



Tipping points in saltmarshes: The scramble for high land

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Thornbills, samphires & saltmarsh tipping points

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A assessment of potential threats to Samphire Thornbill habitat
in the northern Adelaide & Mt Lofty Ranges Natural Resources Management region

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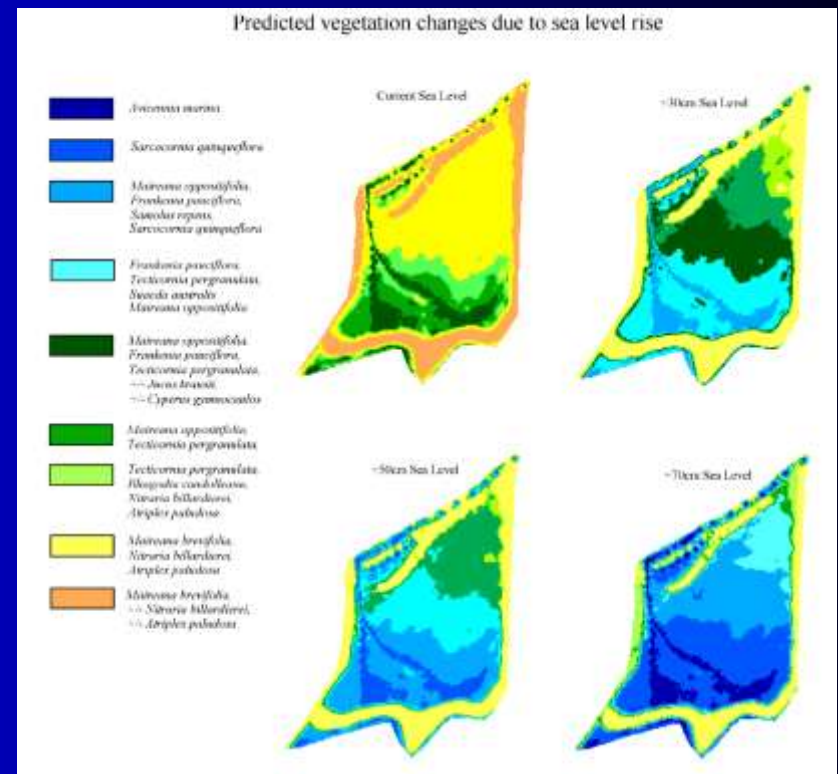
The assumptions:

- Sea level rise will affect all saltmarsh areas similarly
- Saltmarsh plants will simply move uphill, and we will have the same associations we have now, merely at a higher elevation

...confounded

Table 4 - Inundation preferences of saltmarsh species

1990's species or association	Max % inundation, 1990s	Derived new % inundation regime
<i>Avicennia marina</i>	18.7	23.5
<i>Sarcocornia quinqueflora</i>	18.7	23.5
<i>Tecticornia arbuscula</i>	17.3	21.9
<i>Suaeda australis</i>	7.8	10.7
<i>Wilsonia humilis</i>	7.8	10.7
<i>T. halocnemoides</i>	7.51	10.4
<i>T. indica</i>	7	9.3
<i>Samolus repens</i>	4.7	6.9
<i>Hemichroa pentandra</i>	4.4	6.4
<i>Maireana oppositifolia</i>	2.2	3.5



Is there ANY way to predict?

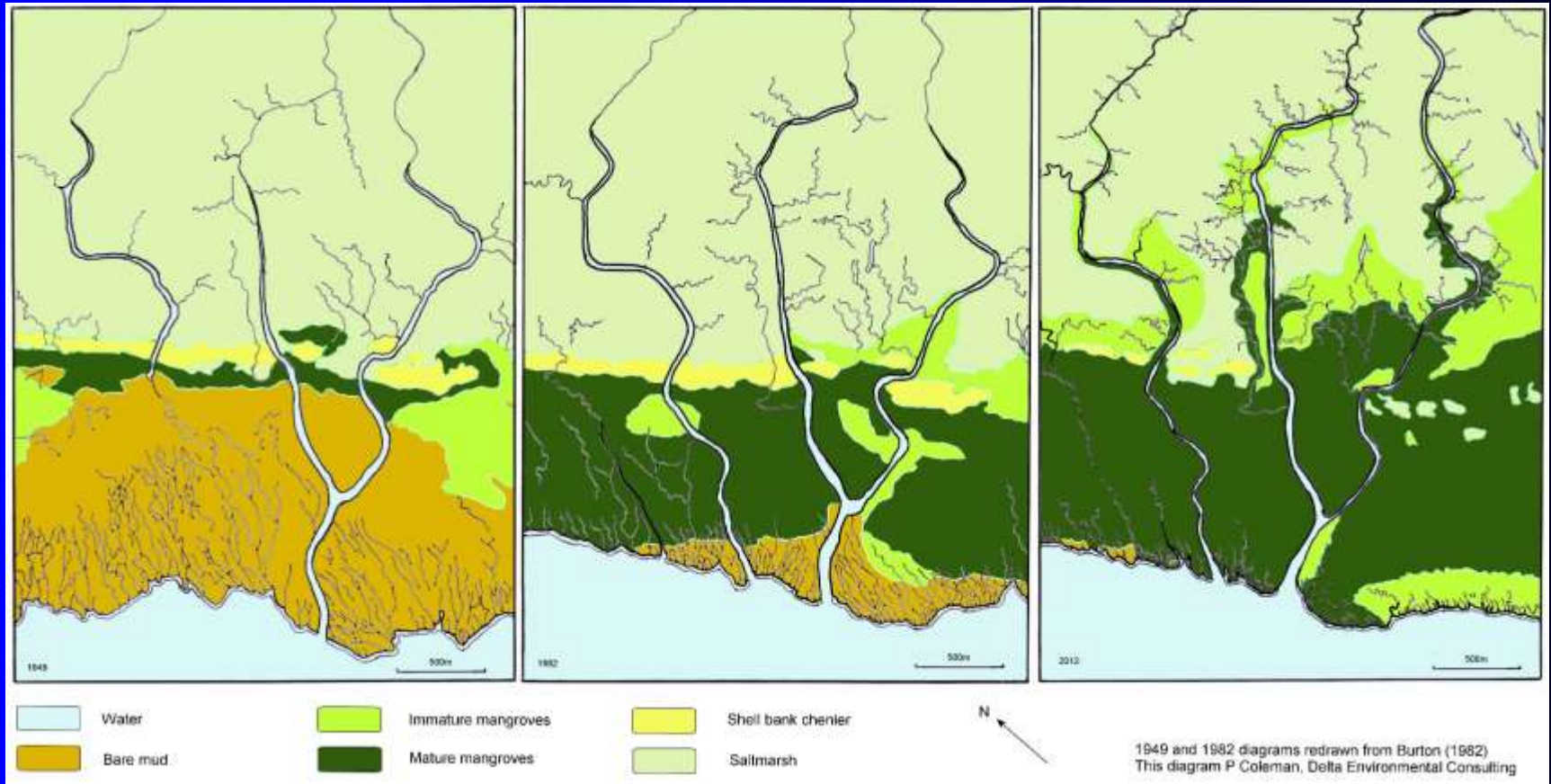
- We know quite a lot about why plant species live where they live (their ecological preferences)
- We know a fair bit about many species' adaptations to the habitat they occur in
- We know a lot about their reproductive strategies
- We have not really put this together to address HOW individual species may adapt to a CHANGE in the habitat niche they occupy

Avicennia marina, white mangrove

- Sediment accumulation
- Root mass expansion
- Young trees' plastic response to inundation regimes
- Cable roots & pneumatophores uphill
- Root allelopathy
- "Live" young



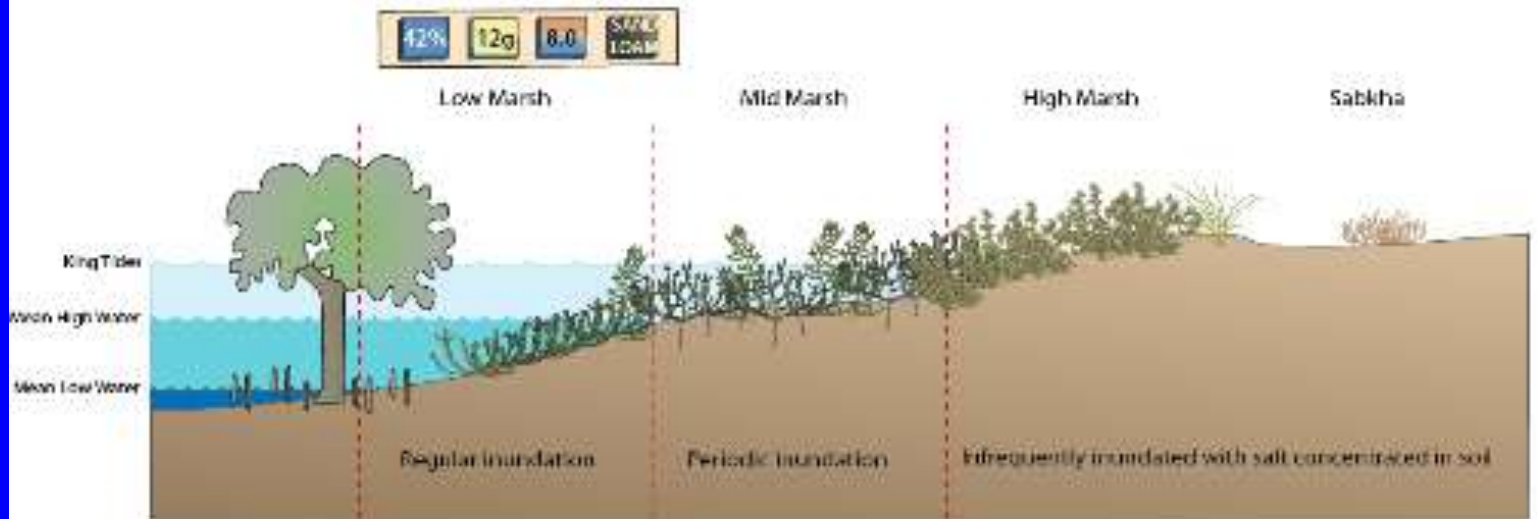
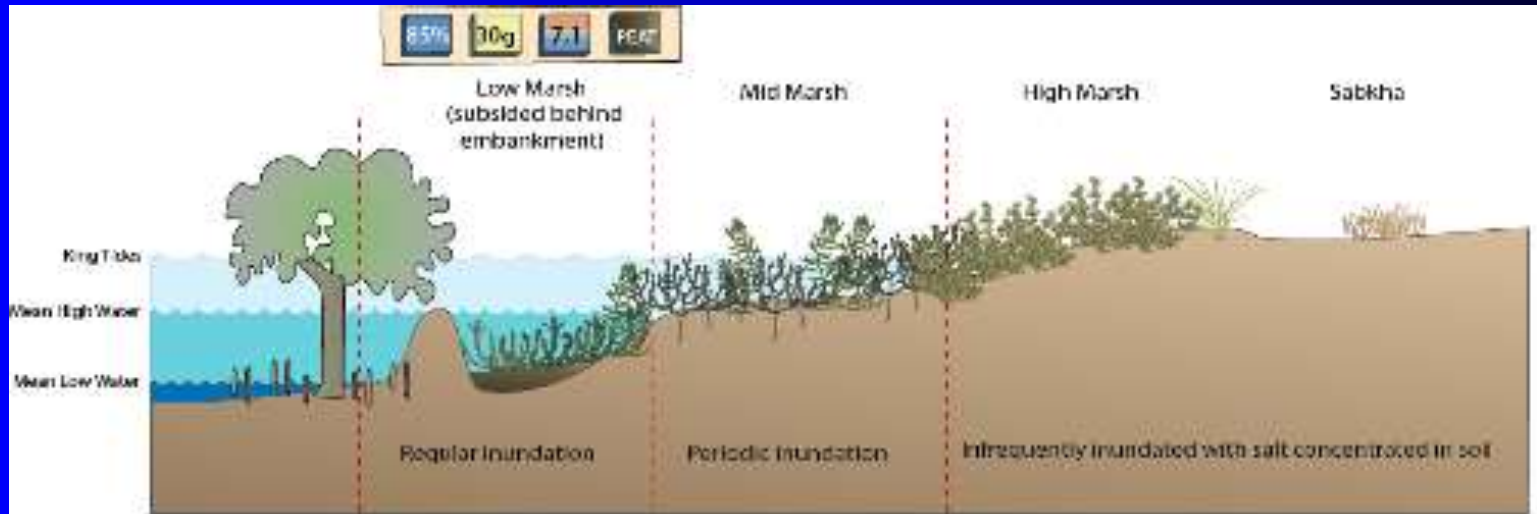
Is Avicennia's approach successful?



Sarcocornia quinqueflora – bearded glasswort

- Both sexual and clonal reproduction
- Can send resources from less impacted zones to impacted parts





Tecticornia halocnemoides – grey samphire

- Species is resilient
- Individuals are tolerant of changeable conditions
- Form of plant is dense and low, creating a dense canopy
- Copious seed production
- Wind assisted seed distribution



Tecticornia arbuscula – shrubby samphire

- Large, long lived species
- Low seed production
- Seed retained in flesh of branches
- Seed distributed within broken bits of branch during winter high tides
- Intolerant of hypersalinity
- Can grow in other, low salinity, habitats if it has a chance to establish



Final thoughts

- Our saltmarshes are showing the signs of having reached a “tipping point” with sudden changes in the abundance of some species already being recorded
- Flow-on effects are likely – the magnitude of impacts on the endangered Samphire Thornbill is not yet known, for example
- There are likely to be unpredictable adaptation outcomes saltmarshes as a result of SLR
- Understandings around adaptation at the species level need to be developed if we are to have any predictive ability at all

Thank you!

For MANY more details of shrubby samphire loss, samphire thornbill distribution & ecology, and recommendations for management actions to maintain or improve the habitat values of samphire communities under threat, please visit:

<http://www.naturalresources.sa.gov.au/adelaidemtloftyranges/coast-and-marine/coast-and-marine-ecosystems/samphire-coast-icon-project>

Look for “Thornbills, samphires and saltmarsh tipping points 2017 report”