



# Memorandum

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From: Greg Smith, Monitoring & Drainage Coordinator

Subject: **Nutrients in Drains in the Shepparton Irrigation Region 2005/06**

Date: 29 October 2007

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## **PURPOSE**

To provide information on nutrient loads discharged from surface drains in the Shepparton Irrigation Region between July 2005 and June 2006.

## **BACKGROUND**

A review of nutrient levels in irrigation drains in the Shepparton Irrigation Region for 2005/2006 has been completed. Nutrient data is collected as part of project C806 "Monitoring of Nutrients in Drains in the Shepparton Irrigation Region". The report summarises data collected from 15 drain monitoring sites in the Broken, Goulburn and Campaspe catchments. Data from Rices Weir, at the bottom of Broken Creek, Goulburn River at McCoys Bridge, River Murray at Torrumbarry and Campaspe River at Echuca are also included in the analysis.

Data has been collected under this program since 1990. The number, and location of sites, has varied over this time. Water samples are collected and analysed fortnightly and this data is then coupled with continuous flow data to enable calculation of nutrient loads.

The data is also used to calculate the overall export of nutrients from the Goulburn-Broken catchment and show the effects of implementation of the Goulburn Broken Water Quality Strategy and related catchment strategies.

Funding for the drain monitoring program is provided by G-MW Irrigation Areas and the Shepparton Irrigation Region Implementation Committee of the Goulburn Broken Catchment Management Authority.

This paper provides a brief summary of the report and data. A full copy of the report can be provided on request or see GMW doc#2254360 or the GMW library.

## DISCUSSION

### Concentration of nutrients and suspended solids

Water in irrigation drains continued to be of poorer quality than water in rivers and streams. Drainage water generally has high concentrations of total nitrogen (TN – medians generally >1 mg/L), total phosphorus (TP – medians > 0.1 mg/L) and filtered reactive phosphorus (FRP - medians > 0.01 mg/L) although there is considerable variation between sites.

- The highest median TN was 2.4 mg/L in Shepparton Drain 11 and the lowest was 0.69 mg/L in Rodney Main Drain.
- The highest median TP was 0.77 mg/L in both MV Drain 6 and 13, while MV Drain 13 had the highest FRP of 0.38 mg/L (marginally above MV Drain 6).
- The lowest median TP was 0.13 mg/L in Rodney Main Drain.

Median concentrations of suspended solids (SS) were in the range 33 to 120 mg/L, slightly higher than the previous year. The Toolamba Drain median SS of 120 mg/L was the highest, whilst the Bamawm Drain recorded the lowest median. As a comparison, in lowland rivers SS is usually less than 30 mg/L.

### Nutrient Loads discharged from drains

Loads of TN and TP discharged from drains overall were lower than the previous year and similar to 2003/04. The same was true for annual flows, which tend to be the main factor determining loads. In 2005/06:

- MV Drain 6 discharged the largest load of TP (10.6t) and TN (20t), or 25% less after taking into account diversions downstream of the monitoring point. In the previous 2 years Deakin Drain discharged the largest nutrient loads.
- Deakin Drain discharged the largest suspended sediment load of 581t, less than one third of the previous year.

Irrigation water allocations in 2005/06 reached 100% WR in the Goulburn system in November, the same as in the previous two years. In the Murray system, the 2005/06 allocation reached 144% WR (15 April) whereas in the previous two years it only reached 100% WR.

This raw load figure is useful as it indicates sources of large loads, but a more useful figure is kilograms of nutrient per hectare per year, known as a generation or export rate. This then takes the size of the catchment into account. Table 1 shows TP and SS export rates (note: length of record varies across sites). In 2005/06 most drain export rates were less than or equal to the all-years average export rates. As is 2004/05, Murray Valley Drain 6 had the highest TP export rate and Toolamba Drain the highest SS export rate. Export rates varied substantially between drains.

**Table 1.** Irrigation Drain TP and SS export (or generation) rates (kg/ha/yr)

Station Number	Description	TP kg/ha/yr all years	TP kg/ha/yr 2005/06	SS kg/ha/yr all years	SS kg/ha/yr 2005/06
405297	Warrigal Creek	0.08	0.17	8	4
405720	Rodney Main Drain, Wells Creek	0.37	0.23	39	25
405730	Toolamba Depression	0.21	0.21	56	45
405779	Shepparton Drain 11	0.08	0.10	10	7
405758	Shepparton Drain 12	0.39	0.35	50	31
406263	Mullers Creek at MV Highway	0.06	0.02	2	3
406704	Deakin Main Drain Outfall	0.29	0.22	20	19
406750	Bamawm Main Drain at Dargan's Bridge	0.48	0.34	33	21
406756	Mosquito Creek at Curr Rd	0.07	0.07	9	3
407712	Lockington Main Drain	0.16	0.03	15	7
406758	Bamawm @ Richardsons Lagoon	0.12	0.07	8	3
409711	Murray Valley Drain 3	0.12	0.05	43	0
409712	Murray Valley Drain 6	1.06	0.61	78	22
404712	Muckatah Drain outfall	0.01	0.00	0	0
405232	Goulburn River @ McCoys	0.08	0.03	8	n/a

(from doc#574896)

### **Drain Nutrient Loads over time**

The load of total phosphorus discharged from “monitored” drains since 1990/91 is shown in Figure 1 (attached). [“Monitored” drains are Deakin, MV6, Rodney and Toolamba. These have been monitored since about 1990 and provide a means of looking at long term trends]. The graph shows that phosphorus loads declined in 2005/06 and are still below the long term target. The 5 year rolling average has also declined to a new low and remains well below the target value for reduction of nutrient loads from irrigation drains.

The estimated phosphorus load for all drains is shown in Figure 2 and this plot has a similar shape to Figure 1.

The total nitrogen load discharge from monitored drains is shown in Figure 3.

### **Drain Flows**

Total estimated annual volume discharged from drains is shown in Figure 4. This shows drain flows over the past few years have been substantially lower than earlier years, with flows in 2002/03 remaining the lowest on record. The 5 year rolling average continues to show a decline.

### **Catchment Nutrient Load Export**

The overall tonnage of TP and TN exported from the Goulburn Broken catchment during 2004/05 was estimated to be 78 t TP and 558 t TN, compared to the long term average of 240 t TP and 1742 t TN respectively. Figures 5 and 6 show how these figures have varied since 1991/92.

The Campaspe catchment exported 1.1 tonne TP and 8.4 tonne TN during 2004/05, which was well below the 5-year average.

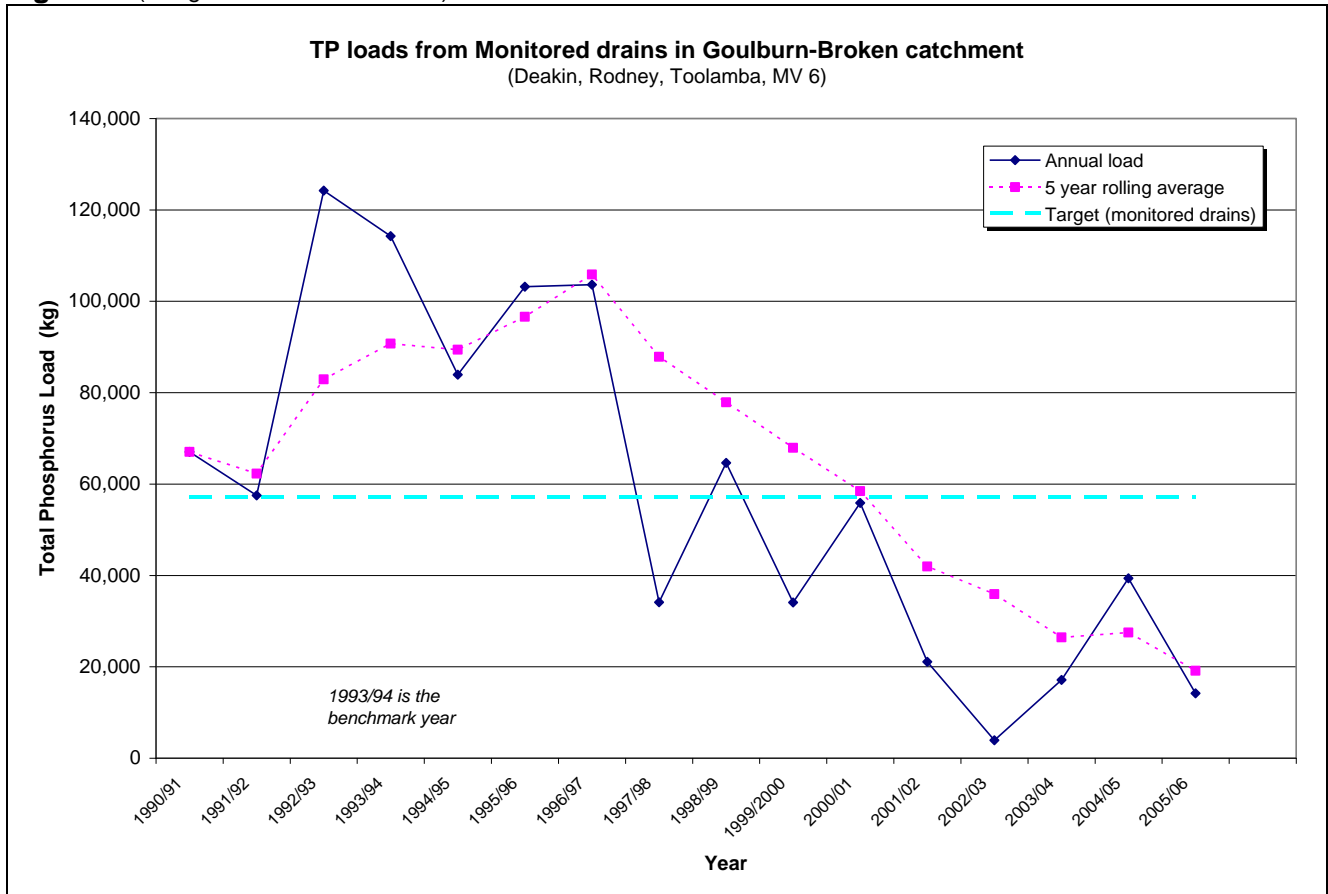
## **RECOMMENDATION**

For information.

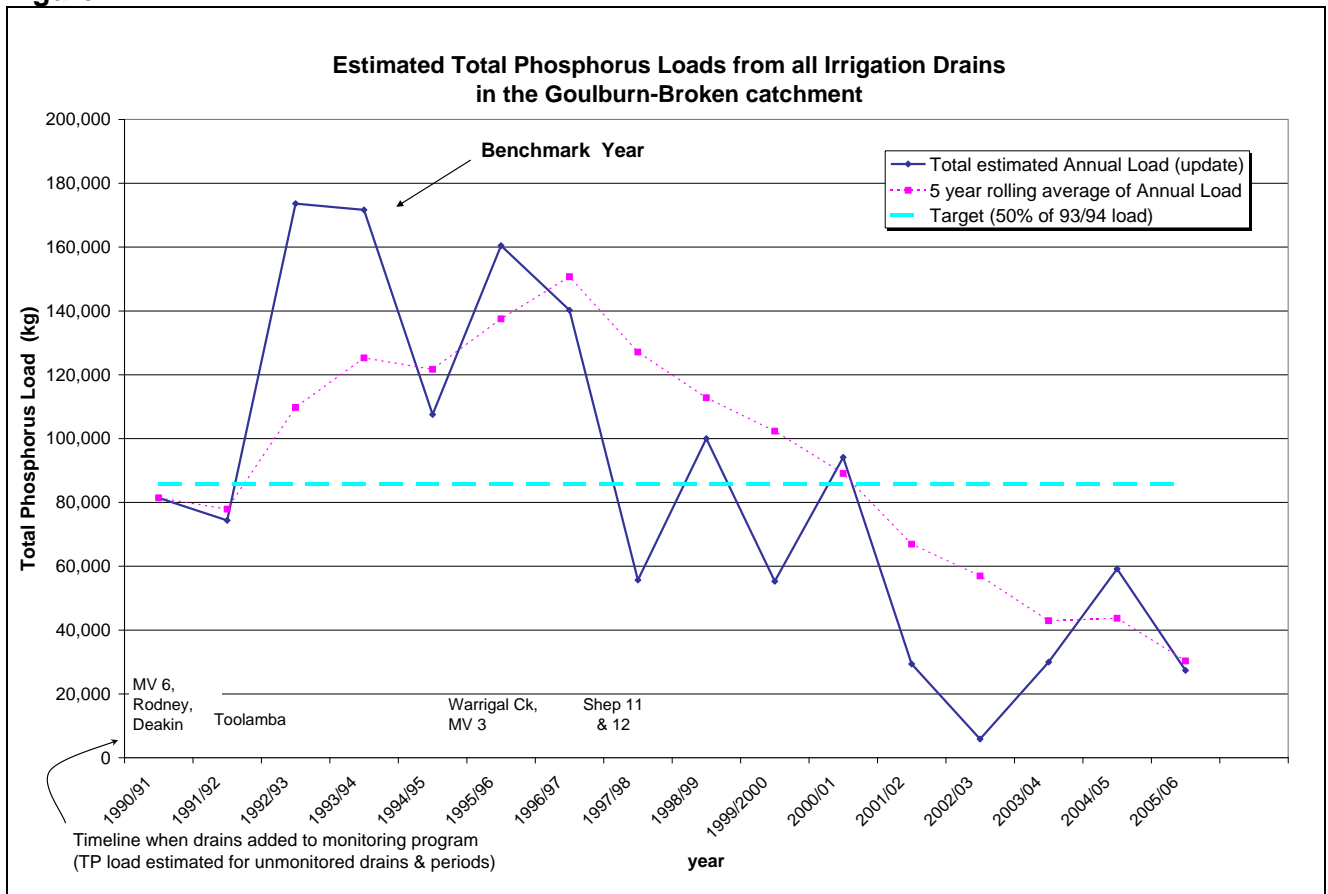
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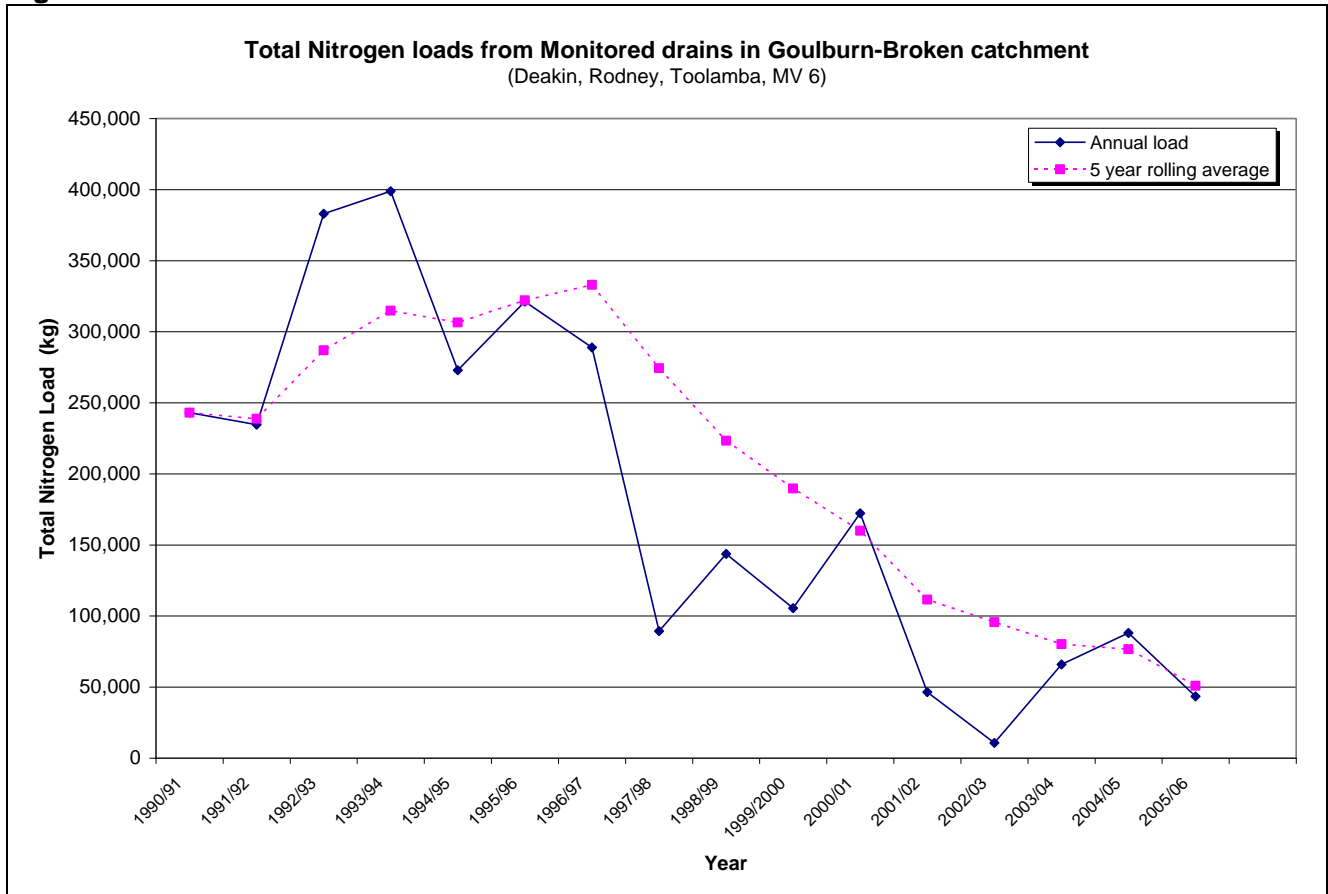
**Figure 1** (all figures from doc#309910)



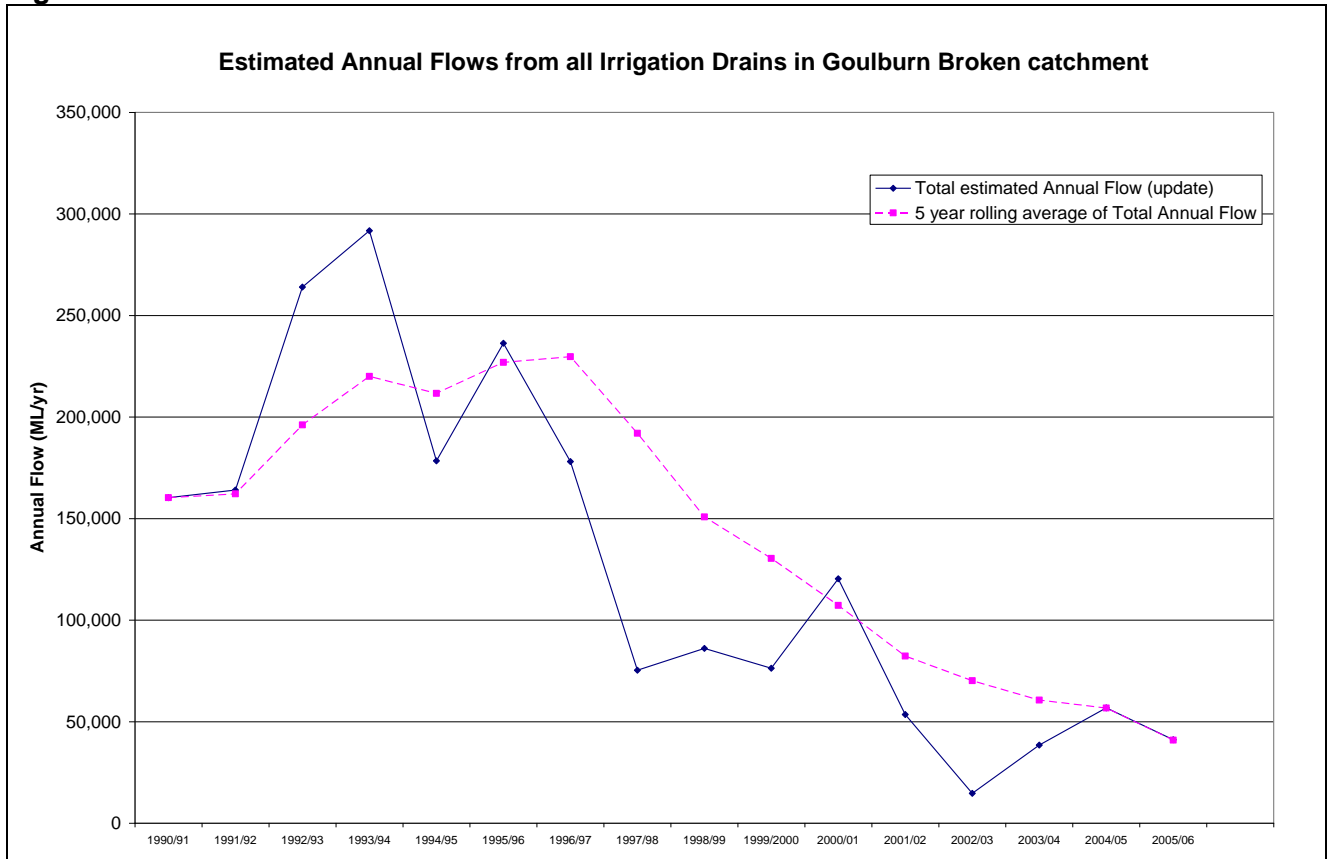
**Figure 2**



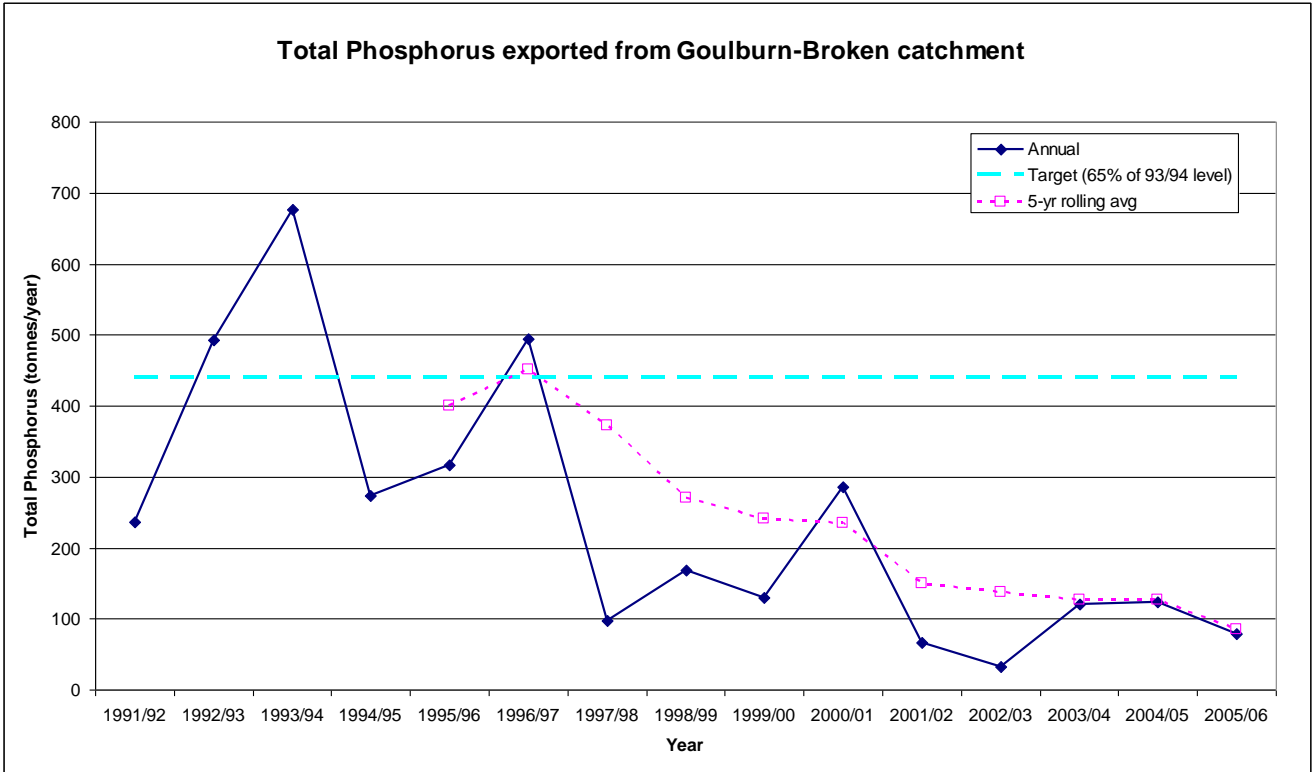
**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**

