The biodiversity value of 'improved' and 'unimproved' saline agricultural land and adjacent remnant vegetation in South Australia

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Introduction Since European settlement of the Upper South-east of South Australia, the distribution and abundance of much of the native flora and fauna of the region has been affected by clearing of native vegetation and drainage of wetlands to facilitate agricultural production. Only 8.3% of the original vegetation and less than 7% of the original swamps now remain in the region and much of what is left exists as small isolated remnants (Croft & Carpenter, 1996). Furthermore, as a consequence of the demise of large areas of agriculturally productive lucerne in the late 1970's and early 1980's, the rise of saline groundwater has resulted in the deterioration of some of this remnant vegetation. A key question being addressed in a major research project into the productive use of saline farming land is "How do saltland pastures influence ecosystem function?". This paper reports some preliminary observations from this assessment.

Materials and methods Landscape functional analysis (LFA), as described by Tongway & Hindley (1995), was used to determine how ecosystem resources such as water, soil, organic matter and nutrients are being retained, utilised and cycled in time and space. It uses 10 measures of soil surface condition to derive indices of water infiltration, soil surface stability and nutrient cycling. Comparisons were made between approximately 100 ha of remnant vegetation (subset of a 400-ha area), a salt scald and three pasture types on approximately 30 ha of grazing land that was cleared of native vegetation in the early 1950s, sown to lucerne for 30 years and more recently established to a mixed pasture of puccinellia (*Puccinellia ciliata*), tall wheat grass (*Agropyron elongatum*), and balansa clover (*Trifolium michelianum*). Since being established to these improved pastures, areas have either reverted to an 'unimproved' sward of predominantly sea barley grass (*Hordeum marinum*), samphire (*Halosarcia spp.*) and salt scalds (Pasture 1), been maintained as improved puccinellia-based pasture with up to 10% balansa clover (Pasture 2) or been further 'improved' to include up to 50% balansa clover with a strong base of puccinellia (Pasture 3).

Results The remnant vegetation provides a benchmark for the LFA indices in the study region. Clearly, the ability of the soil from the 3 improved pastures to withstand erosive forces and reform following disturbance (stability), to partition rainfall into soil-water available to plants and runoff water (infiltration) and recycle organic matter (nutrient cycling) was lower than the remnant vegetation, but significantly greater than the salt scald. The difference between the 3 pastures in LFA was not significantly different due to the similarity between botanical composition, soil type and condition. However, there was greater species diversity in the remnant vegetation, with 105 species from 76 genera noted in the remnant vegetation and only 13 species from the 3 cleared pastures.

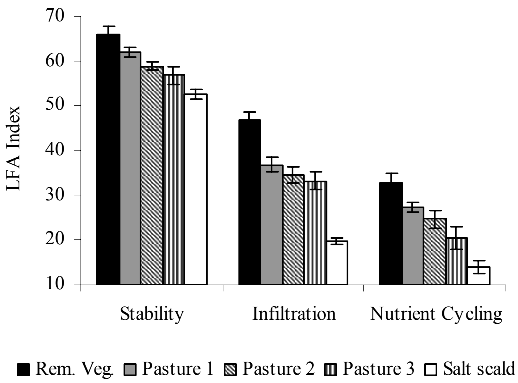

Figure 1 LFA indices for the 5 land types

Conclusions The 3 'improved' pastures, whilst not functioning at the same level as the remnant vegetation, were still significantly better than salt scalds. The critical issue is whether these systems are improving, degrading or remaining stable over time.

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References

Croft, T. & G. C. Carpenter (1996). The biological resources of the South East of South Australia. Native Vegetation Conservation Section, Department of Environment & Natural Resources, Adelaide, Australia.

Tongway, D. & N. Hindley (1995). Manual for the Assessment of Soil Condition of Tropical Grasslands, CSIRO Wildlife and Ecology, Canberra.