Idaho State Department of Agriculture
Division of Agricultural Resources

Jewel Wetland
Water Quality Monitoring Report
August 3 through October 11, 2006

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ISDA Technical Report Summary W-18 January 2007

Introduction

At the request of the Lower Payette River Watershed Advisory Group (LPR WAG) the Idaho State Department of Agriculture (ISDA) conducted a second year of water quality monitoring on the newly constructed Jewel Wetland Complex. Due to a heavy work load ISDA was unable to commence monitoring at the wetland until August of 2006. Samples were collected bi-weekly from six locations commencing on August 3 and ending October 11, 2006. The six locations (Figures 1 and 2) were identified as follows:

- Diversion—Water from the Canyon County district drain that enters the wetland.
- Weir outlet— Water leaving the wetland and enters the North Drain.
- Durham Spill—Spill water from the Payette Canal that enters the North Drain.
- North Drain— Drain that carries irrigation and spill water into the Snake River.
- Anderson Spill—Spill water from the Payette Canal that enters the South Drain.
- South Drain— Drain that carries irrigation and spill water into the Snake River.

It should be noted that due to very high water within the Snake River, caused by spring flooding, severe back water occurred on the North Drain causing major flooding in and around the wetland. This flooding allowed a large population of carp to migrate up the North Drain and gain entrance into the Jewel wetland. This large population of carp may be one reason why the data collected this year indicates increases in total phosphorus and sediment at the weir outlet.

Evidence suggests that carp have significant impact on turbidity levels in freshwater systems. The characteristic feeding behavior of carp resuspends sediment and disturbs macrophytes (Roberts et al. 1995).

Figure 1. Jewel wetland sites.

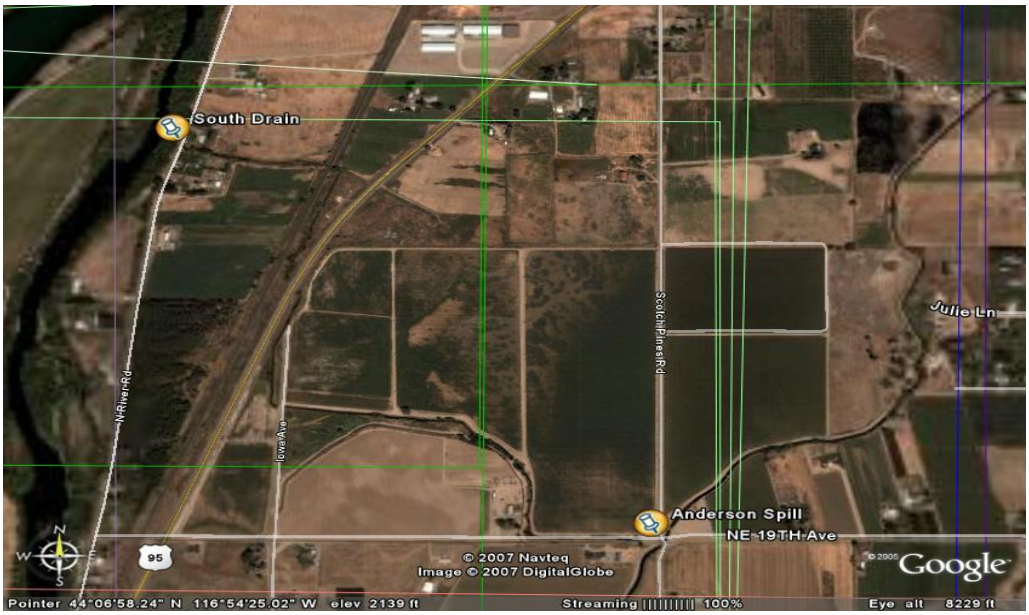

Figure 2. South Drain and Anderson Spill.

Concentrations and Loading for Jewel Wetland

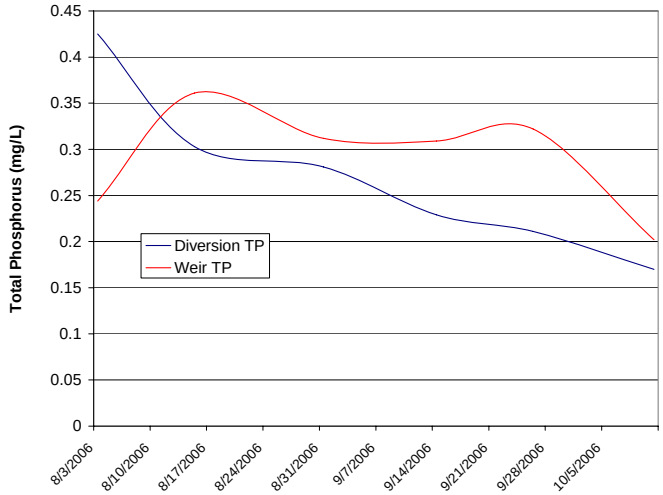

Figure 3. Diversion and weir TP concentrations.

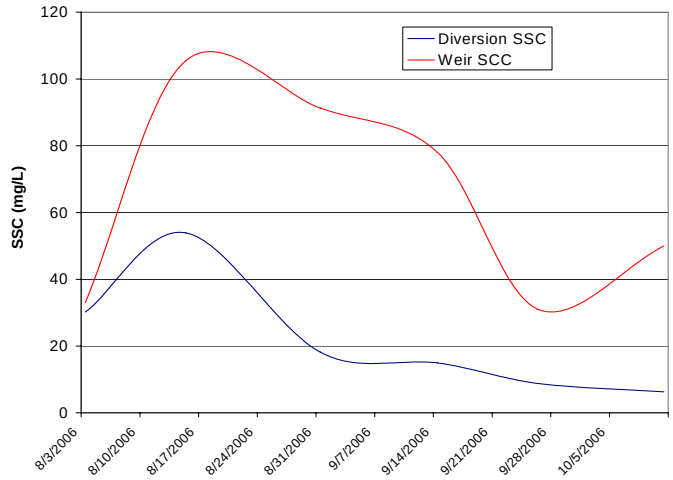

Figure 4. Weir and diversion SSC concentrations.

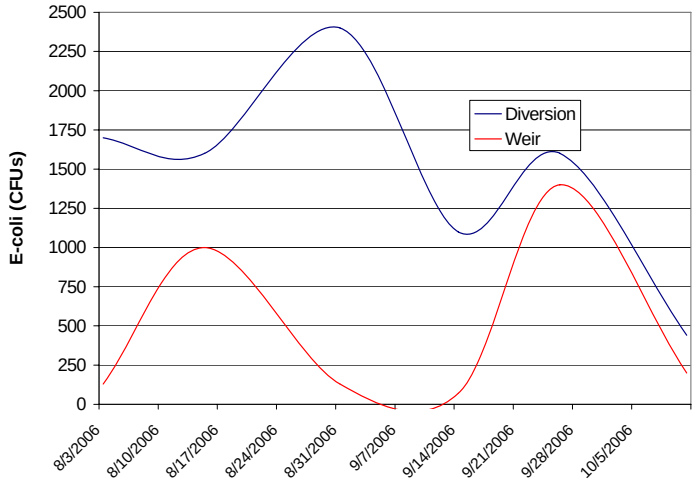

Figure 5. Weir and diversion *E-coli* levels.

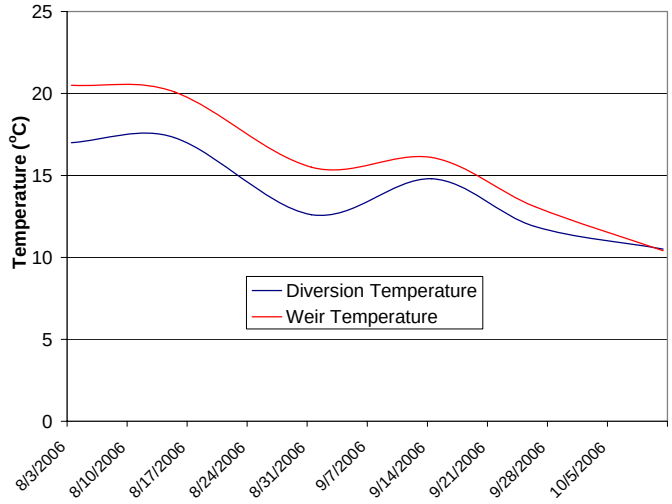

Figure 6. Weir and diversion temperature.

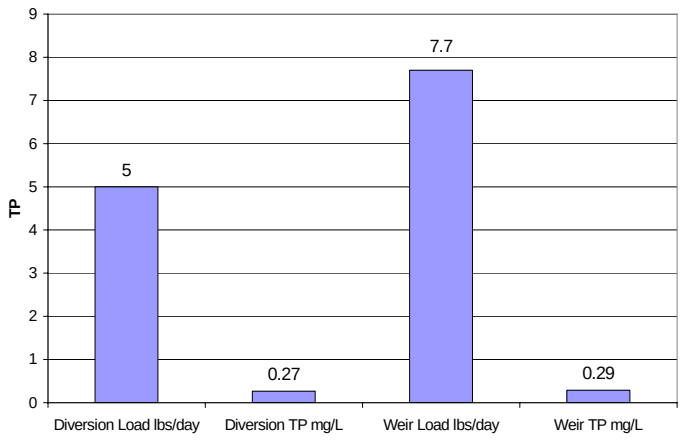

Figure 6. Total phosphorus average load and concentration.

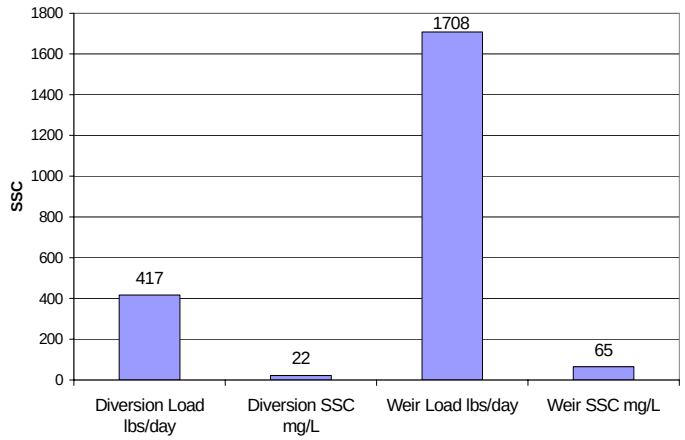

Figure 7. SSC average load and concentration.

North Drain, Durham Spill and Wetland Weir Data.

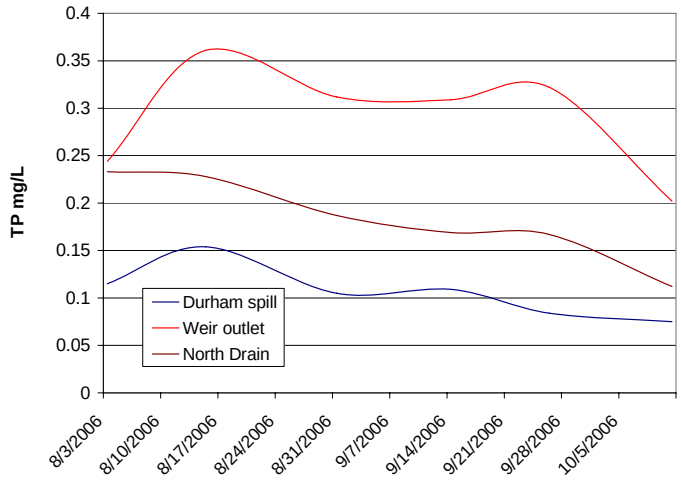

Figure 8. Total phosphorus concentrations.

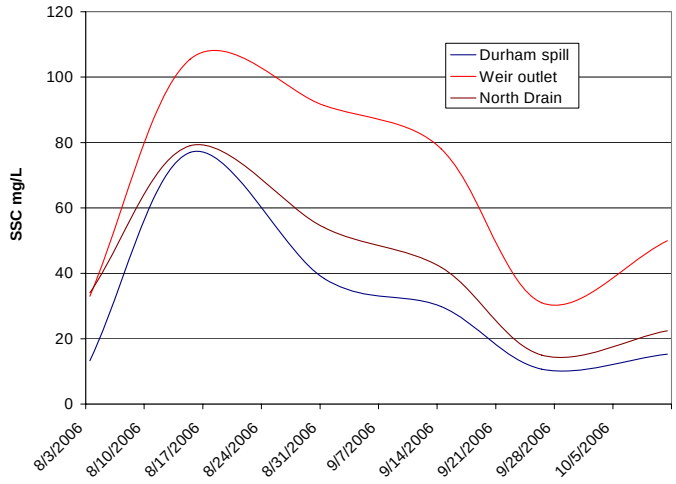

Figure 9. Suspended sediment concentrations.

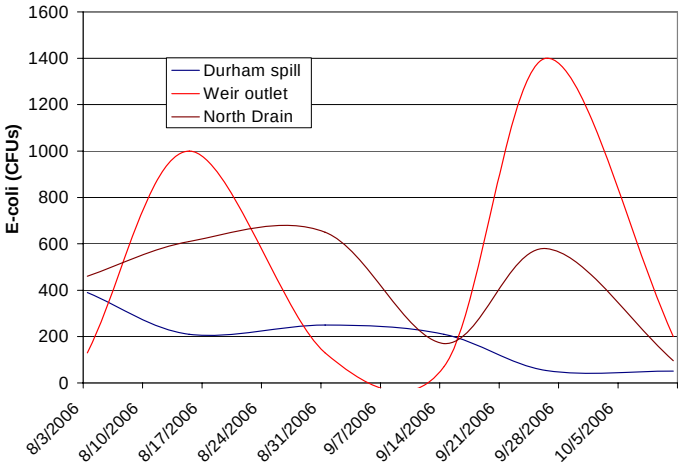

Figure 10. *E-coli* concentrations.

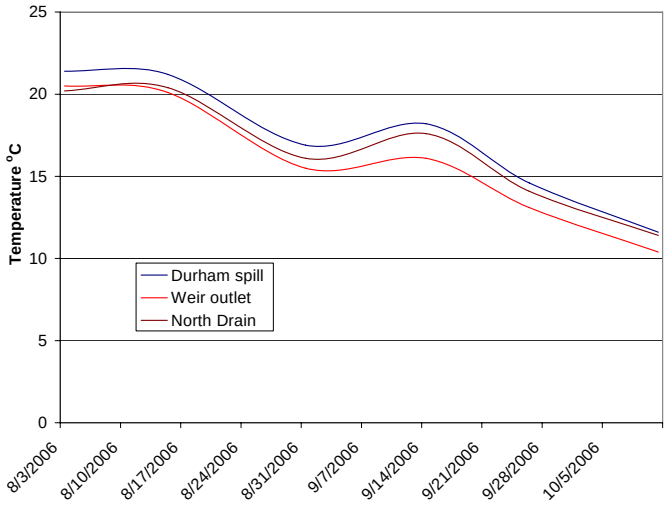

Figure 11. Instantaneous temperature.

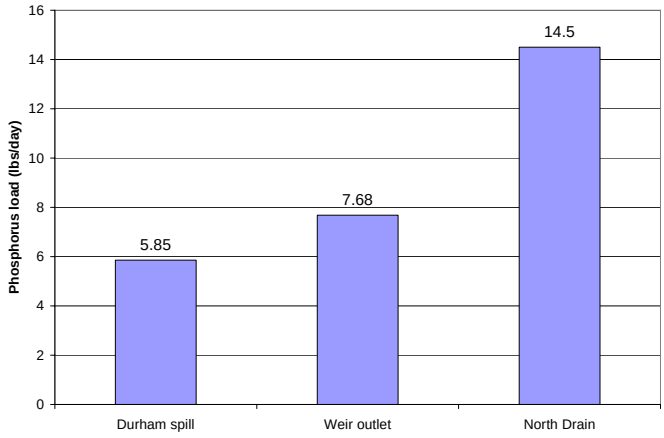

Figure 12. Phosphorus load (lbs./day).

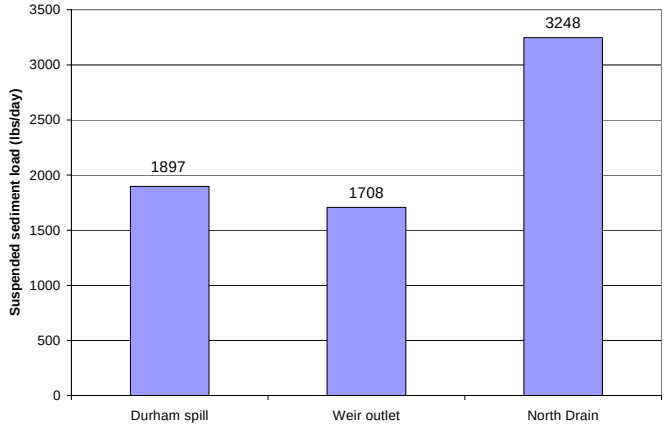

Figure 13. Suspended sediment concentration load (lbs/day).

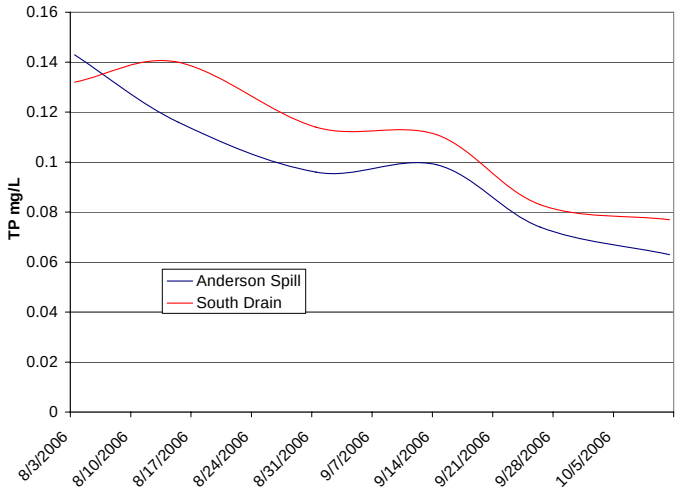

Figure 14. South drain total phosphorus (mg/L).

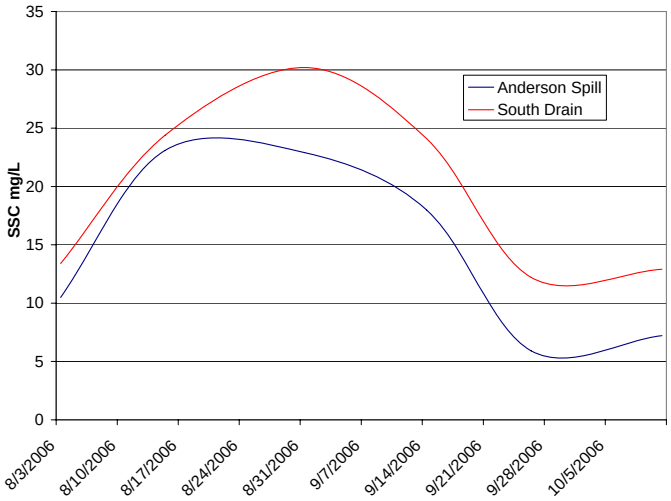

Figure 15. South drain suspended sediment (mg/L).

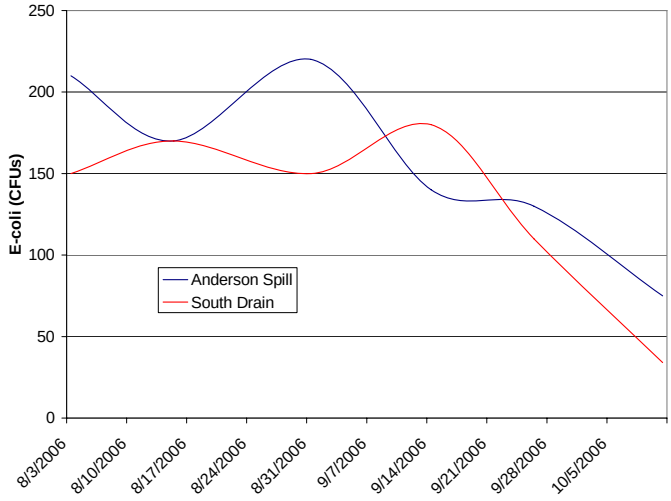

Figure 16. *E-coli* concentration.

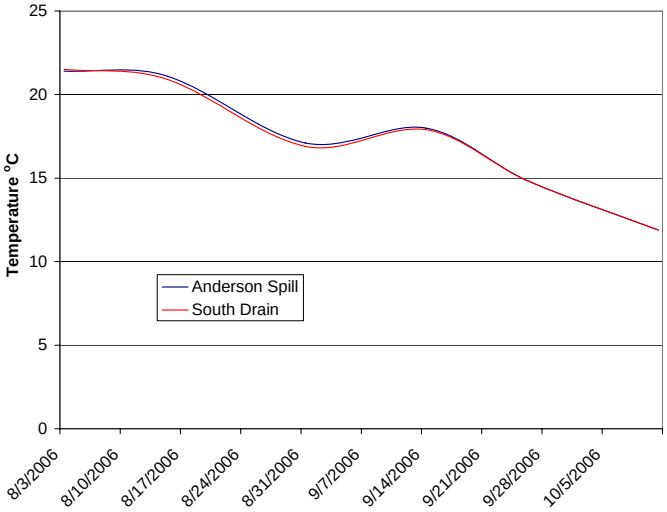

Figure 17. Instantaneous temperature.

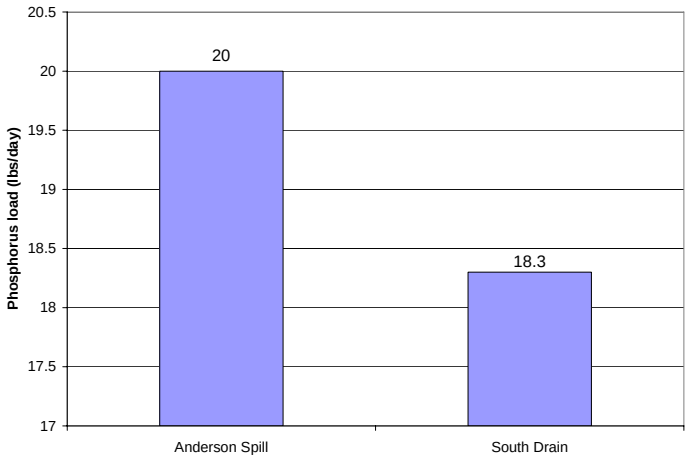

Figure 18. South drain phosphorus load (lbs/day)

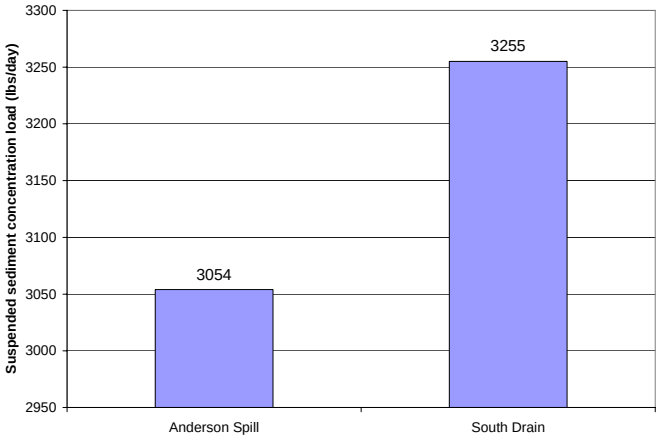

Figure 19. South drain suspended sediment load (lbs/day).

Observations

The 2006 monitoring covered the time period from August through the first of October while the 2005 monitoring encompassed the entire irrigation period of April through October. The samples collected from the wetland weir in 2005 covers the same time period as 2006 (August through October).

The site showing the largest increases in both total phosphorus and suspended sediment was the wetland weir outlet. Phosphorus levels increased on average from 0.21 mg/L to 0.29 mg/L. While the average sediment concentration increased from 12.2 mg/L to 65 mg/L (Table 1). Since the water entering the wetland (Diversion) remained relatively constant from 2005 the only plausible reason for the increased sediment would appear to be the introduction of carp into the wetland.

The site that showed the largest decrease in loading of both phosphorus and sediment was the South Drain. Average suspended sediment loading dropped from 20, 942 lbs/day in 2005 to 3255 lbs/day in 2006 (Table 1). There may be two reasons for this large reduction; one being the short monitoring time in 2006 that was geared towards the end of the irrigation season. The second reason may be that in 2005 the South Drain had higher TP and SSC levels earlier in the irrigation season and a very high load in July (TP = 0.53 mg/L; SSC = 356 mg/L).

Table 1. Jewel wetland average data 2005 and 2006.

Site	TP mg/L	TP Load	SSC mg/L	SSC Load	CFS
Diversion 2005	0.31	8	28	671	4.53
2006	0.27	5	22	417	3.27
Weir 2005	0.21	5	12.2	288	4.38
2006	0.29	7.7	65	1708	4.77
North Drain 2005	0.19	15	37	2855	14.3
2006	0.18	14.3	41	3248	14.7
Durham Spill 2005	0.13	6	8.8	1331	8.58
2006	0.11	5.9	30.8	1897	9.9
Anderson Spill 2005	0.1	15	30.3	4456	27.3
2006	0.1	20	14.6	3054	38.8
South Drain 2005	0.17	42	85.4	20942	45.5
2006	0.11	18.3	19.5	3255	32

Additional observations suggest that the number of carp in the wetland may exceed the carrying capacity of the system. It may be necessary in the future to remove or reduce the carp population, from the wetland, if it is expected to function properly for removal of sediment and phosphorus.

References

Roberts, J., Chick, A., Oswald, L. and Thompson, P. 1995, The effects of carp Cyprinus carpio L., an exotic benthivorous fish, on ecological structure and processes in experimental ponds, Marine and Freshwater Research, vol. 46, pp. 1171-1180