Lake Matilda

South Coast Wetland Monitoring Project **June 2008**

From the bird hide at Lake Matilda looking south east

Conclusion

Lake Matilda ranged between saline and highly saline. The lake's salinities are influenced by both highly saline groundwater which discharges at the margins of the lake and surface flow including surface runoff, sub surface flow and the northern creek line from the upper catchment which is affected by secondary salinisation. Nitrogen levels are usually high and phosphorus levels are occasionally high although the available form of phosphorus was always low. It is important to evaluate the success of the drainage program and monitor any ecological impacts.

Some knowledge gaps were identified during the investigation, monitoring and data analysis for this wetland which should be addressed to improve understanding of the water quality and biodiversity and to detect changes over time. The monitoring period was relatively short and some effects of previous and current land use change and management may not yet be evident. Macroinvertebrates would need to be identified to family or species level to allow more detailed analysis of ecological condition and relationship to other wetland characteristics. The hydrology of the wetland and its catchment is not fully understood or monitored, particularly the interaction between groundwater and surface water. A future monitoring program should be developed to address these issues.

Acknowledgements

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- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Lake Matilda.
- Ania Lorenz, Sherrie Randall, Kevin Hopkinson, and Albany Department of Water team who conducted the monitoring.
- Kevin Hopkinson, Naomi Arrowsmith, Andrew Maughan and others for their support and editing assistance.
- Sherrie Randall and Tracy Calvert for data analysis and report compilation.

Sweeping for macroinvertebrates

Washing macroinvertebrates into tray for identification

For further information please contact Tracy Calvert at the Department of Water Albany (08) 9842 5760.

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This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Lake Matilda based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring Program.

Accompanying this document are appendices which provide more detailed information about the wetland monitoring program, terminology of wetland classification, parameters monitored, methodology and the ANZECC&ARMCANZ guidelines used in this report.

Funding for this program has been provided through the South Coast Natural Resource Management Inc. - supported by the Australian Government and the Government of Western Australia.

About Lake Matilda

Lake Matilda is located approximately 24km south of Mount Barker Western Australia within the Oyster Harbour Catchment and the sub-catchment of the Kalgan River. The wetland is at approximately 255m AHD (Australian Height Datum) and the area receives an annual average rainfall of 520mm.

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Unicup Suite	552365	6189931	50

Lake Matilda is located on the edge of Crown Reserve land and privately owned land within a catchment of approximately 12.15km^2 in the Shire of Plantagenet. The wetland lies within a partially fenced wetland vegetation buffer zone that ranges between 10-60m from the wetland edge (including surrounding terrestrial vegetation). Stock have access to the wetland on the farmland to the east and south side of the lake.

Vegetation in the upper storey consists of Yate trees, *Melaleuca cuticularis* (Saltwater paperbark) and Jam Trees (Bush Tucker) with Samphires (Salt Bush) in the under storey. There are a number of dead trees in the wetland with some regeneration occurring around the margins. A bird hide is situated on the edge of the lake.

Lake Matilda

Bird hide on the edge Lake Matilda with riparian vegetation in the background

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Approximately 70% of the catchment has been cleared of native vegetation for cropping. When full the wetland was used for waterskiing and is popular for other recreational activities including bird watching.

Water quality monitoring commenced in November 1999 which included physical, chemical and biological parameters as outlined in the appendices.

Wetland Classification

Lake Matilda is located in the tertiary sediments and was formed due to land subsidence and wind driven lunette (crater like) formation. Since groundwater rise in the catchment, the lake's salinities and maximum water levels have increased. Highly saline groundwater now discharges at the margins of the lake contributing to high lake salinities.

In response to increased flooding of the wetland a spillway and culvert structure has been established to allow occasional flooding but provide some drainage.

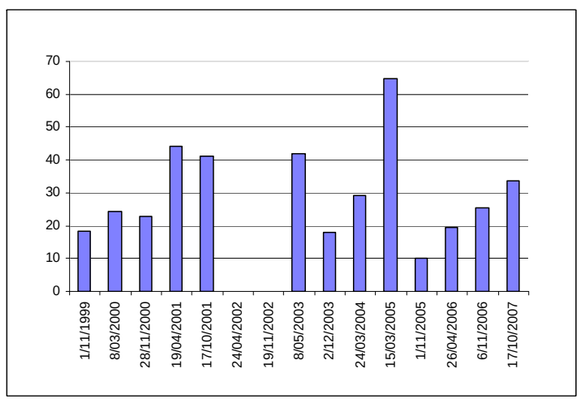
Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Hyposaline - Mesosaline	Poikilohaline	Mesoscale 730 x 700	Round

Classification of Lake Matilda has been evaluated on the basis of guidelines developed by V & C Semeniuk Research Group. For further explanation please refer to the appendices.

Salinity

Salinity over the sample period ranged between saline (10.07mS/cm) and highly saline (44.2/mScm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation.

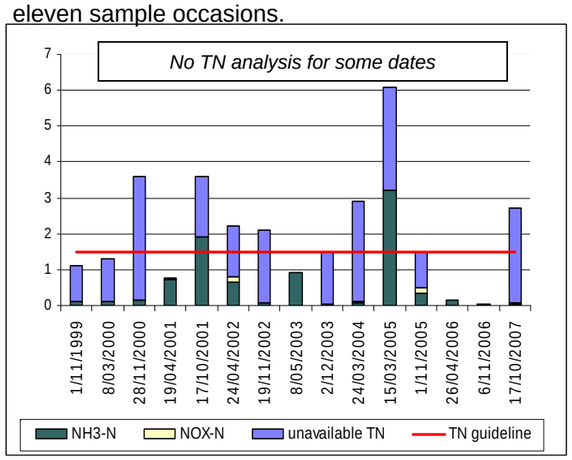
Lake Matilda receives flows from surface runoff, sub surface flow and via the creek line that drains secondary salinised land to the north west. During low rainfall events surface salts may wash into the lake increasing salinity while during high rainfall events the higher flows may dilute incoming water and reduce salinities.



Salinity (mS/cm) over sample period

Nutrients

Total Nitrogen (TN) concentrations ranged between 1.1-3.6mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on four of the eleven sample occasions.



Nitrogen fractions in mg/L over the sample period with TN guideline illustrated

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.031-3.2mg/L which exceeded the recommended guideline value of 0.04mg/L on seven of the eleven sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.1mg/L which did not exceed the recommended guideline value of 0.1mg/L on any sample occasion.

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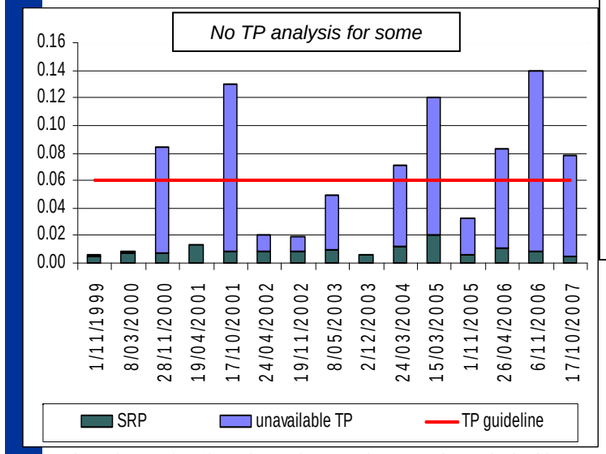
Total Phosphorus (TP) concentration ranged between 0.006-0.14mg/L which exceeded the water quality guideline of 0.06mg/L on seven of the fourteen sample occasions.



Phosphorus fractions in mg/L over the sample period with TP guideline illustrated

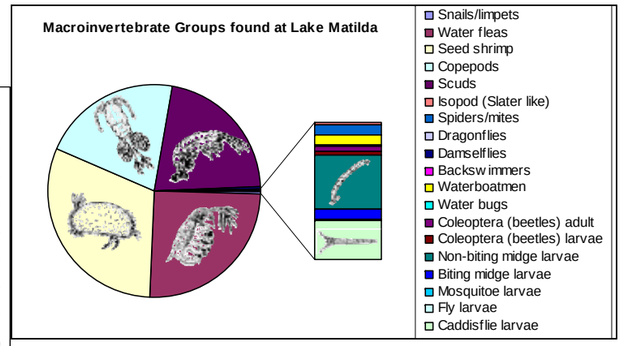
Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.005-0.02mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L.

Nutrients may enter Lake Matilda through surface runoff from surrounding agricultural lands, stock access and via groundwater. Low amounts available phosphorus may indicate some nutrients are readily taken up by plants or are bound to sediments.

Macroinvertebrates

Nineteen groups of macroinvertebrates were found at Lake Matilda during the monitoring period of which the most abundant included; Cladocera (water fleas), Ostracoda (seed shrimp), Copepoda (copepods), Amphipoda (scuds), Gastropoda (snails/limpets), Zygoptera (damselflies), and Notonectidae (backswimmers).

Other groups of less abundance were found including; Isopoda (slater like), Acarina (spiders/mites), Epiproctophora (dragonflies), Corixidae (waterboatmen), Hemiptera (water bugs), Coleoptera (beetles) adult, Coleoptera (beetles) larvae, Chironomidae (non-biting midge larvae), Ceratopogonidae (biting midge larvae), Culicidae (mosquitoe larvae), Other Diptera (fly larvae) and Trichoptera (caddisflie larvae).



The diversity of macroinvertebrates found over the sample period ranged between four to nineteen groups with a median of nine which rates as average based on the Ribbons of Blue Wetland Habitat Score.

Each group of Macroinvertebrate play a different role in the food chain, some feed on organic material (Shredders), others feed on fine organic particles (Collectors/filter feeders), others graze on algae (Scrapers), some feed on each other (Predators), others are parasitic (Parasites) and some are Macrophyte piercers that feed off living plants and algae fluids. These groups are called Functional Feeding Groups (FFG). Some Macroinvertebrates fit into more than one of these groups, for example the Water Boatman is a Predator, a Scraper and a Macrophyte piercer.

A healthy wetland should have a representative of each functional feeding group. A loss or dominance in a particular group may indicate a change in ecology of the wetland. The composition of these groups at Lake Matilda are displayed in the below graph.