Monitoring of acid sulfate soil environments in the Lower Lakes & adjacent tributaries

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Australian Government

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What are acid sulfate soils*

Soils and sediments that contain detectable sulfide minerals, principally pyrite (FeS_2) or monosulfides (FeS), or have been impacted by their oxidation products

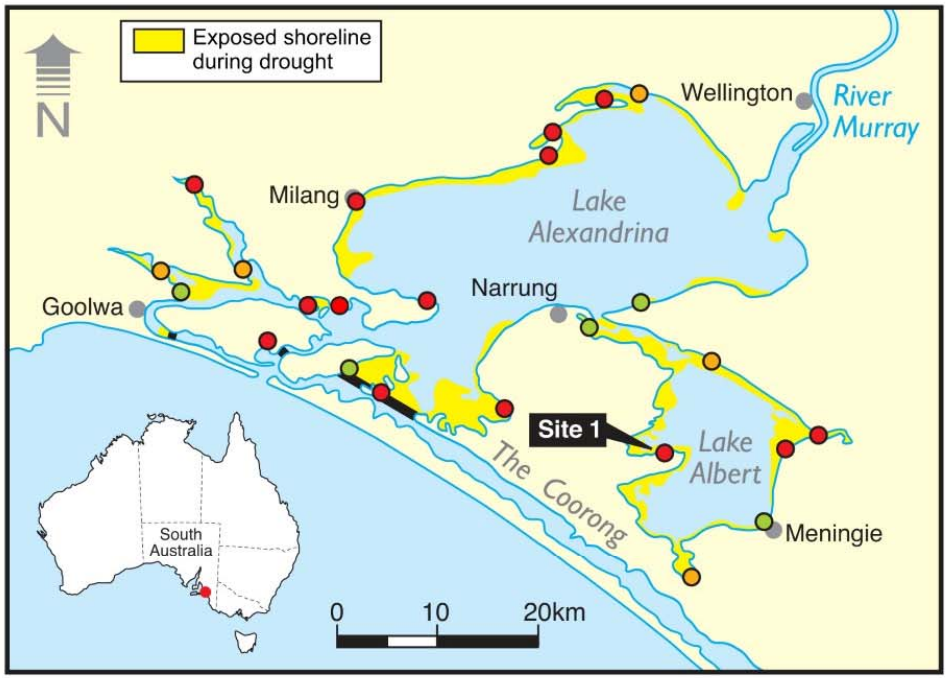
- **Sulfidic** soils are those that contain detectable sulfide
- **Hypersulfidic** soil is sulfidic soil material that is capable of severe acidification (pH < 4) as a result of oxidation of contained sulfides
- **Sulfuric** soil has a pH less than 4 as a result of oxidation of contained sulfides

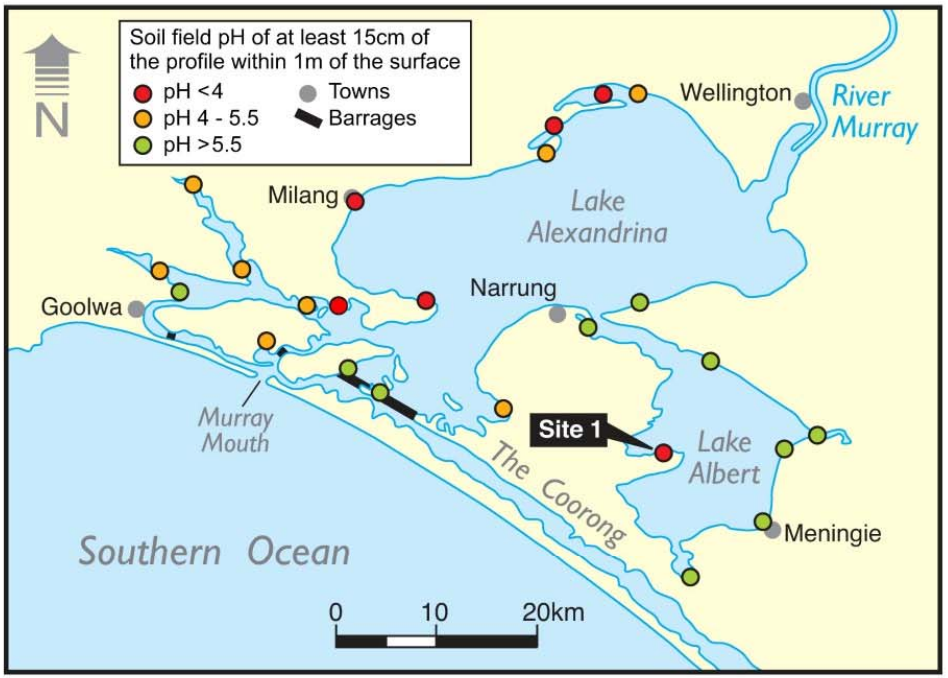
* Sullivan, L.A., Fitzpatrick, R.W., Bush, R.T., Burton, E.D., Shand, P. and Ward, N.J. 2009 Modifications to the classification of acid sulfate soil materials. Southern Cross GeoScience Technical Report No. 309.

Monitoring of ASS recovery

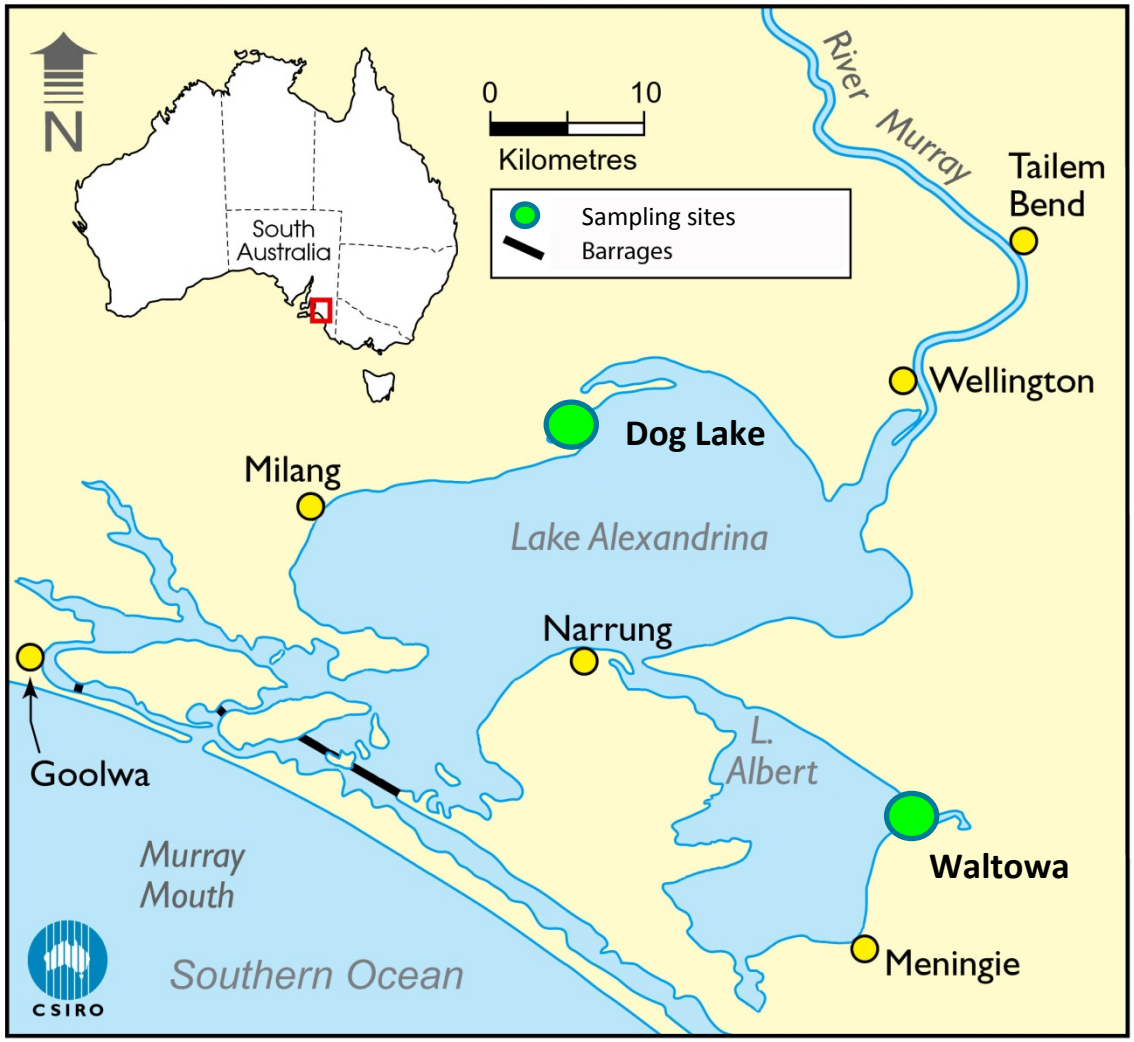
- 17 transects/study areas
- 34 study sites
- Soil profiles (≈ 1 m deep) collected at each site on 6 or more occasions between March 2008 and June 2012
- Over 1100 soil samples:
  - Described/classified
  - Peroxide pH
  - Incubation pH
  - Acid-base accounting

Drought, recovery and ASS neutralisation





ASS neutralisation



At the time of the most recent sampling, both sites had been inundated for approximately 21 months

Waltowa

Changed from Sulfuric (field pH < 4) to Hypersulfidic (field pH > 4) within five months of inundation

Profile dry for greater than 2 ½ years

Profile saturated to 21 months

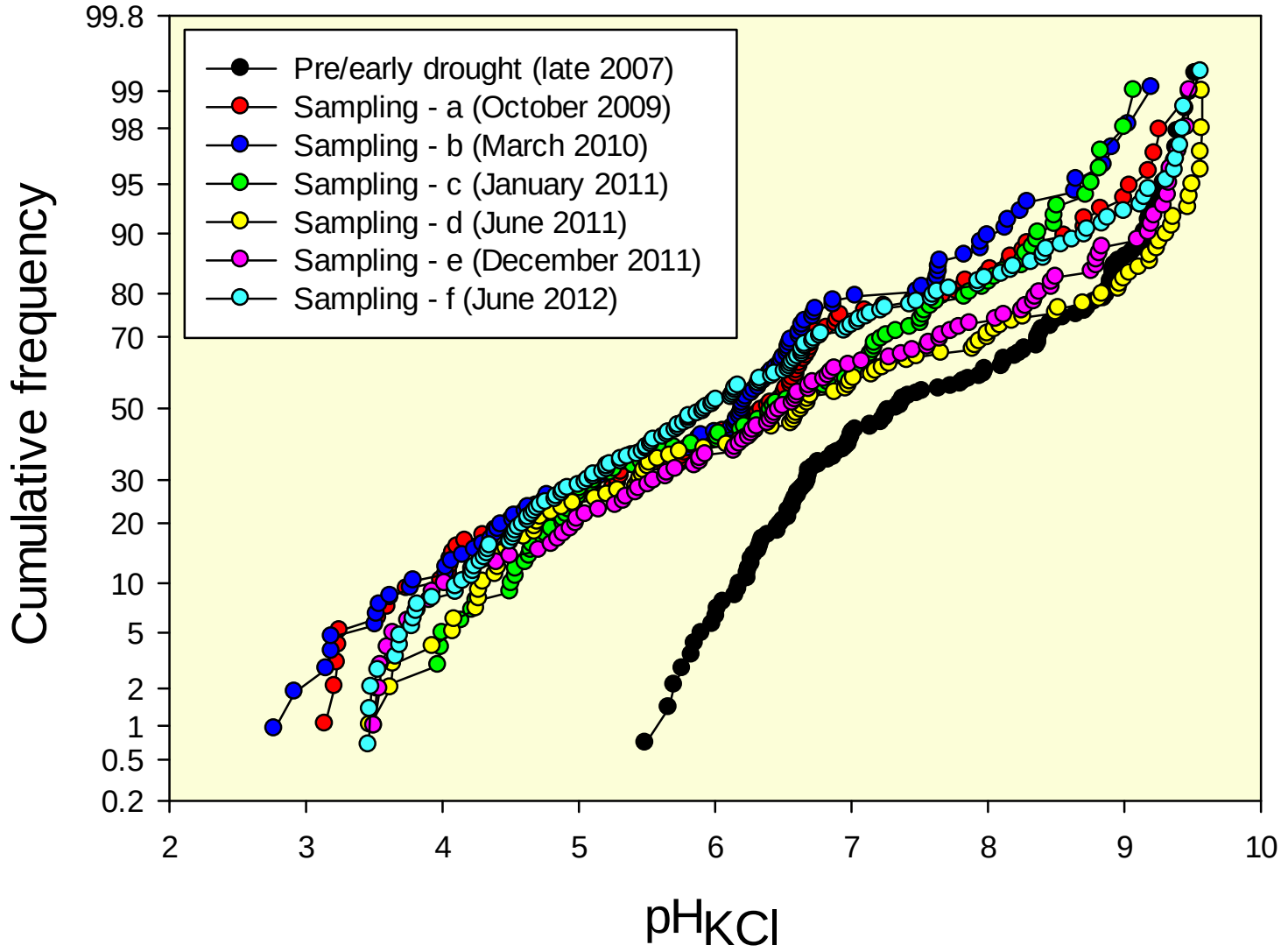
Dog Lake

Profile dry for greater than 2 ½ years

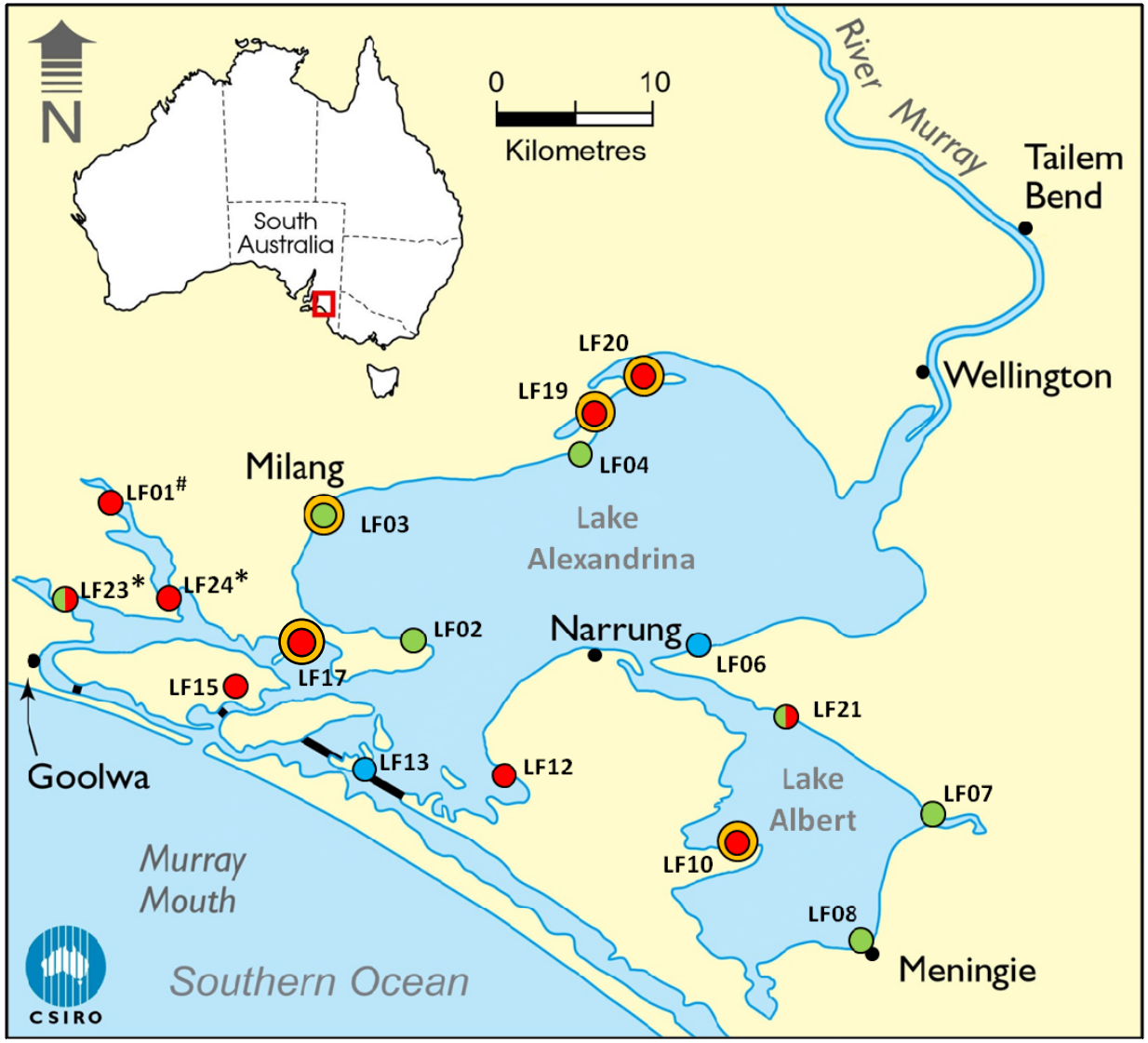
Profile saturated to 21 months

Remained Sulfuric (field pH < 4) even after 21 months of inundation

Slow ASS neutralisation



ASS monitoring summary



Soil acidification hazard after reflooding (2010 to mid 2012)

- High
- Medium/High
- Medium
- Low/Medium
- Low

Presence of acidic soil

- Acidic soil (high acidification hazard)
- Acidic soil (medium acidification hazard)

Time inundated following drought (by June 2012)

#	=	36 months
*	=	30 months
No symbol	=	21 months

Conclusions

- Drying can cause sulfuric soil conditions to develop around the Lower Lakes
- Following inundation, the neutralisation rate of acidic soil material is highly variable:
  - at some sites sulfuric conditions prevailed for less than five months,
  - other sites have remained sulfuric for more than 21 months
- Not all acidic soils have been neutralised
- Soil pH levels in many areas have not returned to pre-drought levels
- Acidification hazard remains high in many parts of the lakes

Thank you

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