Toolibin Lake: Using ecophysiology and hydrology to redefine management goals
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Toolibin Lake: An introduction
Toolibin Lake is an ephemeral wetland dominated by Casuarina obesa and Melaleuca strobophylla woodland (a threatened ecological community).
One of the few of these wetlands remaining in the wheatbelt, Toolibin Lake is threatened by secondary salinisation.

This poster summarises some of the key developments in the management of Toolibin Lake.

Mid-1970s: Initial decline
The first signs of secondary salinity were observed on the lake bed, and planning commenced to address the impact of salinity.
Permanent vegetation monitoring plots were established in 1977.

The Toolibin Lake Recovery Plan established some key recovery criteria including:
• a depth to groundwater of greater than 1.5m
• successful tree and shrub regeneration to be established in all vegetation associations
• no further deterioration observed in the health of the vegetation.

1995: Diversion of saline flows
A surface water diversion structure was completed to carry saline surface water around Toolibin Lake, to Taarblin Lake.
Inflowing water quality is monitored and separator gates allow suitable surface water to flow into the lake.

1997: Commencement of groundwater pumping
Groundwater pumping commenced, to lower the saline groundwater beneath the lake bed.

2009–2010: Recovery Plan review
A review of historical monitoring indicates:
• groundwater depth has largely been maintained below 1.5m over the majority of the lake bed since the commencement of groundwater pumping
• regeneration, however, has not been widespread across the lake bed, although mass regeneration has occurred in some sections (e.g. the area surrounding Pump 9)
• the majority of mature vegetation across the lake bed has shown a declining trend in condition, as although some areas have stabilised. Interestingly, M. strobophylla have generally declined more than C. obesa.

2009: Ecophysiological studies
(a) Sap flow meters and (b) soil moisture and salinity sensors and groundwater bores have all been used to collect detailed information on the interactions between vegetation, soil moisture, groundwater and salt.

Unsaturated zone modelling using parameters determined by the field studies will also be used to explore the future management of Toolibin Lake.

Implications for future management
The information gained from simulating varying climate and lake filling scenarios will assist in revising groundwater and surface water criteria. Quantitative information of this kind is vital for the successful management of Toolibin Lake and its biota.

2009: A better understanding of vegetation response
The Biorisk project, part of the Future Farm Industries Cooperative Research Centre, aims:
• to develop a more detailed understanding of the response of the lake bed vegetation to changes in water quantity and quality
• to ultimately define new recovery criteria for the future management of Toolibin Lake.

2010: Ecophysiological studies
Our data indicates that the two dominant wetland species have different rooting depths.
M. strobophylla is more likely to be exposed to saline groundwater within the root zone due to its deeper rooting depth.

Unsaturated zone modelling using parameters determined by the field studies will also be used to explore the future management of Toolibin Lake.

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