



South Australia's Environment Protection Authority

# **Acid sulfate soil research in the Lower Lakes - update**

World Wetland Day presentation

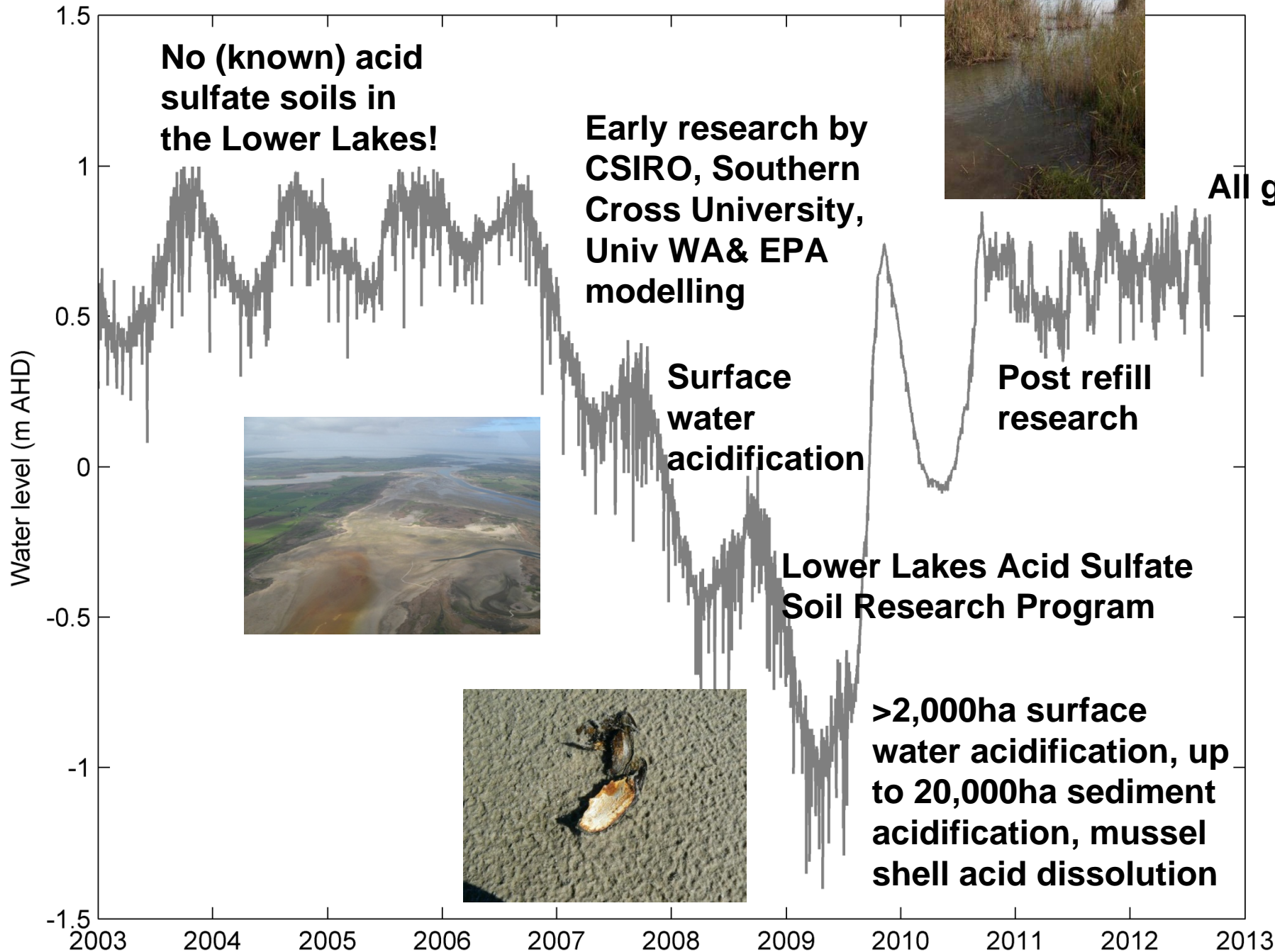
Signal Point, Goolwa

Friday 1<sup>st</sup> February 2013

Luke Mosley (Principal Scientific Officer, Water Quality)



**Water level - Goolwa 2003-2012**



# Management and research questions

## Overarching Questions

- How long will it take for the lakes to recover and what are the indicators of recovery/problems?
- What we would do differently to manage acidification risks in the future?

## Ecosystem

- What are the toxicological effects on key aquatic organisms?
- What are the minimum water levels required to protect key species?
- What are the implications of functional changes to ecosystem processes?

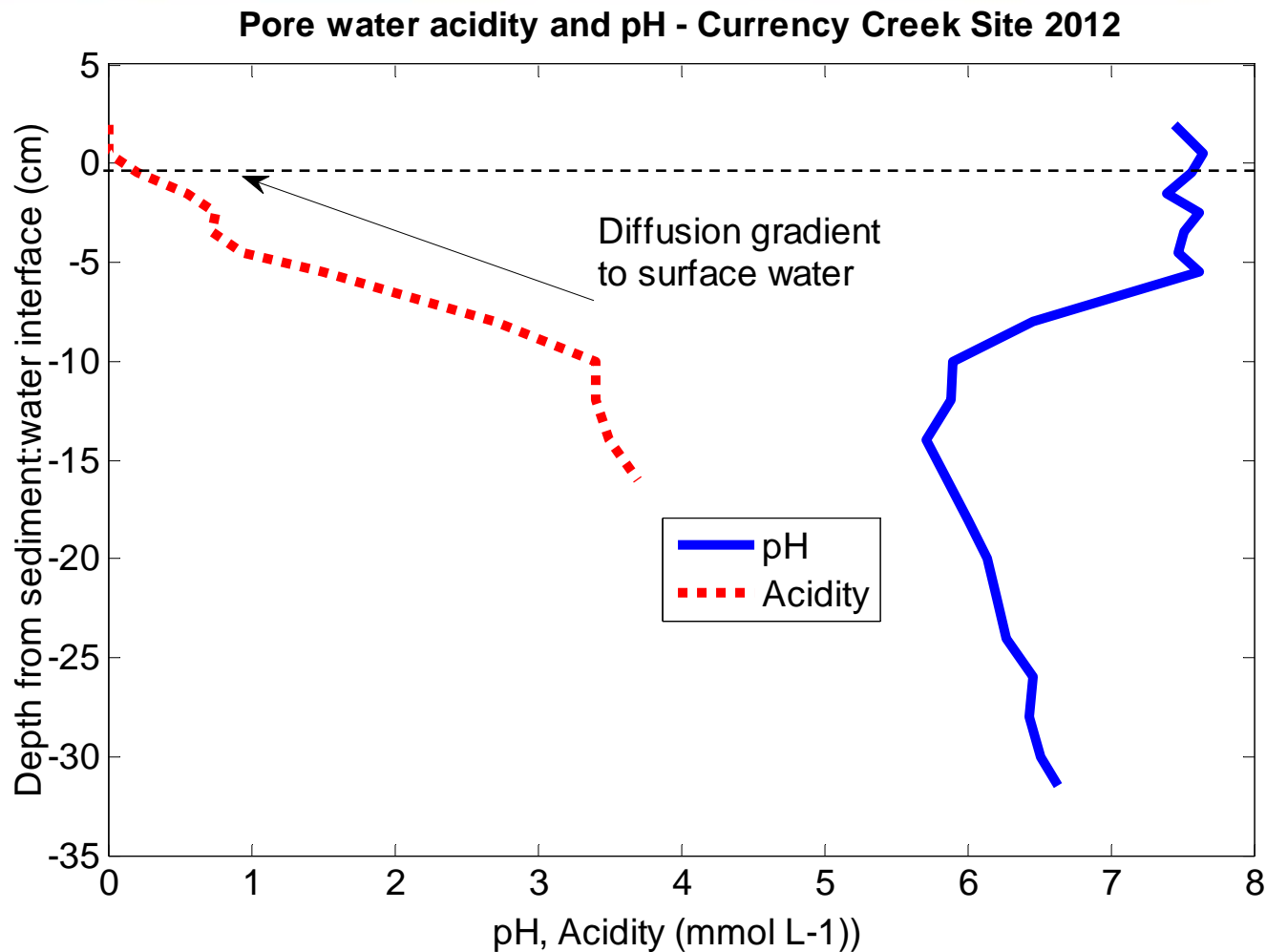
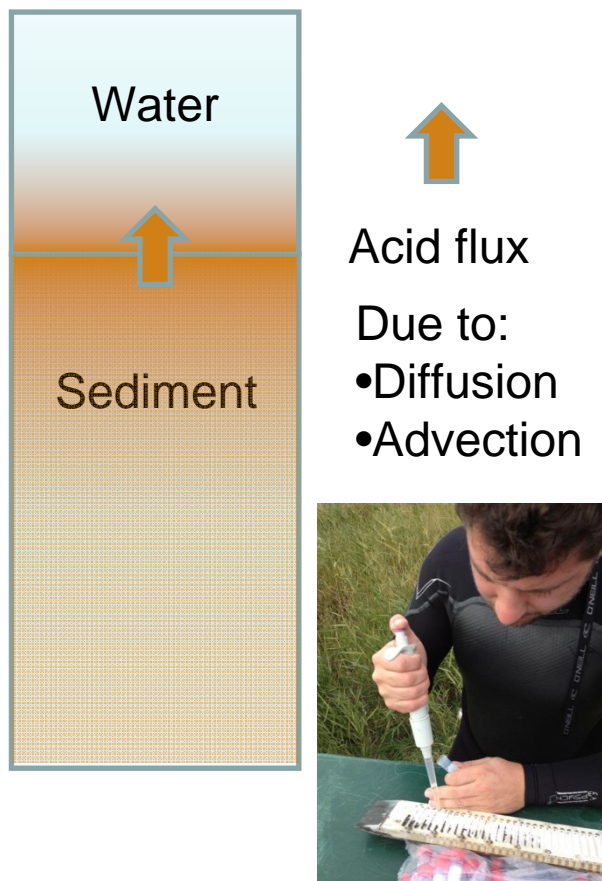
## Bioremediation

- What are the medium and longer term consequences of bioremediation?
- What are the rates and drivers of recovery?
- Are the lake sediments now more susceptible to future acidification?

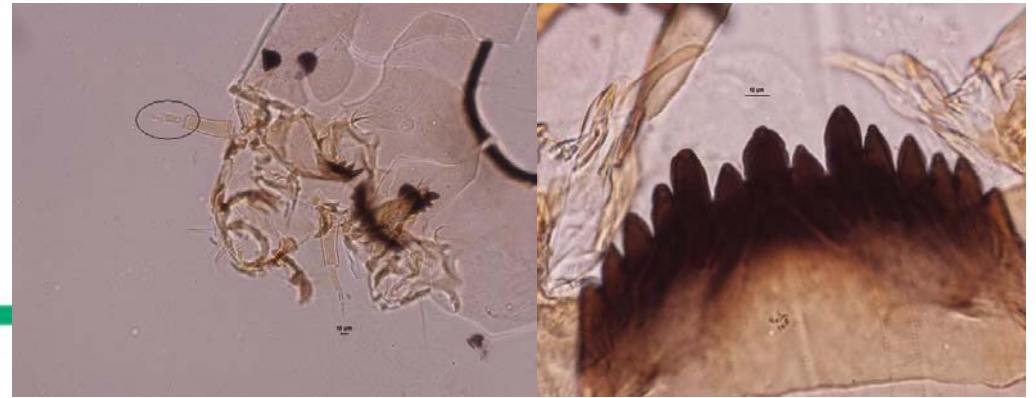
## Ground: surface water interactions

- How significant are surface - groundwater interactions ?

# Ecosystem - BETA pilot study (2012)



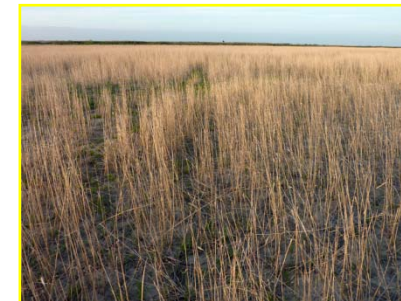
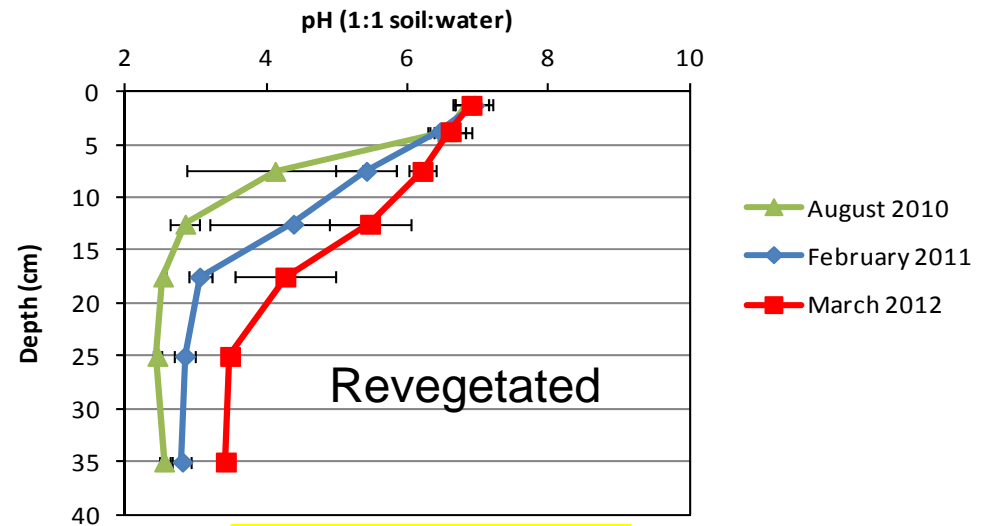
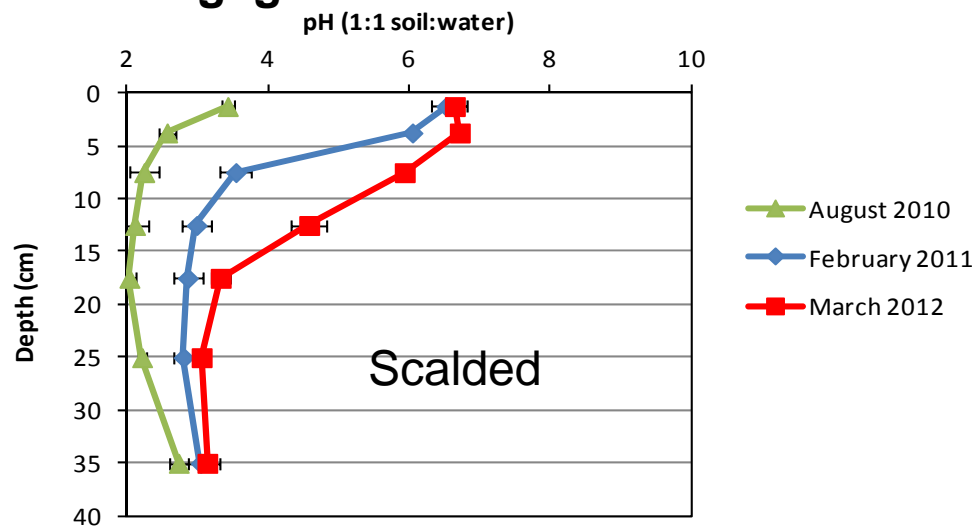
# Ecosystem impacts



- A good number and diversity of taxa was found in the top 2 cm of sediment at all sites sampled (< diversity at Currency)
- Very few animals were found below 5 cm at any of the sites (sediment oxygen low?)
- Deformity rates in chironomids were low (4-5%), although the deformities of more major structures in the chironomids collected from Currency Creek, in comparison with the reference site (may suggest sub-lethal impacts to biota at this site)
- Further work planned with CSIRO (TRIAD approach)

# Bioremediation

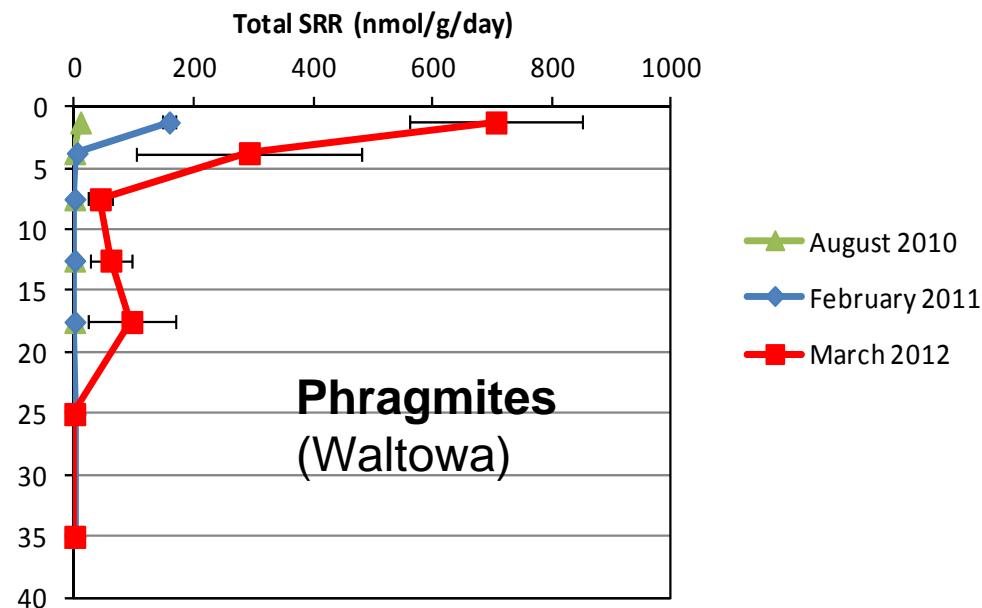
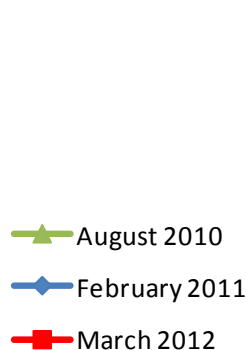
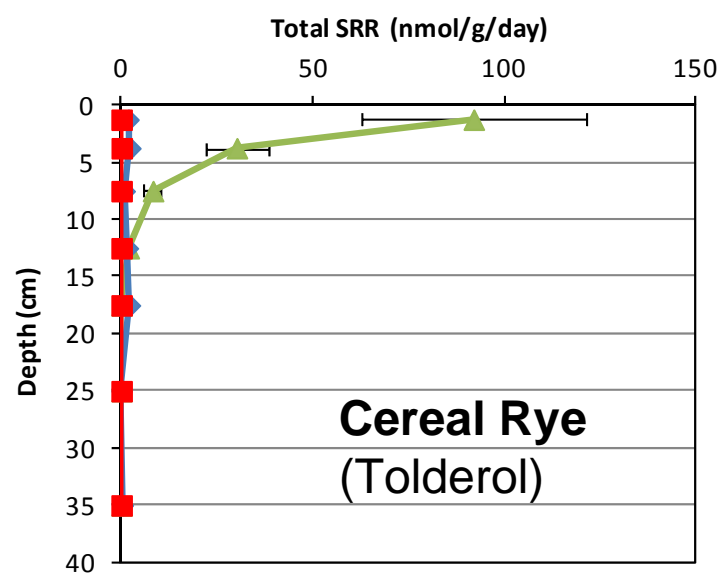
- **Bioremediation of the exposed acidified lake sediments resulted in higher initial pH levels and lower acidities in the surficial lake sediments. Differences in pH b/w treatments at most sites are now negligible**



Source: Southern Cross University

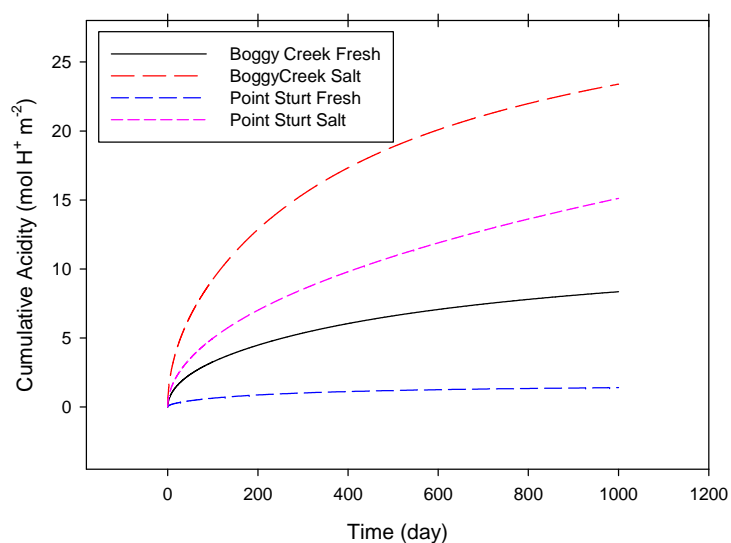
# Bioremediation

- In most bioremediated sites there is now minor or negligible sulfate reduction occurring.
- However, under *Phragmites* the rates of sulfate reduction have been enhanced further since Feb. 2011
- Pyrite accumulating at *Phragmites* sites (new hazard)



# Ground: surface water interactions

- EPA/DEWNR monitoring of surface and ground water above previously acidified areas
- Measurements of pore water chemistry and diffusion calculations (long term diffusion/reacidification risk indicated)
- Benthic flux chambers— directly capture acid flux to surface water (assess acidification risk under low flow)





A decorative graphic in the top left corner consisting of several parallel, light blue diagonal lines.

# Thank you

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## Acknowledgements

- Dr Liz Barnett, Ann-Marie Jolley (DEWNR)
- Prof Leigh Sullivan (Southern Cross University)
- Warren Hicks, Dr Paul Shand, Dr Rob Fitzpatrick, Nathan Creeper (CSIRO)
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- Dr Chris Madden (Chris Madden and Associates)
- Dr John Cugley (John Cugley and Associates)
- Dr Freeman Cook (Freeman Cook and Associates)
- Local landholders who gave access to sampling sites

For more information see:

•[http://www.environment.sa.gov.au/Conservation/Rivers\\_wetlands/Coorong\\_Lower\\_Lakes\\_Murray\\_Mouth/The\\_environment/Acid\\_sulfate\\_soils/Research\\_projects](http://www.environment.sa.gov.au/Conservation/Rivers_wetlands/Coorong_Lower_Lakes_Murray_Mouth/The_environment/Acid_sulfate_soils/Research_projects)