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THE ECOLOGY OF SALT LAKE HYDROPHYTES:
THE SYNECOLOGY OF SALINE ECOSYSTEMS AND THE AUTECOLOGY OF
THE GENUS *RUPPIA* L. IN THE SOUTH-EAST OF SOUTH AUSTRALIA

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SUMMARY

The nature and distribution of submerged and emergent macrophytes in relation to salinity, to the temporary or permanent nature of the aquatic habitats and to the tolerance of fluctuating environments was investigated in a series of saline ecosystems in the Coorong and Robe/Beachport areas of the south-east of South Australia. A synecological survey of the floral relationships in a range of saline habitats was followed by an autecological study of *Ruppia* L., a genus of submerged halophytes.

Only two genera of angiosperms occur above a salinity of 4 ‰ TDS: *Ruppia* is found in waters from 3 to 230 ‰ TDS and *Lepilaena* Drumm. ex Harvey from 3 to 50 ‰ TDS. Both occur in permanent and ephemeral habitats, in pure and mixed stands and in the understorey of emergent salt marsh communities.

The plant associations of a salt marsh, a saline lake and a fresh lake were compared by means of morphometric and vegetation maps and quadrat and biomass sampling. For the Lake Eliza Salt Marsh community twelve plant associations were delimited by species composition, and mapping of these associations shows that their distribution is related to small increases in elevation, which total 0.5 m height above the lake level over 500 m distance from the shore.

Annual and perennial growth forms of *Ruppia* were observed and the genetic or ecological bases of these growth form differences were examined further. A systematic survey indicated the presence of three species, two annuals, *Ruppia tuberosa* Davis and Tomlinson and *Ruppia polycarpa* Mason, and one perennial, *Ruppia megacarpa* Mason, none of which has previously been recognised in South Australia. Both annual species have asexual perennating organs (turions), structures that have not been recorded for this genus outside Australia.

Transplantation, germination and salinity experiments were used to examine the differences between annual and perennial growth forms. The wide salinity tolerance of all three species was confirmed. Under experimental conditions annual and perennial growth forms did not alter in alternate habitats. Decrease in salinity had a positive effect on the germination of the perennial *R. megacarpa* whereas increase in salinity and the wetting and drying of seeds broke the dormancy of the annual *R. tuberosa* seeds.

Explanations advanced to explain the ability of this species to withstand harsh and fluctuating environments were examined by analyses of life cycles, reproductive patterns and osmoregulatory mechanisms of the three species of *Ruppia*.