

# CURRENCY CREEK & FINNISS RIVER WATER QUALITY REPORT

Report 1, 14 June 2009

## Observations at a glance

- Low pH values, high acidities and high metal levels have been observed in pooled water in several locations in the Currency Creek region
- pH and alkalinity levels in the Finnis region have been declining
- Aerial limestone addition is underway in the Currency region but these results were not available at the time of this report

## Background

The Environment Protection Authority, Department for Environment and Heritage, and the South Australian Murray–Darling Basin Natural Resources Management Board are monitoring to assess potential water quality impacts associated with water level decline and the exposure of acid sulfate soils (ASS) in the Currency Creek, Finnis River and Goolwa Channel region (Figure 1).

A wide range of water quality parameters are being analysed the key parameters at this time are alkalinity, salinity, pH, turbidity and metals.

***pH is a measure of acidity or alkalinity. Pure water has a pH of 7, acidic solutions have lower values and alkaline solutions have higher values. Prior to the recent drying and re-wetting, the pH in the region was between 8 – 8.5.***

***Acidity is a measure of the acid (Hydrogen ions) and dissolved metal ions present in water bodies. Acidity is expressed as the volume of Calcium Carbonate (mg/L of CaCO<sub>3</sub>) required to neutralise any acid. Acidity build up occurs when the alkalinity or buffering capacity has been consumed***

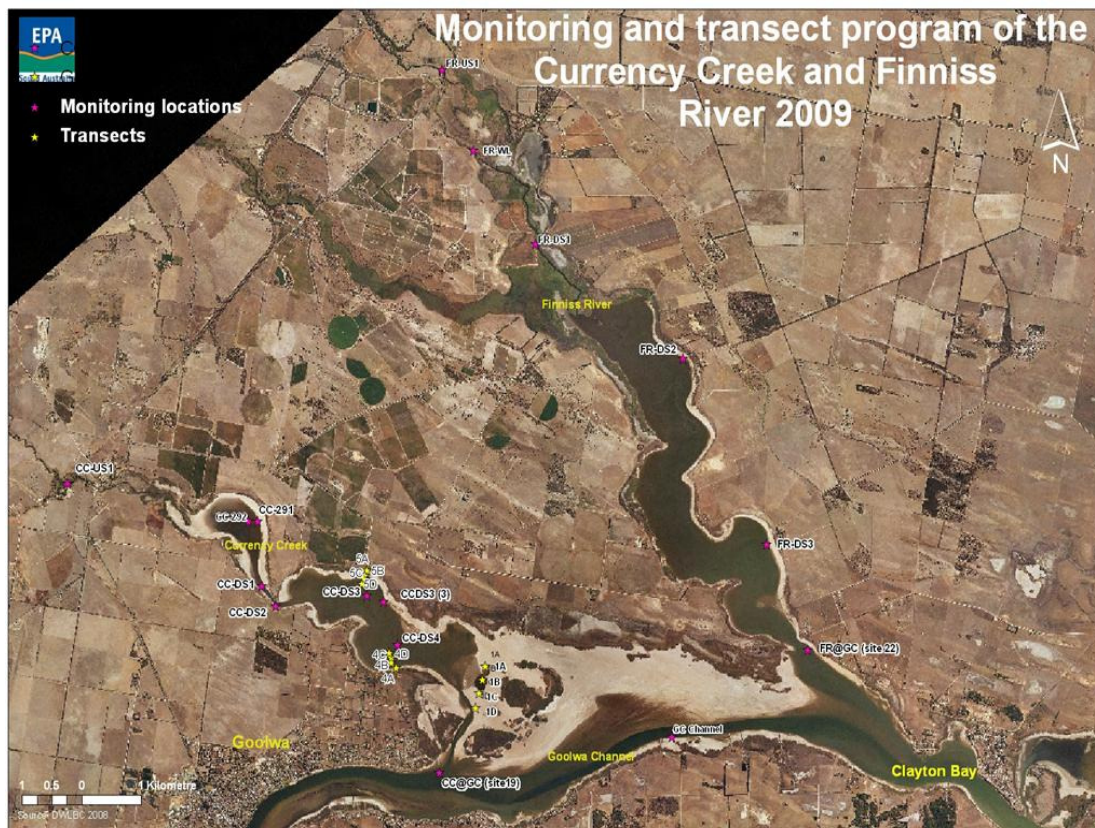
***Alkalinity is a measure of the buffering capacity of water, or the capacity of the water to neutralise acids and resist pH change. Alkalinity within water bodies is consumed as acid is released from acid sulfate soils. Adding limestone contributes alkalinity to waters helping to neutralise any acid released from the sediments. Historically levels within this region have been measured between 150 – 250 mg/L as CaCO<sub>3</sub>.***

***Salinity is a measure of the amount of dissolved salts in the water. Saline water conducts electricity more readily than freshwater so electrical conductivity (EC) is routinely used to measure salinity. As***

**salinity levels increase it may become toxic to native freshwater organisms. Prior to drought conditions salinity was observed between 1 and 1.2 mS/cm within the region.**

**Metals may be toxic to aquatic organisms if they are found at high levels. Acidification of soils releases metals which can be released into water bodies.**

**Figure 1 Map of sample sites**



A number of sites have been identified as high risk sites and as a result are being monitored as regularly as possible (in some instances up to 5 times weekly).

These sites include CCDS1 and CCDS2 which are located upstream (DS1) and (DS2) downstream of a pool containing a pre-emptive limestone addition site. CCDS3 is located on the north-west side of a large pool and the closest pool to the Goolwa Channel, CCDS4 is located on the south-east of this same pool, it also has been a site of limestone slurry pumping and is located west of a limestone barrier currently under construction. CC-291 is a large pool located upstream of the pre-emptive limestone site. CC@GC is located at the junction of the Currency Creek and Goolwa Channel. This site is vital for monitoring due to risks associated with the acidic pool at CCDS3 and CCDS4 reconnecting with the Goolwa Channel.

FRDS1 is located downstream of a pre-emptive limestone site. It is also downstream from the junction of tributaries entering Finniss which have been identified as showing impacts from ASS in the past. FR@GC has also been

added as a high risk site due to showing a decline in levels of alkalinity over the last fortnight.

## CURRENCY CREEK WATER QUALITY

Surface water quality results are discussed below for selected sites and parameters in the Currency Creek region. Please refer to graphs in Figure 2 for this section.

### ***Alkalinity***

- No Alkalinity has been recorded at four Currency Creek sites CCDS1, CCDS2, CCDS4 and CC-291.
- Alkalinity levels at the site CCDS4 had shown some minimal signs of improvement with levels reaching 32 mg/L on the 29<sup>th</sup> May. This was presumably a result of limestone slurry pumping which was being conducted on the same day of sampling approximately 25 m upstream of the sampling site. Nevertheless, since this time alkalinity levels have continued on a downward trajectory and are currently non existent.
- Alkalinity levels at the CCDS3 site have shown some improvement and are currently 61 mg/L.
- Alkalinity at the CC@GC site continues to remain steady at around 180 mg/L.

### ***Acidity***

- At the Currency Creek sample sites with low or absent alkalinity the acidity levels remain high and range between 25 and 295 mg/L as CaCO<sub>3</sub>. Acidity levels continue to remain quite variable at all of these sites.

### ***pH***

- pH levels remain below the ANZECC guideline level of pH<6.5 at all Currency sites except CCDS3 which has risen in recent weeks and is currently 8.20. The remaining sites all exhibit similar levels of pH within the range of 3.64 – 3.84.

### ***Salinity (EC)***

- After showing some improvements with decreases in salinity as a result of rains over the weekend of the 6<sup>th</sup> of June, all sites (CCDS1, CCDS2, CC291, CCDS3 and CCDS4) have since exhibited increases in EC. These five sites show salinity levels between the ranges of 15.4 and 32.4 mS/cm.
- Salinity levels at CCDS4 had remained steady at around 22.9 mS/cm.

## **Metals**

- Soluble metal levels (in particular Aluminium) are very high at all sites which have low pH. This is a result of the acidity dissolving the soil mineral surfaces and structure. Aluminium levels (>100mg/L) at some sites exceed ANZECC guidelines (0.0008 mg/L Aluminium at pH<6.5) by 100,000 times.

## **FINNISS RIVER WATER QUALITY**

Surface water quality results are discussed below for selected sites and parameters in the Finniss River region. Please refer to graphs in Figure 3 for this section.

### **Alkalinity**

- Most sites are showing a general declining level in alkalinity. It was initially thought that it may have been rainfall which was driving these declines via dilution. However more intensive monitoring has revealed rapid declines in alkalinity around the FR@GC site. FR@GC currently has an alkalinity of 79 mg/L. An additional site approximately 300m downstream of FR@GC was monitored and recorded an alkalinity of 67 mg/L, also the mouth of the Finniss was monitored at Clayton and recorded an alkalinity of 73 mg/L.

Sites were also monitored approximately 300 and 600 meters upstream of FR@GC, alkalinity both sites was observed to be 100 mg/L.

- It appears that there is a source of acidity in the vicinity of the FR@GC site or downstream from this site which is causing the declines in alkalinity. Possibilities may include the exposed bank on the western side of the Finniss River from the mouth at Clayton to directly across from site FR@GC. Additional possibilities may include sources East of Clayton or on Hindmarsh Island.

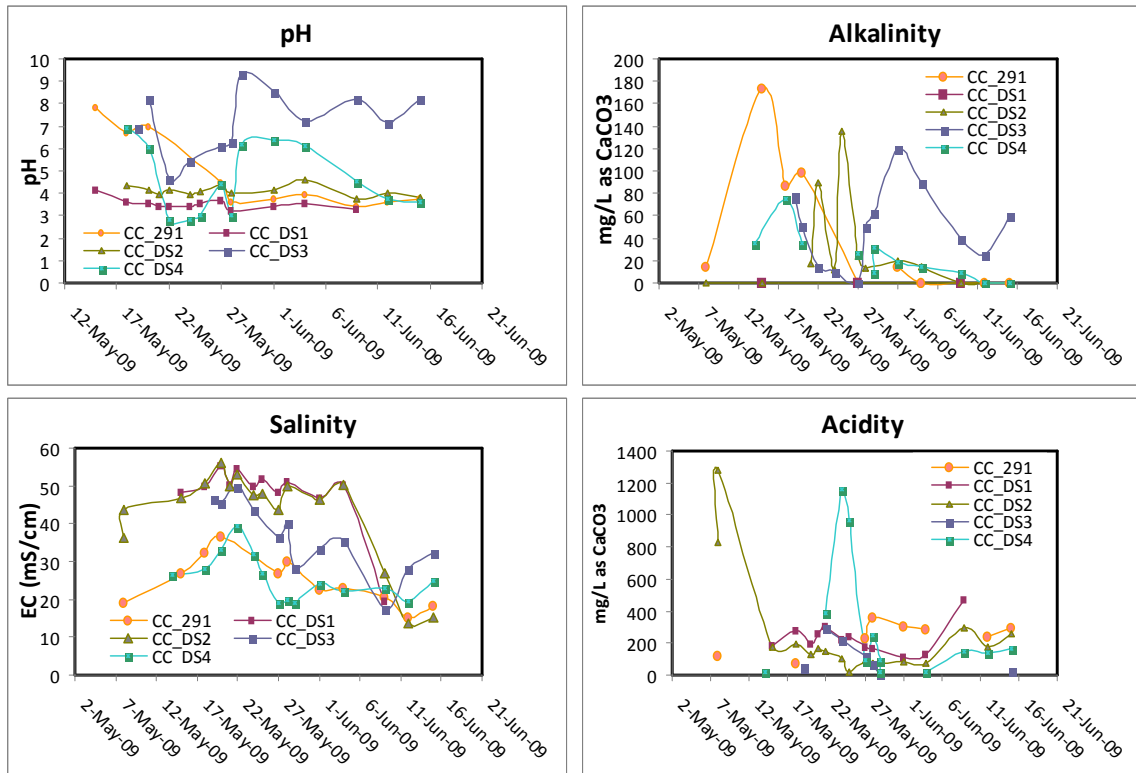
### **pH**

- pH levels at all Finniss sites remain within the ANZECC guidelines for aquatic ecosystems (pH 6.5 to 9).

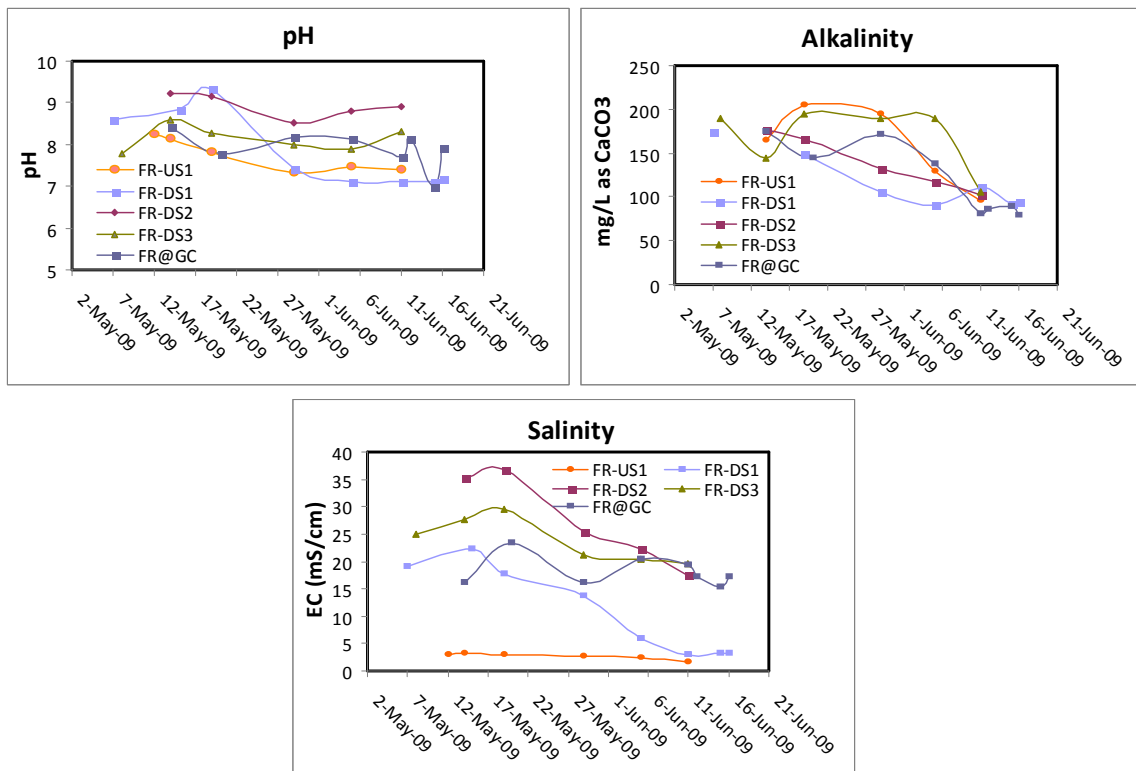
### **Salinity (EC)**

- Salinity levels have stabilised at approximately 17 mS/cm for the middle three sites (FRDS1, 2 & 3).
- Levels continue to remain steady at FRUS1 (currently 1.5 mS/cm).
- Levels at FR@GC have also stabilised but remain variable between 15 and 17.5 mS/cm.

## Figure 2 - Currency Creek Water Quality



## Figure 3 - Finniss water quality



Further information on water quality and quantity can be found on the following websites:

- Department for Environment and Heritage  
<http://www.environment.sa.gov.au/cllmm/>
- River Murray Data <http://data.rivermurray.sa.gov.au/> (real-time data)
- Environment Protection Authority [www.epa.sa.gov.au](http://www.epa.sa.gov.au)
- Department of Water, Land and Biodiversity Conservation  
[www.dwlbc.sa.gov.au](http://www.dwlbc.sa.gov.au)
- South Australian Murray–Darling Basin Natural Resource Management Board [www.samdbnrm.sa.gov.au](http://www.samdbnrm.sa.gov.au)
- Murray–Darling Basin Authority [www.mdba.gov.au](http://www.mdba.gov.au)
- Waterwatch [www.waterwatch.org.au](http://www.waterwatch.org.au)