St Kilda monitoring results
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EPA involvement

Role

To provide scientific and technical support that will:

1. Generate the understanding to explain why samphire and mangrove and associated habitats were damaged

2. Identify risks & options to protect the env and support recovery
EPA involvement

How? Focus to date

1. Establish and sample piezometer network across Section 2 saltmarsh/ponds (record groundwater depth and chemistry over time (input for hydrogeological model; harm and risk measures)

2. Monitor wq of isolated pools and tidal creeks in the saltmarsh on receding tides throughout Section 2

3. Document presence of brine shrimp in the affected saltmarsh

4. Assess acidification risk from possible pyrite oxidation

5. Identify relevant data and knowledge gaps, and fill them

6. Data available on WaterConnect
Main findings to date

• Na and Cl dominate all waters (ponds, piezos, pools & creeks); most pH>7 but a few piezos in pH 6.6-6.9 range (acid risk low)

• SK1-9 shallow wells in the saltmarsh show little change in water quality from 26/11/20 to 22/12/20 (awaiting 20/1/21 lab data)
  o But results show a lowering of groundwater across saltmarsh from Dec to Jan (17-282 mm lower)(=Gabor)
  o Expect to see some reduction in salinity with Jan results
  o SK10 seaward of Pond 6 seepage channel had salinity >260 g/L in Dec = pond leakage (soils saturated in Jan)

• UoA piezo series in salt ponds shows at least a 50+mm lowering of groundwater from Dec to Jan
Main findings to date (cont)

- Isolated pools and tidal creeks in the saltmarsh with salinity \( \gg 50 \text{ g/L} \), despite regular tidal flushing of mangroves and samphire
  - All isolated pools 2-5x seawater (highest opp Pond 6 due ongoing leakage)
  - S end Pond 11 leaking into tidal creek (4x seawater, and presence of brine shrimp in Dec and Jan)

- Ponds 6-9 & 11 with salinity \( >340 \text{ g/L} \) (Dec), precipitating salt (white froth and deposits along each pond edge)
  - Shallow piezos (gypsum level) higher salinity than deeper piezos (below the clay) in each pond
New work and next steps

• New SK piezo series:
  o 2 added opp Pond 11 on 28/1/21
  o will add 2 opp to Pond 8 among dead saltmarsh and mangroves next, completing coverage across Section 2

• To assess acidification risk, just teamed UoA to sample and apply a new UoA sulfate isotope method to determine if the source of sulfate is from pyrite oxidation (ASS = unlikely) or gypsum dissolution (expected) in the ponds and saltmarsh

• Continue monthly g/w and wq program + weekly g/w depths

• Data analysis to support development of hydrogeological model, and describe changes in g/w depth (+ waterlogging risk) and wq quality patterns spatially and over time
New work and next steps (cont)

- Work with DEW/consultants to quantify the damage to samphire and mangroves (structural, possibly include chemistry and physiology measures; early warning indicators?)

- Install wq sondes in the Barker Inlet to assess if a hypersaline signature evident in the wider marine environment after 1 week deployment; repeat along mangrove trail and tidal creeks

- Sampling program will identify when depth to g/w drops below samphire root zone (= low waterlogging risk) and salinity <50g/L across saltmarsh = natural and reveg work likely to succeed
Thank you

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