found in the river. Fish of all ages and sizes have been observed, giving evidence of breeding. Although carp numbers are lower than in other Macquarie tributaries, they still do some damage.

Hydrogeology

The Bureau of Rural Sciences recently released a report, written for Mid-Macquarie Landcare, which covered groundwater details of the catchment. The report found that groundwater levels rose by an average of nearly 3 metres in 16 bores in the catchment between 1988 and 1999. Other groundwater flow system studies have been done of the region. These reports form the basis of the descriptions of aquifers and associated geology in this section.

Characteristics common to all flow systems are that recharge occurs mainly during seasonal rainfall and discharge is localised. Rates of the onset of salinity after changed groundwater conditions are summarised in table 7. One specific observation is that the Dilladerry volcanics have very small flow lines so the recharge zones will be found close to the discharge zones.

The **Ordovician sediments** flow system lies in a belt from Cumnock heading north, to the east of Arthurville, towards Geurie. It is mainly low relief country. The **Cudal Group** flow system lies in a broad belt on either side of the Ordovician sediments running from Cumnock to Geurie. It is normally rolling or steep hill terrain. **High relief granite** flow systems tend to be found in the steep, granite, hill country adjacent to the Little River north of Yeoval. The landscape has granite outcrops and boulders. **Low relief granite** flow systems are typically found in the undulating country to the north, south and west of Yeoval. A major problem in this system is waterlogging in certain soil types.

Table 7: Hydrogeology summary of the groundwater flow systems of the catchment

	Ordovician sediments	Cudal Group	High relief granite	Low relief granite	Dilladerry volcanics	Alluvium	Upper Devonian
Groundwater system	Local	Local	Small	Small	Very small	Local to intermediate	Local
Flow lines	Short, <5km	Short, <5km	Short, <2km	1–5km	<1km	Up to 10km	Short, 1–5km
Main aquifer	Fractured rock	Many sediments inc. limestone	Fractured granite	Weathered granite & lower slope deposits	Coarse sediments of the deposits	Sands and gravels	Fractured Upper Devonian sediments
Confined or unconfined	Un-	Semi / un-	Un-	Un-	Un-	Variable	Variable
Permeability	High	Mod to variable	Low to mod low	Low to mod low	Mod but variable	Moderate to high	Variable
Yield	-	-	Low to mod low	Low to mod low	-	Moderate to high	Variable
Recharge details	All across the system, highest at top of catchment	Higher on skeletal soils and upper slopes	Mainly on hilltops and slopes where deposits are thin	Mainly on hilltops and slopes where deposits are thin	Patchy across the slopes	Varies depending on nature of soils, also occurs above floodline	Mainly on hilltops and slopes where deposits are thin
Discharge details	At major changes in slope	-	Where watertables at ground level and aquifers under pressure	Where watertables at ground level and aquifers under pressure	-	At break of slope below the terraces	-
Discharge sites affected by break in slope and lithology change	Yes	Yes	Yes	Yes	Yes	-	Yes, and also artesian aquifers
Discharge into streams	Yes, as g/water	Yes, as g/water	Yes, as g/water	Unclear	Yes, mainly as runoff	Yes, runoff and g/w	Not yet assessed
Salinity onset rate	Fast (<30 years)	Fast (<30 years)	Fast (<30 years)	-	-	Slow (up to 50 yrs)	-
G/w salinity	-	-	Very low	Low	Low	Low-mod	Low-mod
Salt storage	-	Variable	Very low	Low	Low	Low	Low to moderate
Salinity risk	-	High with current rapid expansion	Low but water-logging risk high	-	-	-	Low

Dilladerry volcanics flow systems are generally found in the volcanic landscape of the Yahoo Peaks and Saddleback Mountain areas. These areas have steep hills with sloping deposits leading to the lower slopes. The main management issue is to be aware of the small scale nature of this flow system—this means that recharge areas will be very close to a discharge area. **Alluvium** flow systems are scattered around the catchment. The two main areas are in the south west of the catchment (in a broad band running from south of Baldry, northwards towards Wandawandong) and a large, flat area

running north from Arthurville towards the Macquarie River. Some other areas are found in the Buckinbah Creek. The **Upper Devonian sediments** flow system tends to occur in sediments and bedrock of the footslopes of the hilly country in the west of the catchment in the Hervey Ranges and to the east in the Catombal Range. These areas are National Parks or State Forests and are heavily timbered. **Other flow systems** include an area of Gregra group rocks in the south east of the catchment, to the north east of Cumnock, and an area of Devonian sediments of the Toongi group in the north of the catchment, to the north west of Arthurville. There are some other minor areas.

Vegetation, Fauna and Biodiversity

Table 8: Current vegetation cover (ha) in the Little River Catchment (National Vegetation Information System – NVIS)

NVIS Category	Baldry	Cumnock	Suntop / Arthurville	Yeoval	Total
Cleared	59,929	40,734	54,320	31,813	**186,795**
Mallee woodland			671		**671**
Open forest	3,555				**3,555**
Open woodland	12,833	1,796	3,992	2,152	**20,773**
Settlement		40		50	**90**
Tussock grassland	3,666		465	1,951	**6,082**
Unknown	1,572	144	435	258	**2,409**
Water		6			**6**
Woodland	29,578	1,270	7,050	43	**37,941**

Source: BRS (2002)

Goobang National Park, almost half of which is in the catchment, was proclaimed in 1996. It was last logged in the early 1980s but some areas of old growth forest have survived the logging. There are eleven distinct vegetation communities, considerable species diversity and nine significant species that are rare or threatened. Four of these have restricted distribution areas or are regionally significant.

There are five plant species and forty five fauna species that are threatened or endangered in the area covered by the Wellington 1:100,000 map sheet. These species include mammals, reptiles and birds. The five threatened plant species are the Burr Daisy, Goodenia, Philotheca, Zieria and Pea (*Swainsona recta*). Some of the threatened fauna species are the Bilby, Brolga, Koala, Squirrel Glider, Western Blue-tongued Lizard and Malleefowl.

In 2002, a biodiversity assessment of the catchment recorded 203 plant species, 76 of which were native woody plants over 50 centimetres tall and recorded at two or more sites. The assessment defined six vegetation categories—with a number of sub groups.

The **Hill Communities** category is diverse and species-rich with five sub-communities, which occur on ridges or shallow soils. Dominant tree species are Black Cypress Pine (*Callitris endlicheri*) and Red Stringybark (*Eucalyptus macrorhyncha*) and a dense shrub layer is common. The **Grey Box** (*E. microcarpa*) **White Cypress Pine Woodland** category also includes some Fuzzy Box (*E. conica*), Bull-oak (*Allocasuarina luehmannii*) and White Box (*E. albens*). The understorey is often White Cypress Pine (*Callitris glaucophylla*) in dense patches. The **Fuzzy Box Woodland** category also includes scattered White Cypress Pine. The **Yellow Box Blakely's Red Gum Woodland** also

includes some White Box, Silver Wattle (*Acacia dealbata*), Apple Box (*E. bridgesiana*) and Green Wattle (*Acacia deanei*). There can be an understorey of grasses or forbs. **River Red Gum Forest** occurs near semi-permanent water and also includes some Yellow Box (*E. melliodora*), Blakely's Red Gum, Apple Box and River She-oak (*Casuarina cunninghamiana*). Any understorey tends to be River Bottlebrush (*Callistemon sieberi*). **White Box Woodland** also has scattered Kurrajong (*Brachychiton populneus*) and White Cypress Pine. The understorey is usually grassy and has sparse Hickory Wattle (*Acacia implexa*).

Table 9: Estimated pre-clearing and current extent of six vegetation communities in the catchment

Veg. Community	Pre-clearing area (ha)	Area remaining (ha)	% remaining
Hill Communities	106,252	42,736	40
Grey Box – White Cypress Pine	9,615	235	2
Fuzzy Box	13,866	366	3
Yellow Box – Blakely's Red Gum	87,252	5,154	6
River Red Gum	4,038	609	15
White Box	37,300	1,082	3
Total area	**258,323**	**50,182**	**19**

Source: Seddon et al. (2002)

Hill Communities now make up 85% of the remaining woody vegetation in the catchment. The woodland remnants tend to be very small and only around 10% of remnants in the catchment are larger than one hectare.

Land Use

The latest complete data set for the catchment is from 1989. Table 10 uses recent data (2000) but it does not cover to the west of Baldry (Goobang NP covers part of this area) and the far north of the catchment. As a proportion of each sub-catchment:

- 29% is cropping
- 66% is grazing
- ~4% is tree cover

The remaining 1% is other land uses. Baldry provides the exceptions to these figures as cropping covers 10%, grazing covers 70% and tree cover is 17%. It is unlikely that these figures are skewed due to only half of the area being mapped. It's more likely to be the opposite, as Goobang is not mapped, which would increase the tree cover proportion. Tree cover in the Yeoval area is less than 1%. Note that this definition of tree cover varies from the NVIS vegetation data in table 8.

Table 10: Land Use (2000) by sub-catchment in the Little River Catchment

Land Use (ha)	Baldry	Cumnock	Suntop / Arthurville	Yeoval	TOTAL
Cropping	5318	12574	14928	10365	43186
Grazing	38691	28464	34583	24226	125964
Mining & Quarrying	6	1	2		9
Rivers, Drainage & Water	986	543	772	859	3160
Transport & Other Corridors	372	521	822	456	2170
Tree Cover	9533	1725	1598	175	13031
Urban		162	6	185	353
Area surveyed	54906	43990	52710	36266	187872
Proportion of Total (%)	49	100	79	100	73
TOTAL AREA	**111134**	**43990**	**66933**	**36266**	**258323**

Source: DIPNR (2003)

Surveys were completed on 32 properties in the catchment in 2001/2002. An average 71% of total property area was devoted to pasture with the dominant pasture type being improved perennial pasture (51% of total pasture area). An average 8% (ranging from 1–32%) of total property area was devoted to woody vegetation in various forms. Of this area, 94% was remnant vegetation. Livestock production was carried out on 97% of properties, even though some had very small enterprises. Grain production was carried out on 84% of properties. Wheat was the dominant crop with an average 162 hectares grown per property (and an average yield of 2.6 tonnes per hectare). Canola was the next most common crop (38%) and then barley, triticale, oats and lupins (16–22%). Hay or silage was produced on 44% of properties and a dedicated fodder crop on 22% of properties.

The Little River, Central West NSW LRLG (Don Bruce)

Just over 50% of properties ran sheep and cattle, 20% ran sheep only and another 20% ran cattle only. Rotational grazing was the most commonly used grazing system. Average stocking rates were 8.7 Dry Sheep Equivalents (DSE) per hectare with a range

from less than one up to 16 DSE/ha. An average of 1,400 ewes were run (with a high of 4,800) and the lambing percentage averaged 89%. Average wool cut was 4.5 kilograms per head and the average sale price was $24 per head (sheep) and $461 per head (cattle). The average calving percentage was 84% and the largest number of breeders run was 1,000 head.

Topdressing of pastures with fertiliser was carried out by 75% of landholders although the frequency varied. The most common frequencies were every 1–2 years, every 3–5 years and when establishing a new pasture. Around 25% of people applied lime to their pastures and 20% applied other soil conditioners. Three quarters of people applied fertiliser regularly to wheat crops but just over one third applied fertiliser to canola and oats. Lime was applied to canola by one third of people, more than any other crop. Decisions were normally made based on soil tests and advice from agronomists. Most landholders stated their pH range as being between 4.6 and 5.5.

There are 29 irrigation licences, totalling 1999 megalitres (ML), 3 stock and domestic licences, totalling 15ML and one town water supply and one industrial licence, neither of which have a volume attached as yet. The total groundwater allocation (for irrigation) is 4002 ML. Most of the groundwater allocations in the catchment are for the properties adjacent to the Macquarie River. In the upper catchment, the groundwater allocation is only 88 ML.

Socioeconomic Profile

Typical property sizes range from less than 100 hectares (ha) to over 3,000 ha and the average size of surveyed properties was 999 ha. Table 11 provides further details.

Table 11: Property sizes in the Little River Catchment

Property Size (ha)	% of Properties
<250	20
250–500	15
500–1,000	25
1,000–1,500	12
>1,500	28

Source: Watson et al. (2002)

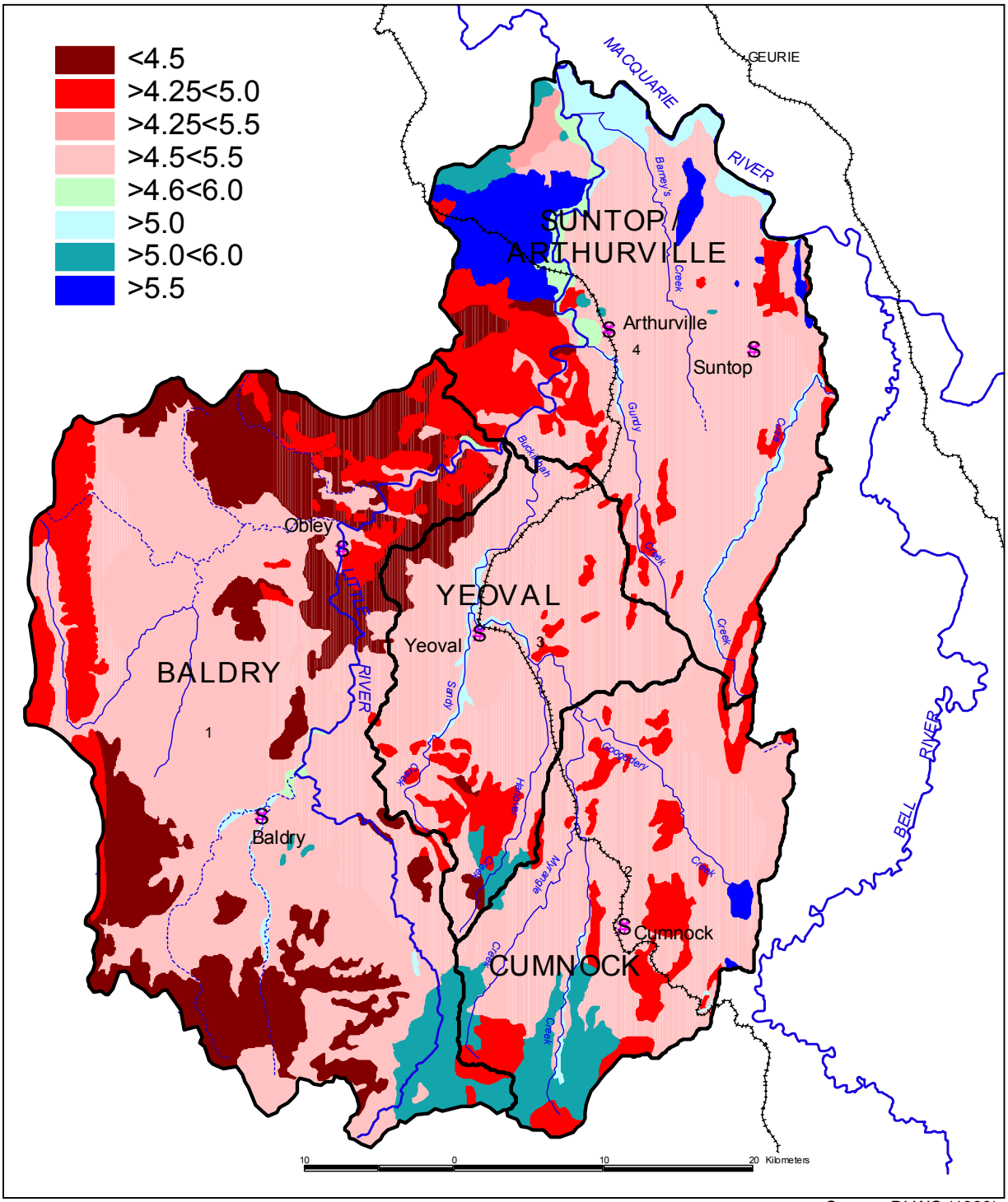
The average farm cash income was $31,000 (cash receipts of $224,000 and cash costs of $193,000), although one third of respondents had a negative farm cash income and nearly another third had a farm cash income of over $50,000. The average farm business profit (after depreciation and trading stock changes) was around $14,000 while 44% recorded a negative business profit and 19% recorded a business profit higher than $50,000. Livestock sales contributed 29% of farm cash receipts, followed by wool sales (20%), grain sales (20%) and off-property income contributed 24% of receipts. Total business assets averaged $1.6 million with an average debt of $320,000. Average business equity was 81% and 13% of total business equity was based on non-primary production equity such as town property or shares.

There was a broad distribution of age groups with 35% of males and 38% of females being 46 years and over. There were more males (32%) than females (29%) between the ages of 26 and 45 while 17% of males and 20% of females were dependent children (less than 15 years old). The male group is experienced with 50% of males having more than 21 years farming experience but 28% of males and 45% of females had less than 10 years farming experience.

Acidity

Soil acidity is a chemical condition that reduces crop and pasture yields. Soil acidity tends to gradually increase with time, especially since the 1950s with the introduction of pasture improvement, increased fertiliser use and other agricultural practices. It is important to treat acidity early because it is hard to treat once the subsoil becomes acidic.

Figure 4: Derived topsoil pH map of the catchment



Source: DLWC (1999)

Acid Soil Action data was collected by eleven participating Landcare groups in the catchment. These have been assigned to sub-catchments for simple presentation (although no results were taken for the Suntop/Arthurville area). The number of samples in each Landcare area varies, which affects the range and averages. **All Landcare areas have an average pH below 6** and the lowest was 4.17 at Saddleback. The three soil groups with the lowest pH were shallow soils, siliceous sands and red podzolics. The red-brown earths and non-calcic brown soils were found to be moderately acidic and the alluvials, euchrozems and terra rossa soils were generally not acidic. The degree of acidity was affected by previous land use.

Table 12: Acid Soils Action Monitoring Project results for the catchment

	Baldry	Cumnock	Suntop/ Arthurville	Yeoval	Average
pH (CaCl) Topsoil Ave.	4.73	5.14	No data	4.86	**4.91**
pH (CaCl) Topsoil Range	4.0–6.4	4.0–7.0	No data	4.1–6.2	**4.0–7.0**
CEC Average	7.79	8.30	No data	9.98	**8.69**
pH (CaCl) Subsoil Ave.	4.86	5.22	No data	5.17	**5.08**

Source: Acid Soil Action (1999)

Dryland Salinity

The Central West Catchment Salinity Risk Assessment gave the Little River Catchment a **salinity hazard rating of very high**. This mainly results from the catchment having a high salt store in the landscape and having a high recharge potential due to highly fractured rocks.

In 1988, 0.12% of the Upper Macquarie Catchment was affected by dryland salinity but 0.41% (1074 ha) of the Little River Catchment was affected. When this study was undertaken, the Wellington map sheet (1:100,000) had by far the largest area of dryland salinity in the Macquarie Catchment. By 1998, 1.7% (4408 ha, excluding to the west of Baldry) of the Little River Catchment was affected by dryland salinity, a fourfold increase. Nearly 40% of the affected area has reached the point where salt tolerant species replace sensitive species.

Table 13: Areas (ha) of Known Saline Sites in Little River – 1988 and 1998

Salinity (ha)	Baldry	Cumnock	Suntop/ Arthurville	Yeoval	TOTAL
1988 – known salinity	274	269	358	173	**1074**
1998 – known salinity	779	1180	1590	859	**4408**
1998 – % of area	0.7*	2.7	2.4	2.4	**1.7**
1998 – no known salinity	53069 (57286 unmapped)	42810	65343	35407	**253915**
1998 TOTAL	**111134**	**43990**	**66933**	**36266**	**258323**

* Only 49% of the Baldry sub-catchment was mapped

Source: DLWC (1999)

The following table accounts for the many different costs of dryland salinity within the Little River Catchment but does not include off-site impacts (such as for downstream irrigators, town water supplies and the Macquarie Marshes).

Table 14: Summary of Annual Costs of Dryland Salinity in Little River by Community Sector

Types of Costs	Farmers	Household	Business	Councils	Agencies	Total $
Repairs & Maintenance	234,483	88,527	26,965	58,821	25,553	434,349
Infrastructure costs	100,723	50,025	2,840	13,233		166,821
Preventative works	256,781	24,015	5,067	2,133		287,996
Increased operating costs, income foregone	178,756	15,377	4,225			198,358
Education, Research, etc					367,263	367,263
Reduced Property values	102,973	109,804				212,777
TOTAL $	**873,716**	**287,748**	**39,097**	**74,187**	**392,816**	**1,667,564**

Source: Ivey ATP (1998)

Soil Degradation

The Soil Conservation Service mapped erosion using 1988 air photos and this study has not been updated. Sheet and rill erosion mapping was based on land use, so this may have been altered by land management changes since 1988.

Table 15: Area of the Little River Catchment affected by sheet and rill erosion (ha) and gully erosion (metres) in 1988

Erosion (ha / m)	Baldry	Cumnock	Suntop/ Arthurville	Yeoval	Total
No appreciable erosion (ha)	82460	28330	35449	18593	164832
Rill erosion (ha)					
Minor to moderate	471	304	252	161	1188
Severe to very severe	250	36	29	49	364
Sheet erosion (ha)					
Minor to moderate	26586	9323	21180	15052	72141
Severe to very severe	1093	5728	9665	2238	18724
Erosion caused by salinity	274	269	358	173	1074
TOTAL (ha)	**111134**	**43990**	**66933**	**36266**	**258323**
Gully erosion (m)					
Minor to moderate	79127	45925	43948	41380	210380
Severe to very severe	145382	51532	45401	40504	282819
TOTAL (m)	**224509**	**97457**	**89349**	**81884**	**493199**

Source: Donaldson (2000)

Around 75% of the Baldry sub-catchment had no appreciable erosion when mapped. Sheet erosion is mainly on the cropping areas; rill erosion happens both on cropping and grazing areas; gully erosion is greatest on the light soils to the north of Baldry; and

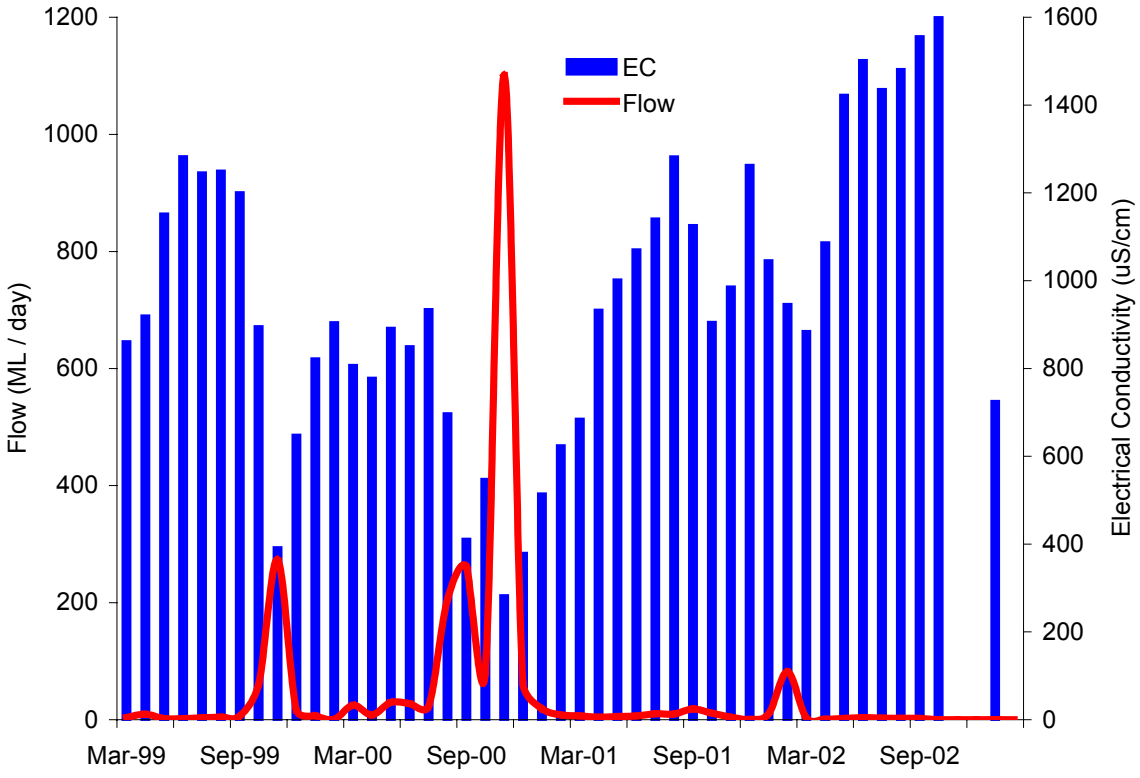
Goobang National Park has the least erosion. In the Yeoval sub-catchment, nearly 50% of cropping areas are affected by sheet erosion and the worst gully erosion is in the south of the sub-catchment in the Hanover Creek area. There was no appreciable erosion in 65% of the Cumnock sub-catchment—mainly in the high rainfall, mixed pasture and timber areas to the south. Areas of sheet erosion are scattered. In the Suntop/Arthurville area, around 50% of the sub-catchment is affected by sheet erosion although the Catombal Range has very little erosion.

Surface Water

Half of the salt that leaves the Mid-Macquarie Catchment is generated from upstream of Burrendong Dam—that is, the Upper Macquarie Catchment. The two main in-region contributors to stream salinity in the mid-Macquarie are the Talbragar River downstream of Elong Elong and the Little River downstream of Obley.

There are three main salinity threshold levels for water quality, as defined by the Murray-Darling Basin Commission. The limit for desirable drinking water levels is 800 EC. At 1500 EC irrigation becomes risky and direct environmental effects occur (also water begins to taste salty at 1700 EC and the upper limit for occasional drinking is 2300 EC). The accepted division between fresh and saline water is 5000 EC and the limit for mixing with herbicides is 4700 EC.

Figure 5: Monthly average Flow (ML/day) and Electrical Conductivity (µS/cm) for the Little River at Obley



Source: DIPNR (2003)

The water quality monitoring station at Obley has the best historical data in the catchment. Historical averages for the Arthurville station are not yet reliable as there are only 10 months of records. Being downstream of Obley it will have a higher annual salt load, but the 10 months on record fall in the 2002–2003 drought, causing a below average reading. Obley results for this period are lower than the Arthurville results.

Table 16: Salt load data (tonnes) for the catchment

	Ave. Daily Salt Load (t)	Calculated Annual Salt Load (t)	Months in database
Little R at Obley	17.2	6269	48
Little R at Arthurville	13.1	4783	10
Buckinbah C at Yeoval	8.1	2955	12

Source: DIPNR (2003)

Turbidity data for the catchment is available from 1976 until 1991. In this period, turbidity ranged from 0–230 NTU (with a 'typical' range of 0–75 NTU). Turbidity should be less than 5 Nephelometric Turbidity Units (NTU) for drinking water and less then 50 NTU for environmental protection. Turbidity was above the drinking water limit for most of the time and above the environmental limit periodically—every 18 months on average.

River Environment

The health of the Little River varies along its length. At its origin, the river has vertical banks, weedy groundcover, no understorey and in-stream Cumbungi, which is both beneficial and detrimental. The presence of Carp and Red Fin increases turbidity—they also eat smaller fish and can increase bank erosion risk. Further downstream, the banks are mostly stable, there is reduced vegetation, some introduced plant species, wider river channels and sediment transfer.

Near Obley, the river is well vegetated and has stable banks and beds. There are more weeds and some bank instability where there is more cropping below the Buckinbah Creek confluence. Where the river joins the Macquarie, the banks are steep, narrow and in good condition but with some weeds.

Buckinbah Creek has stable banks and good vegetation at origin and downstream is highly disturbed with Carp and Cumbungi. Gundy Creek has steep to vertical banks with good grass cover, Cumbungi and weedy groundcover. Downstream the creek is highly disturbed and the banks are not so steep. Sandy Creek has steep sloping grassed banks with extensive bank erosion due to clearing and damage from stock; in the upper catchment this has led to sediment transfer. Cumbungi is present as well.

Native riparian vegetation in the catchment is River She-oak (*Casuarina cunninghamiana*) and River Red Gum (*Eucalyptus camaldulensis*) with very little understorey.

The topography of the region means that floodplains are not extensive in the catchment, therefore flood damage is limited. The lower parts of the catchment can be flooded after heavy rainfalls in the Upper Macquarie Catchment.

Groundwater

There are unconsolidated alluvial aquifers along the Macquarie River and around the confluence with the Little River. There may be a major lineament running north east through Toongi and Wongarbon resulting in a large buildup of alluvial deposits both on the Macquarie and in the Little River Catchment. The Upper Macquarie Alluvial Aquifer was classed as a medium risk in the NSW Water Reforms Aquifer Risk Assessment Report.

There are many fractured rock bores in the catchment that are used for stock and domestic purposes. Landholders in the Baldry and Cumnock areas are particularly concerned about high iron levels and rising salt levels in the groundwater.

Native Vegetation and Biodiversity Decline

The majority of the Little River Catchment has been heavily affected by tree decline and the understorey layer has almost been completely lost. This means that, as well as vegetation communities being threatened, fauna and bird populations are in danger. The exceptions are the Catombal Ranges and Goobang National Park.

"If enough species are extinguished, will the ecosystems collapse, and will the extinction of most other species follow soon afterward? The only answer anyone can give is: possibly. By the time we find out, however, it might be too late. One planet, one experiment."
Edward O. Wilson, The Diversity of Life.

Table 17: Current (2002) and Target Vegetation Cover for the catchment

Name	Current Vegetation Cover % #	Target Vegetation Cover % *
Baldry	41	41
Cumnock	7	14
Suntop/Arthurville	17	19
Yeoval	6	13
Total	**24**	**26**

Current vegetation cover is based on the mallee woodland, open forest, open woodland and woodland NVIS categories (table 8, Vegetation and Fauna section)
* Target vegetation cover is calculated from tables 5 and 6 (Land Capability section)

Pasture Degradation and Weeds

Weeds were identified as a major concern at sub-catchment workshops conducted during the planning process. Blackberry is widespread, especially in gullies, depressions, along streambanks and on lightly grazed slopes. St. Barnaby's and Saffron Thistles are also widespread. Around the Hervey Ranges, Vulpia is a problem and river weeds are common, especially near Arthurville and Yeoval. Wellington Shire Council is concerned about the spread of weeds, especially Golden Dodder and Noogoora Burr, and the lack of coordinated weed control programs downstream of where Buckinbah Creek joins Little River.

Weeds in crops are widespread but, as landholders see weed control as part of normal cropping practice, there is little concern about these.

Pests

Some native animals, especially kangaroos, cause problems and require further control. Foxes, rabbits and wild pigs are also a problem. There are some fish pests that are covered under the River Environment section.