Kalmerndyip Lake

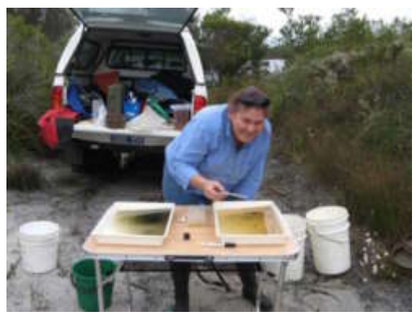
South Coast Wetland Monitoring Project **June 2008**

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 Kalmerndyip Lake displayed in the below graph. There appears to be a high number of collectors / filter feeders which could relate to high amount of suspended decomposing fine particulate organic matter in the wetland.

Conclusion

Kalmerndyip Lake receives both groundwater and surface water including inflow from the western creek line from the upper catchment which is affected by secondary salinisation. Salinity in the lake ranged between highly saline and brine. Although the wetland-groundwater relationship requires further investigation, it is likely that Kalmerndyip Lake is a groundwater discharge lake. Nutrients in the wetland were high on some occasions which corresponded with low water levels in. The main issues to consider are the wetland-groundwater relationship, groundwater salinity and rate of rise and changing effects on the wetland ecology.

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.



Macroinvertebrate identification

A future monitoring program should be developed to address these issues.

Dead stands of trees in the lake due to increased inundation in 1993

Acknowledgements

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- Ron and Judy Thomas for their support of the project and allowing access to the lake through their property.
- Ruhi Ferdowsian (Department of Agriculture and Food, Albany) for providing knowledge of the hydrogeology associated with Kalmerndyip Lake.
- 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.

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

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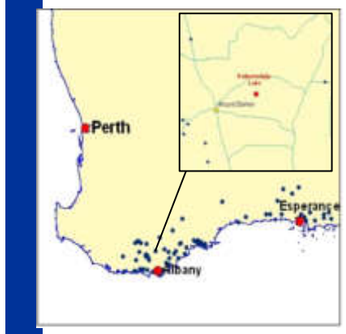
This report card summarises the Department of Water's current state of knowledge of the physical, chemical and biological characteristics of Kalmerndyip Lake based on the knowledge gained from investigation and monitoring conducted by the Department of Water through the South Coast Wetland Monitoring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

Accompanying this document are appendices that 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 Kalmerndyip Lake



Kalmerndyip Lake is located approximately 50km north of Albany in Western Australia within the Oyster Harbour catchment and the sub-catchment of Kalgan River. The wetland is at approximately 185m AHD (Australian Height Datum) and the area receives an annual average rainfall of 560-600mm.

	GPS Location Coordinates		
Wetland Suite	*Easting*	*Northing*	*MGA Zone*
Pallinup Suite	574608	6172617	50

Kalmerndyip Lake is located on Crown Land within a catchment of approximately 51km^2. The swamp lies within a fenced wetland vegetation buffer zone extending approximately 40-200m from the wetland edge.

Vegetation consists predominantly of *Eucalyptus occidentalis (Yates)* in the upper storey with *Melaleuca cuticularis* (saltwater paperbark) in the mid storey and Samphire and *Gahnia trifida* in the understorey. There are a number of dead trees in the wetland that died as a result of increased or prolonged inundation following the floods in1993.

Kalmerndyip Lake

Riparian vegetation at sample site

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Kalmerndyip Lake

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Approximately 65% of the catchment has been cleared of native vegetation for cropping and now tree plantations.

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

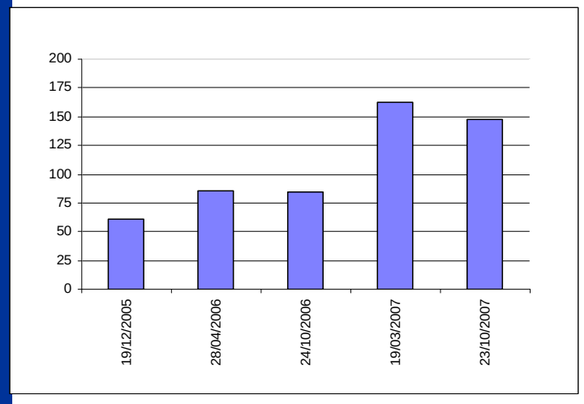
Wetland Classification

Wetland type	*Water Salinity*	*Consistency of Salinity*	*Size (Metres)*	*Shape*
Lake	Mesosaline - Hypersaline	Poikilohaline	Macroscale 1550 x 925	Ovoid

Classification of Kalmerndyip Lake 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 highly saline (61mS/cm) and brine (162.3mS/cm). Fluctuations in salinities relate to seasonal fluctuations in rainfall, evaporation and hence water level variation. Brine conditions related to very low water levels in 2007.



Salinity (mS/cm) over sample period

Low water levels in 2007

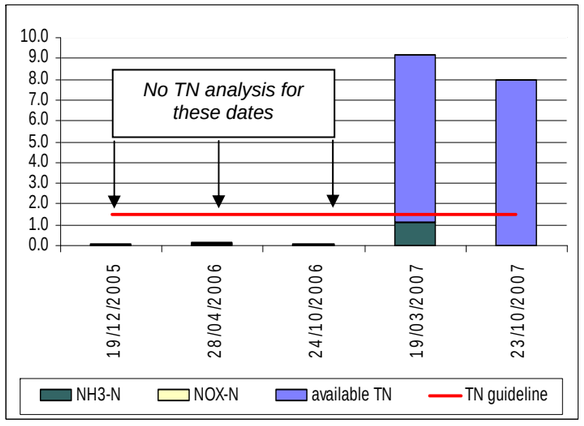
Kalmerndyip Lake was formed due to land subsiding and wind driven lunette (crater like) formation. Fluctuations in salinities relate to seasonal fluctuations in rainfall which in turn determines the amount of surface runoff through the creek line which drains surface salts from secondary salinised land to the west. During low rainfall events surface salts may wash into the creek line increasing salinity while during high rainfall events the higher flows may dilute incoming water and reduce salinities.

Although further investigations are required to determine the wetland-groundwater relationship it could be inferred from drilling records of a nearby bore that there is connectivity and groundwater discharges into the lake. In a nearby bore at approximately 195m AHD, groundwater levels have been recorded at 2.4m below ground which is about 7m above the lake bed. The recorded demise of riparian vegetation in 1993 may relate to rising groundwater in the catchment and increased delivery of salts to the lake.

Nutrients

Total Nitrogen (TN) concentrations ranged between 8-9.2mg/L which exceeded the guidelines developed for ecosystem protection for southwest Australian wetlands for slightly disturbed systems of 1.5mg/L on both sample occasions.

Dissolved inorganic nitrogen fractions of ammonia (NH_3-N) ranged between 0.01-1.1mg/L which exceeded the recommended guideline value of 0.04mg/L on three of the five sample occasions. Total oxidised nitrogen (NOx-N) ranged between 0.01-0.022mg/L which did not exceed the recommended guideline value of 0.1mg/L on any



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

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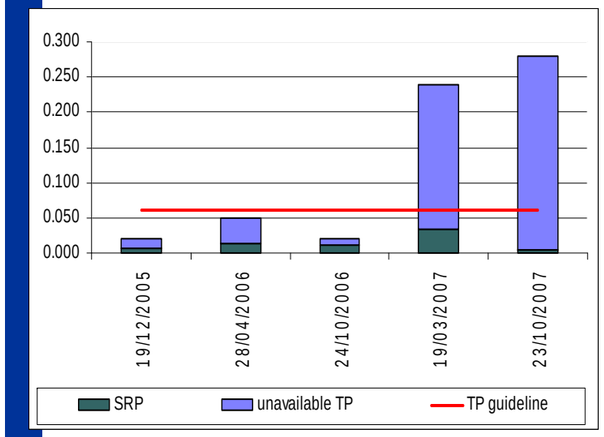
sample occasion.

Total Phosphorus (TP) concentration ranged between 0.02-0.28mg/L which exceeded the water quality guidelines of 0.06mg/L on two of the five sample occasions.

Soluble Reactive Phosphorus (SRP) (form of phosphorus available for uptake by plants) ranged between 0.007-0.03mg/L which did not exceed the recommended water quality guideline value of 0.03mg/L on any sample occasion.



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

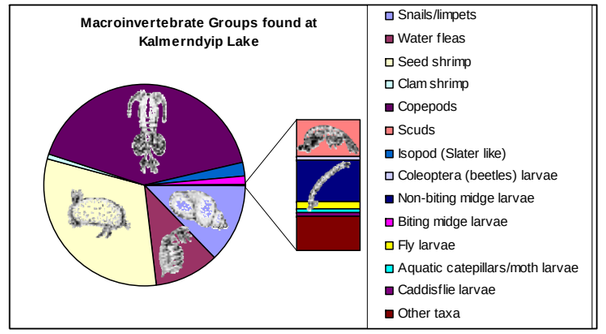
Nutrients are recycled naturally through the swamp due to uptake and assimilation of nutrients by plants and animals and through release of nutrients for example through microbial breakdown of organic material.

Catchment nutrient stores in the sediments may also enter Kalmerndyip Lake through surface and sub surface flow from the surrounding land, via drainage from land to the west and groundwater. In 2007 nutrients would have concentrated with low water levels in the lake.

Macroinvertebrates

Fourteen groups of macroinvertebrates were found at Kalmerndyip Lake during the monitoring period of which the most abundant included; Copepoda (copepods), Ostracoda (seed shrimp), Gastropoda (snails/limpets), Cladocera (water fleas), Isopoda (slater like), Ceratopogonidae (biting midge larvae), and Conchostraca (clam shrimp).

Other groups of less abundance were found including; Chironomidae (non-biting midge larvae), Amphipoda (scuds), Other Diptera (fly larvae), Lepidoptera (aquatic catepillars/moth larvae), Trichoptera (caddisflie larvae), Coleoptera (beetles) larvae and Other taxa.



The diversity of macroinvertebrates found over the sample period ranged between six to thirteen groups with a median of eight, 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.