Wetlands for Potential Rehabilitation and Water Savings within the NSW Murray Valley.

Preliminary Report - Extent of Sulfidic Sediments in 9 Wetlands between Albury and Corowa.

Background

The Murray Wetlands Working Group requested the Murray-Darling Freshwater Research Centre to determine whether or not 9 specific wetlands between Albury and Corowa contained sulfidic sediments. The wetlands in question were 8212, 8247, 7413, 7804, 7410, 7312, 7369, 7330 and 7992 (all numbers refer to the MWWG numbering system).

Methods

Three cores were taken from each wetland (except Wetland 7804 where only two cores were taken) and sent to the Environmental Analysis Laboratory in Lismore for analysis for a range of parameters (see Table 1). In addition pH, conductivity, dissolved oxygen and turbidity were also measured in the water column at the time of sampling.

Results

Based on the criteria previously described for inland wetlands (Hall et al. 2006) Wetland 8212 most likely contains sulfidic sediments. Two of the three replicates had chromium reducible sulfur (S_{Cr}) and/or Peroxide oxidisable sulfur (S_{POS}) greater than 0.02%. In addition, the net acidity for all three samples were greater than 18 moles H^+/tonne, suggesting that if the sediments were oxidised (through drying) they would produce acid. One core from Wetland 7413 also had S_{Cr} greater than 0.02% and a net acidity greater than 18 moles H^+/tonne, suggesting that pockets of sulfidic sediments may be present in the wetland. Two wetlands (7339 and 7369) had at least one core with S_{POS} (but not S_{Cr}) values greater than 0.02% and had net acidities greater than 18 moles H^+/tonne; and would be classified as possibly containing sulfidic sediments.

Interestingly, in a previous assessment (Hall et al. 2006), based on S_{Cr} levels, we found strong evidence for sulfidic sediments in Wetland 7804 (Croppers Lagoon), but during the current study the level of S_{Cr} was relatively low. One possible explanation is the water level in Croppers Lagoon is substantially lower now than during the first sampling period. This may have led to the oxidation of the sulfides in the sediments (similar to Bottle Bend lagoon). However, unlike Bottle Bend Lagoon, the oxidation (if it occurred) did not result in a net acidification of the water body. During the first sampling occasion sediments from Croppers Lagoon had a relatively high acid neutralising capacity (roughly 100 moles H^+/tonne); sediments taken in the current sampling program had no measurable excess neutralising capacity. If oxidation of sulfidic sediments did occur, there was sufficient buffering capacity in the sediments to prevent net acidification, however this capacity has now been depleted.

Summary and Recommendations

Of the 9 wetlands identified for water savings, one wetland (8212) has sediment characteristics that indicate that there is a real likelihood that during drying the wetland will become acidic and as a consequence will suffer long-term ecological damage. Furthermore three other wetlands (7413, 7339 and 7369) may be at risk of acidification. Unfortunately there is very little knowledge available on sulfidic sediments in wetlands to adequately determine the actual risk of drying out these wetlands. In order to assess the risk of long-term ecological damage, sediments from these wetlands should be subjected to a laboratory-based experimental wetting and drying regime and monitored for acid pulses. This will provide some early indication of whether the government should consider investing substantial amounts of money to initiate a wetting/drying regime for the purposes of water recovery.

Table 1: Results of sediment sampling of nin priority wetland sites

Wetland Number (replicate)	S_{POS} (%S)	S_{Cr} (%s)	Titratable Actual Acidity (moles H^+/tonne)	Titratable Potential Acidity (moles H^+/tonne)	Titratable Sulfidic Acidity (moles H^+/tonne)	Net Acidity (moles H^+/tonne)
7312 (1)	≤0.01	0.004	10	13	3	12
7312 (2)	≤0.01	0.001	8	8	0	8
7312 (3)	≤0.01	0.004	25	10	-15	27
7339 (1)	≤0.01	0.006	50	15	-35	54
7339 (2)	0.02	0.013	75	38	-38	83
7339 (3)	0.02	0.015	55	30	-25	64
7369 (1)	≤0.01	0.004	20	10	-10	22
7369 (2)	≤0.01	0.006	43	13	-30	46
7369 (3)	0.03	0.011	55	15	-40	62
7410 (1)	≤0.01	0.008	55	8	-48	60
7410 (2)	≤0.01	0.003	25	10	-15	27
7410 (3)	≤0.01	0.013	63	35	-28	71
7413 (1)	≤0.01	0.005	40	15	-25	43
7413 (2)	≤0.01	0.012	30	13	-18	37
7413 (3)	≤0.01	0.024	50	8	-43	65
7804 (1)	≤0.01	0.009	10	25	15	16
7804 (2)	≤0.01	0.008	35	23	-13	40
7992 (1)	≤0.01	0.003	28	13	-15	29
7992 (2)	≤0.01	0.002	18	10	-7	19
7992 (3)	≤0.01	0.004	23	8	-15	25
8212 (1)	≤0.01	0.028	18	10	-7	35
8212 (2)	**0.04**	**0.023**	**43**	**73**	**30**	**57**
8212 (3)	0.04	0.012	98	140	43	105
8247 (1)	≤0.01	0.017	43	95	53	53
8247 (2)	≤0.01	0.009	30	18	-13	36
8247 (3)	≤0.01	0.011	48	13	-35	54